

**NATIONAL MUSEUMS OF
SCOTLAND**

**SAQQARA PROJECT
REPORT
2000**

**NATIONAL MUSEUMS OF SCOTLAND
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SAQQARA PROJECT 2000

**Jon Dittmer, Salima Ikram, Anthony Leahy, Ian Mathieson
Campbell Parker and Mark Roughley**

An interim report on the work carried out during the 2000 season covering the use of the model 18 Geoscan Gradiometer equipment to test previous geophysical results and record archaeological features in the Gisir el-Mudir and L-shaped enclosure area.

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THE NATIONAL MUSEUMS OF SCOTLAND

PRELIMINARY REPORT OF THE SAQQARA SURVEY PROJECT 2000

By Jon Dittmer, Salima Ikram, Anthony Leahy, Ian Mathieson, Campbell Parker and Mark Roughley

The aims of the National Museums of Scotland Project have been:

- a) To produce an up-to-date archaeological and subsurface geophysical map of an interesting and relatively little studied area of Saqqara, the great necropolis of Memphis, the major city of Egypt from c.3000 BC to Hellenistic times. The area concerned comprises the Gisir el-Mudir ('the Great Enclosure') in the south, an area of the structures lying to the west of the mastabas of Ptahhotep, the area of the Serapeum and its dependencies, part of the Archaic necropolis, and the Sacred Animal Necropolis complex near the village of Abusir in the north (see plan of concession area).
- b) To adapt and combine a series of well-known geophysical techniques to the special problems of plotting large monuments, cemeteries, catacombs and natural features in desert conditions where unexcavated and previously excavated monuments are buried either under drift-sand or the dumps of former excavations. These techniques incorporate resistivity survey, electro-magnetic impulse profiling, ground conductivity, proton magnetometer survey, sonic profiling, field inspection, archival research and test-excavation (for descriptions see 1992/3 Report pp. 1-4).¹

The National Museums of Scotland acknowledge with gratitude the help and co-operation of the Supreme Council for Antiquities with whose permission the Museum's work is carried out; the Chairman Prof. Dr G A Gaballa, Mr Magdi abu el-Aala at the Secretariat, Dr Zahi Hawass at Giza, Mr Adel Hussein, Director of Saqqara, the Chief Inspectors Mr Khalid Mahmoud and Mr Sami Hoseini, Mr Hamdi Amin Said, the inspector attached to the mission. The October - December 2000 season has been undertaken with the generous financial support of grants from the Friends of the National Museums of Scotland, the Gerald Averay Wainwright Fund (Oxford University), and technical assistance in map reproduction by Survey and Development Services, Bo'ness, West Lothian. Professor Harry Smith is archaeological advisor.

The National Museums of Scotland field team comprised Ian J. Mathieson, field director, Jon Dittmer, geophysicist, Salima Ikram, faunal analyst, Anthony Leahy, Egyptologist, Campbell Parker, data recorder and Mark Roughley, archaeologist. The 2000 season opened on 3rd October and continued until 15th November.

Previous Fieldwork

During the 1990 season resistivity work was completed along the length of the concession area and four of the proposed cross-sections covering the large enclosure known as the Gisir el-Mudir were surveyed (fig. 1). In 1991 the complete concession area was field-walked and all visible surface indications of structures and old excavations were located for inclusion on the base maps. Work was completed in 1992 on the observation of the resistivity data covering the southern two-thirds of the original concession area, from the northern access road to the Serapeum to the southern limit of the concession, which lies some 100m south of the southern boundary of the Gisir el-Mudir². In 1993 sondage trenches were opened on anomalies in the southwest corner of the Gisir-el-Mudir to check the resistivity data plotted at these points. A mud-brick platform was discovered inside the enclosure at the SW corner and the construction of the enclosure walls was investigated (1993 Report, Map Sheet 1, A7 & A8). In the 1994 season sondage trenches were opened to confirm the geophysical findings on profiles taken over the North Wall (1994 Report, Map Sheet 1, GMNWXS2). The construction of the wall was found to extend to the North with a buttress formation on the North face. Several graves were

¹ See I. J. Mathieson et al., *JEA* 85 (1999), 21-43.

² See I. J. Mathieson and A. Tavares, *JEA* 79 (1993), 17-31.

found on the South side of the wall, one of which had a stela of the Persian period deposited in the sub-structure (Reports 1990 - 1994)³.

During 1995 further sondage trenches were opened (1995 Report, Map Sheet 1, A9-14), to inspect anomalies over the south-west corner of the monument where the inside corner was located and surveyed⁴. In 1996 electro-magnetic impulse equipment, kindly loaned by ERA Technology of Leatherhead, Surrey, was used for the first time in Saqqara. Many scanning profiles were taken over existing resistivity surveys and the results confirmed the previous findings and gave a much-enhanced interpretation of the sub-surface conditions (Report 1996). In 1997 conductivity surveys were carried out using the Geonics EM 31 covering half of the Gisir el-Mudir and a portion of the L-shaped structure (Report 1997). In 1998 the conductivity survey of the Gisir el-Mudir was completed and several auger holes were drilled to determine the elevation of the bedrock. Sondage excavations examined the structure of the East Wall (Report 1998). In 1999 we were fortunate to obtain the loan of Global Positioning Satellite equipment from The Natural Environment Research Council and surveyed all the main triangulation stations in the Saqqara area. We also found the position of the South Wall of the Gisir el-Mudir and located the south-east corner (Report 1999). The various excavation trenches from 1993 - 2000 are indicated on Fig. 2.

The Objectives of the 2000 season were:

1. To continue the electromagnetic survey of the Gisir el-Mudir and the L-Shaped enclosure area using the Geoscan Gradiometer instrument to measure the apparent influence of the surface material to a depth of approximately 3 metres.
2. To re-observe certain areas previously surveyed by other electronic means to obtain comparative results.
3. To test by small *sondage* trenches the results of the electronic surveys, which had indicated anomalies in the sub-surface materials.
4. To carry out a surface bone survey of faunal remains in the valley between Ka'Aper and the Sacred Animal Necropolis.
5. To plan and carry out a detailed survey of a tomb which had been opened by persons unknown at the edge of the NMS concession near the Sekhemkhet enclosure.

Fieldwork

Geoscan Gradiometer surveys. (Figs. 3, 4, & 5, Plate 1) geophysicist Jon Dittmer

The magnetic gradiometer is an instrument which enables the surveyor to measure the earth's magnetic field very accurately. The device is moved across the area being surveyed and readings are taken approximately every 25cm. This fine density of readings gives an accurate picture of the variations in the magnetic field. As two sensors are used, the instrument is very sensitive to local variations caused by shallow buried (up to 4 - 5 metres) archaeological features. Features which contain concentrations of magnetic compounds (in particular iron) such as mud brick, ditches, kilns, hearths etc produce measurable anomalies. Therefore, archaeological sites which have such features are suitable for surveying with a magnetometer. Due to the diversity of features on the site, the NMS concession area is eminently suitable for this instrument.

³ See I.J.Mathieson et al. *A Stela of the Persian period from Saqqara*. JEA 81 (1995), 23-41.

⁴ See I.J.Mathieson et al. *The National Museums of Scotland Saqqara Survey Project 1993-1995*. JEA 83 (1997)

The L-Shaped enclosure (Figs. 3,4,& 5, Plate 1)

A model 18 Geoscan gradiometer was hired to give comparison results over areas surveyed by resistivity, conductivity and Ground Penetrating Radar(GPR) and to extend our coverage of the concession in a northerly direction from the main base of the Gisir el-Mudir. The results obtained over the limestone walls of the Gisir el-Mudir were inconclusive with better data coming from resistivity and GPR surveys. However when the instrument was used over areas of aeolian sand covering probable mudbrick structures the resulting data gave clear indications of walls and occupational debris.

A total of 78 30m grid squares were observed giving 312,000 data points. We were able to trace the outline of walls buried up to three metres below the surface and the computer enhanced results are shown on Fig. 4 & Plate 1. These plots clearly indicate that structures are present under the sand cover. What these structures represent and any possible date information will have to wait until the results have been checked by sondage. This will enable us to find out if it is the material composition of the mudbrick, the thickness of the structure or the difference in magnetic properties between the aeolian sands and the mudbrick that gives us such a distinctive signature.

From our work this year it looks as if we have found the answer to delineating the many structures of mudbrick which lie in the Serapeum and in the valley leading down to the old lake of Abusir and also the lines of mastabas forming the edges of the SAN.

Gisir el-Mudir East Wall (Figs. 6, 7 & 8 Plates 2, 3 & 4) Site supervisor Mark Roughley.

The objective of the 2000 excavation season was to concentrate on the investigation of anomalies in the sub-surface materials revealed by electromagnetic survey in an area on the east face of the East wall, relatively close to the south-east corner of the Gisir enclosure.

Surface deposits were removed in a portion of the area to be investigated (B480+00, B485+00). Immediately below the surface part of a rectilinear area of fine Aeolian sand was exposed. This lay in a roughly north – south alignment and contrasted sharply with the rubble and mud fill predominant in the surrounding areas. A sondage trench was opened to investigate this feature and removal of the Aeolian sand indicated the existence of a vertically cut trench. The Aeolian sand was removed completely from the trench for a length of approximately five metres. This revealed the foundation and lower courses of the inner wall of the east face of the East wall along the west side of the trench. A hard and compact flat surface abutted the lowest course of stone. This surface was made of limestone chips in a mud matrix and appeared to extend eastwards under the rubble and mud fill through which the original trench had been dug. This face of the East wall was found standing to a height of between two and three courses, approximately 0.7m high, and its construction was of a poor quality, the limestone blocks were irregular and undressed and they were laid in a thick sand mortar. Some of the compact surface was removed in one area and uncovered the shallow foundation cut in the tafl bedrock. At the southern end of the trench the compact surface rose towards the surface in a series of 'steps' reflecting the rising height of the bedrock at this end of the monument. The surviving courses of the inner wall terminate here where they meet the bedrock surface (Fig. 6, Section 1). This trench was probably originally excavated in antiquity as part of activities associated with the widespread removal of stone from the enclosure.

The excavation was then extended eastwards to uncover the remains of the outer wall of the east face of this section of the East wall (A480+95 - +85, A485+95 - +80). A large area on the projected line of this face of the wall was exposed but except for a few poorly cut limestone blocks and the foundation cut in the bedrock, no standing remains were uncovered. This would suggest that the stone from this portion of the East wall had been comprehensively robbed in antiquity. In the process of searching for the remains of the east face of this section of the East wall a number of features were exposed and subsequently investigated (Fig. 7 Plan).

To the east of the cut for the wall, in area A490+85, a large deposit of limestone chippings was partially uncovered. This deposit probably relates to activities associated with the robbing of stone from the wall, in that the robbed limestone blocks were cut and prepared here before being transported to a new location.

A second feature lay just to the south of the robber trench. In this area a number of limestone 'slabs' lay close to the surface forming a platform in the lee of what appeared to be a straight man-made cut in an exposed outcrop of bedrock (context numbers 3060 & 3061). The 'slabs' lay close together, some of them neatly adjoining, and all rested on the same compact sand/mud matrix. The individual 'slabs' were of a thickness varying between c.3-14cm and formed a relatively even surface. Also, eroded limestone between some of the slabs would appear to indicate that the area was at one time more completely covered. This feature does not appear to be a random assemblage of stone but despite thorough investigation no conclusions in terms of date or original function could be determined.

A third feature was a massive limestone block cut in an 'T-shape', half of which protruded above the surface. Upon cleaning the area around the megalith the edges of two cuts appeared on opposite sides of the stone. Excavation on the northern side of the megalith was begun first and showed that both cuts were contiguous and formed one large pit completely exposing the mid-section of the limestone block. The cut had been made through multiple layers of collapsed or re-deposited wall fill, a hard and compact mix of sand and mud mortar and rubble. On the northern side of the megalith the cut bottomed out at a depth of 1.8 metres and on the southern side at a depth of around 2.5 metres before continuing down even further in a small area in the southernmost corner of the pit. This small area was not excavated but was probed and estimated to be over 0.5 metres deep. As we had no available means of supporting the 'T-shaped' megalith the excavation of this feature was halted at this point for reasons of safety.

The pit revealed that the western end of the 'T-shaped' megalith partially rested on another equally massive, dressed rectangular limestone block. This second massive block was only visible in the wall of the pit and so its exact shape and dimensions could not be fully determined. The exposed face of this block was vertical and the block was resting at an angle of approximately 45 degrees. This in turn lay on two fragments of a possible third large limestone block; the upper fragment was only partially revealed in the wall of the pit and the lower fragment lay out from the side of the pit in the base of the cut. The space this had left in the wall of the pit revealed a layer of mortar on the underside of the second megalith and some tool-marks on the sides of the cavity. At the southern side of the pit the corner of another large limestone block protruded from the wall of the pit; its shape suggested it was another rectangular block similar in size to the others discovered at the northern end of the pit.

Investigation of the anomalies revealed by the electromagnetic survey was then begun in the area to the north of the first sondage (B485+20 - +05, B490+40 - +15). Initially an erratic spread of large, irregular shaped limestone boulders was uncovered along the projected line of the outer face of the East wall. The excavation was then extended further north and revealed a large abutment or platform built against the outer face of the wall constructed of articulated limestone blocks in a thick sand mortar. A swift evaluation of the size of this structure showed that it is over 25 metres long and projects approximately 3 metres out from the face of the East wall. The southern face of this feature lies at approximately 60 degrees to the outer face of the East wall. Similarly, the limestone blocks of the lower courses of the southeast corner were cut at the same angle (Fig. 8 Plan & Elevation). A hard compact surface abutting the lowest course of limestone along the eastern face of the structure was also uncovered. This surface is comprised of limestone chips in a mud and sand matrix and extended eastwards on an incline of about 15-20 degrees for approximately 4 metres. This feature is a new development in terms of the enclosure walls construction as no similar structure has been found on any other section of the monument so far investigated.

A series of roughly built ramps lying at right angles to the east face of the structure were also found. These ramps were all of a relatively similar width and abutted the structure at fairly regular intervals. These ramps probably formed the means by which much of the good stone from the Gisir was removed from the wall in later periods (Fig. 8 Plan & Fig. 6 Sections 3 & 4). Close to the eastern face of the structure a large quantity of

limestone chippings was partially excavated. This feature is similar to the spread of chippings found 40 metres further south and probably represents the same activity.

We have to clear the collapsed blocks from the edge of the platform to find out where it joins back to the wall face then trace the wall northwards to the other end of the platform and by doing that we will be able to see if it is indeed the entrance. It looks like at least another two seasons work before we will know the answer to this difficult area.

Faunal Bone Survey in the SAN Valley (Fig. 9) surveyed by Salima Ikram

A faunal bone survey was carried out in the area between the Ka' Aper tomb and the SAN. The preliminary results indicate that the bones found consist mainly of young cattle with a few examples of sheep and goats. In the area northeast of the Serapeum and Ti's mastaba, and north of the SAN several scatters of very fragmentary animal bone lie on the desert's surface. Most of these deposits are associated with sandy-mounds which have a few pieces of pottery (silt) lying together with the bone. A very few of these assemblages are located in flat sandy -areas. The bones were extremely fragmentary and thus difficult to identify to species. However, bone density suggests that most of these fragments come from large mammals. Almost all identifiable fragments could be ascribed to cattle, *Bos taurus*, with a very few examples of sheep and goat (*Ovis aries*, *Capra hircus*) being recovered from the area near J. de Morgan's 'tombeau de boeufs'.

Fragments of almost all body parts of *B. taurus* were found (mandible, phalanges, ribs, vertebrae, long bones, patellae, carpals and tarsals), although a cursory examination yielded very few epiphyses. The most easily identifiable elements recovered were teeth, phalanges (first, second, and third), carpals/tarsals (surprisingly no astragali, although there were several fragmentary calcanei), and horn cores. Shattered shaft fragments of long bones were most commonly found. Some shaft fragments could be identified to tibiae, humeri, etc. of large mammals. A few epiphyses were found, including proximal metacarpals, and distal ends and fragments of humeri, femurs, and tibiae. Several vertebrae, ribs, and bits of scapulae and pelvises were recovered from the scatters. In the area just north of the 'tombeau de boeufs' fragmentary remains of long bones of medium mammals were found. In this area a few fragments of clearly identifiable ovicaprid bones were found: an unfused distal radius epiphysis (under three years), and an ulna proximal fragment with a fused olecranon (over two and a half years old).

The cattle remains that could indicate the age of the animal at death were few. However, those that were recovered showed a variety of ages, with a surprisingly high number of juvenile animals, as attested by the number of deciduous teeth present. Horn cores showed ages of infant to old adult. Fused limb bones indicated ages from just under one year to over four years. The teeth that were found were loose teeth, so it is only possible to provide estimates of age. These tended to be of younger animals, with the majority of teeth coming from animals under two years of age. This is surprising, as one would expect the animals, if sacred, to have survived to a great age. Presumably these bones are from disturbed burials; certainly there is no evidence that they might be of butchered animals. The vertebral fragments found did not include centrum bodies, so they could not be used as age indicators.

Unsurprisingly, most of the bones were weathered due to extended exposure to sand and the elements. Some bones were discoloured due to the soil in which they had been deposited, and portions of the articular surface of one calcaneum had turned bright blue.

It is quite possible that these bovid bones are related to the skeletons of different types of *Bos* that are mentioned in the *Catalogue Général, La Faune Momifiée* (C. Gaillard and G. Daressy, Cairo: IFAO, 1905). The volume lists several skeletons that were found in Saqqara and Abu Sir prior to 1902. These animals are not those of Apis -bulls as they were not found in the Serapeum, but might have been relatives (as was the Mother of Apis) of the bull, or indeed (perhaps more likely), another set of sacred cattle as they seem to be of a different type (in horns and general look, see p. 18 in the *Catalogue Général*) than the Apis bull, according to Gaillard and Daressy, the authors of the volume.

The Tomb of Ny-Ankh-Nesut (Fig. 10)

During late 1999 a previously unrecorded tomb was exposed at the foot of the north-west corner of the Sekhemkhet enclosure inside the NMS concession by persons unknown. The SCA office at Saqqara excavated the tomb to safeguard the structure and Mr Khalid, the Chief Inspector, asked the NMS mission to survey and record the inscriptions. The Plan of the tomb is shown on Fig.10 and the record of inscriptions and the translations will form a separate publication.

Conclusions

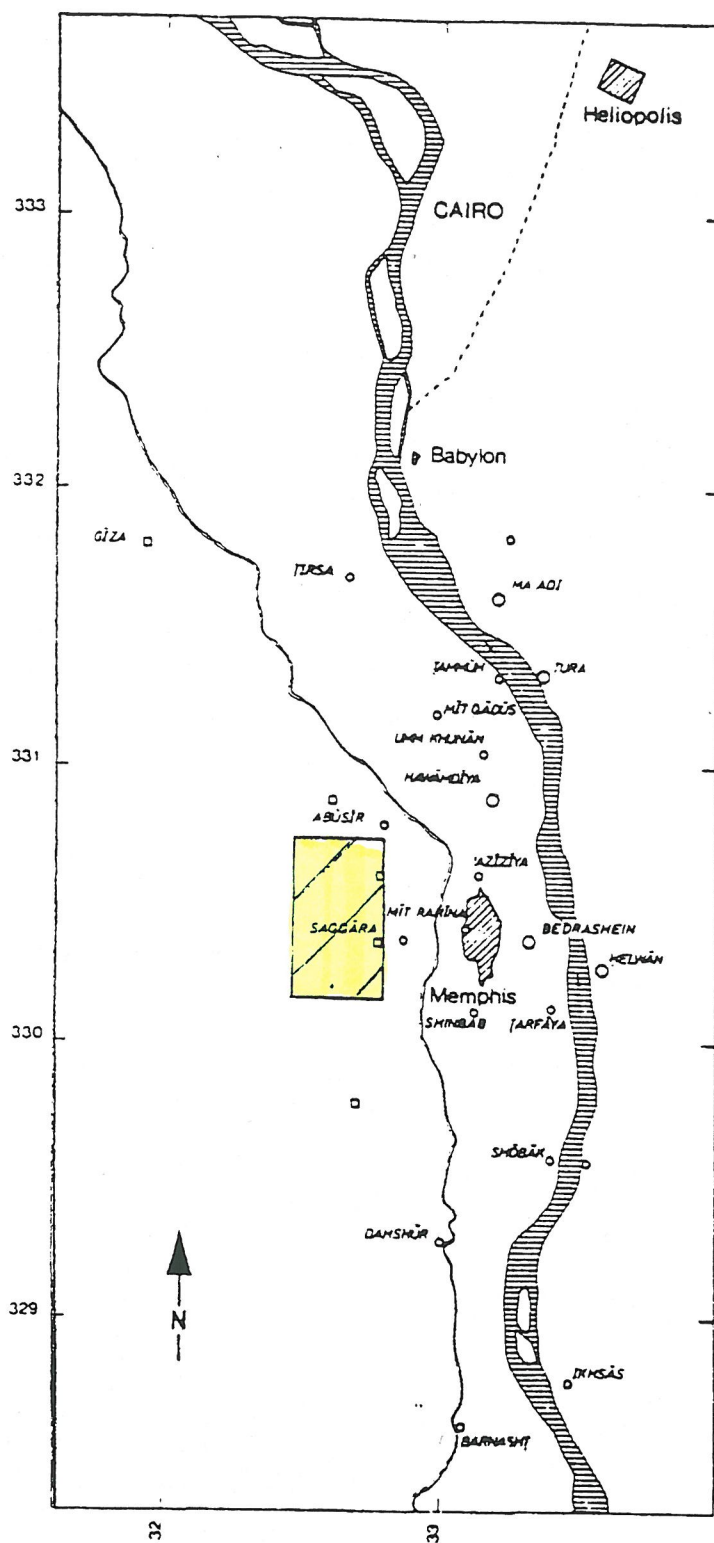
The small-scale trenches excavated to test the anomalies have provided good evidence of the accuracy of geophysical data and at the same time have enhanced the archaeological interpretation of the site and provided results which give strong indications of an early dynastic date for the Gisir el-Mudir.

The 2000 season revealed a number of unexpected features and it is our intention that further investigation of these features will be addressed in future excavation seasons. If one looks at the step pyramid enclosure and the mud brick enclosures at Abydos the articulated stone platform found on the East wall does fall in (more or less) the correct position for an entrance to the Gisir enclosure.

With the permission of the Supreme Council for Antiquities the NMS plan to continue the work through 2001 to 2005 and complete the geophysical survey of the concession with particular reference to the Gisir el-Mudir, the proving of the L-shaped enclosure structures, the Serapeum and the valley between the Sacred Animal Necropolis and the Ka'Aper tomb group.

Ian J Mathieson

Project Director



SAQQARA

Location map

- extent of Nile flood plain
- course of Nile
- course of Bahr Libeiny
- course of Red Sea canal

TURA modern place name

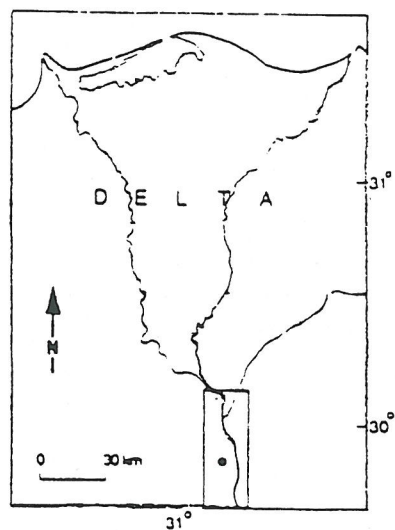
pyramid field

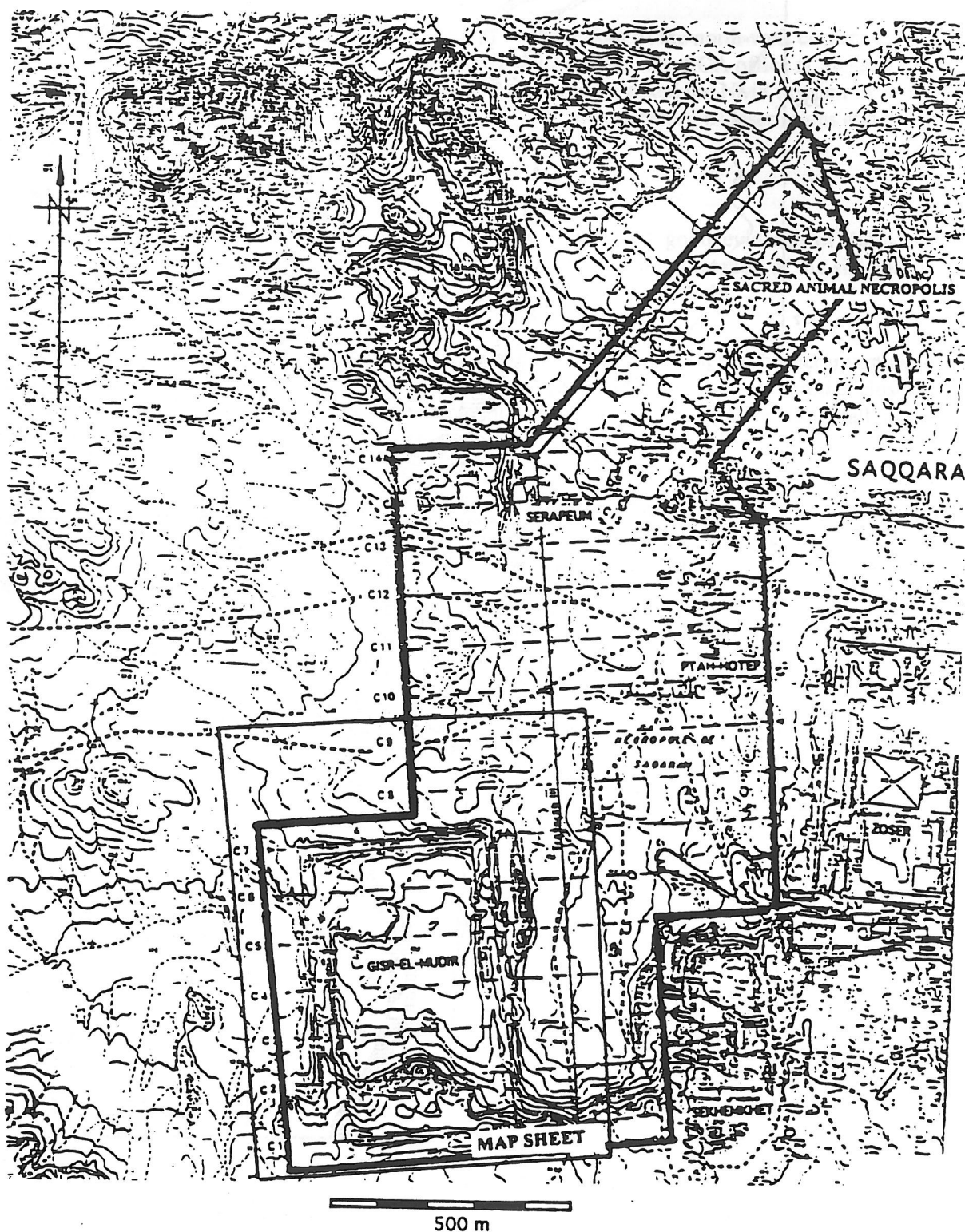
Babylon ancient place name

UTM GRID INTERVALS = 10 000 m

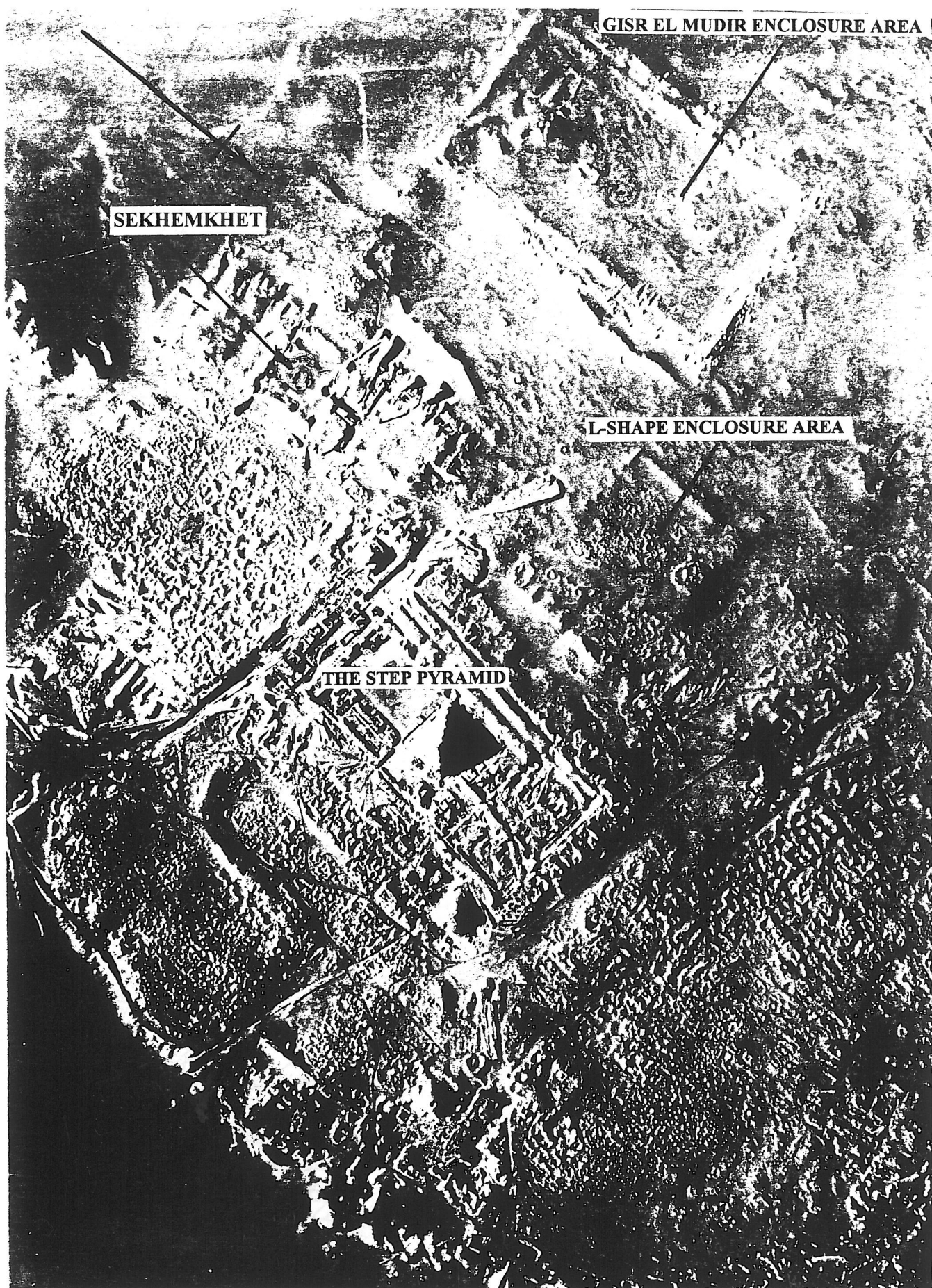
SOURCE SOE 1930

EES 1983

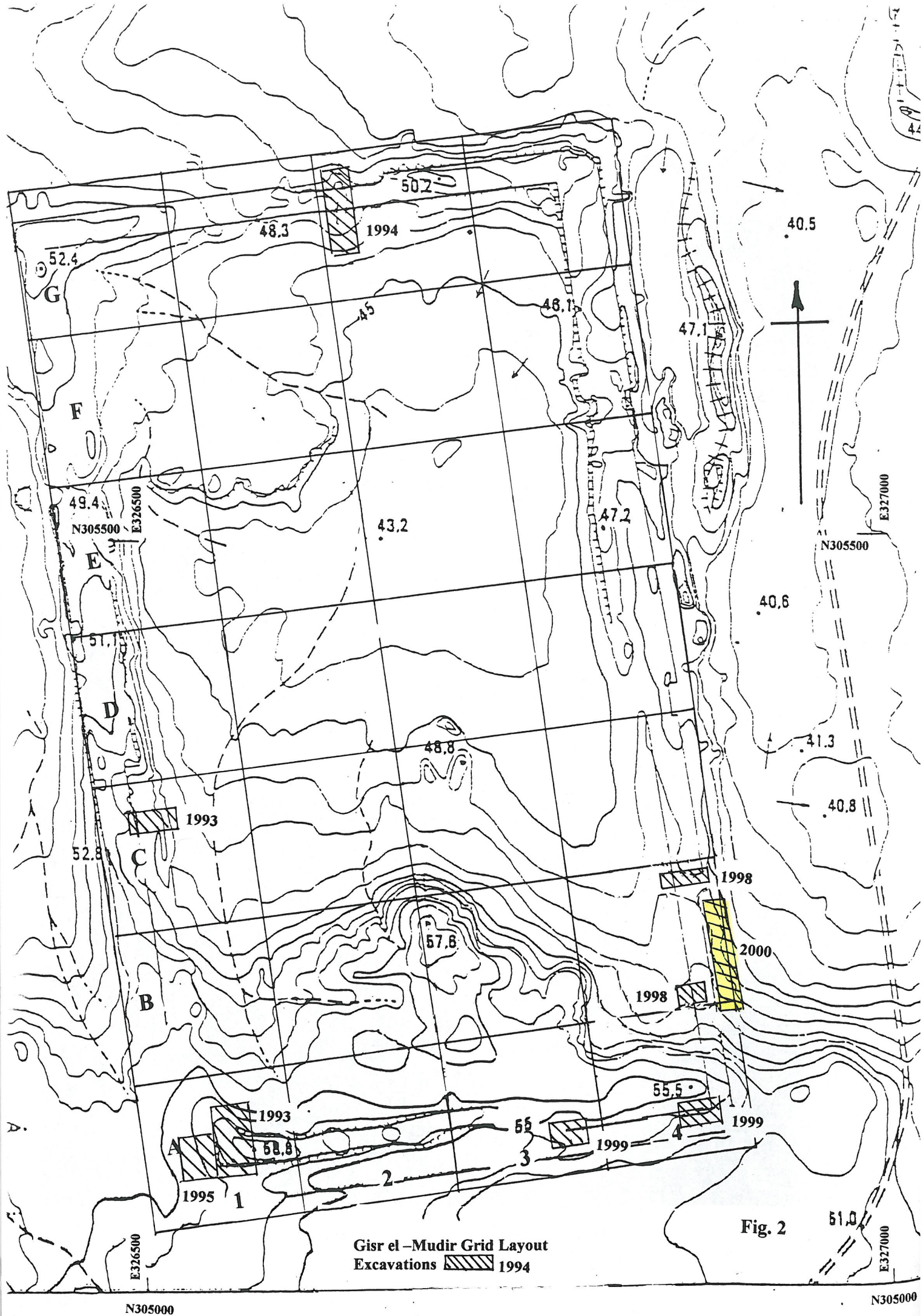




National Museums of Scotland Concession Area

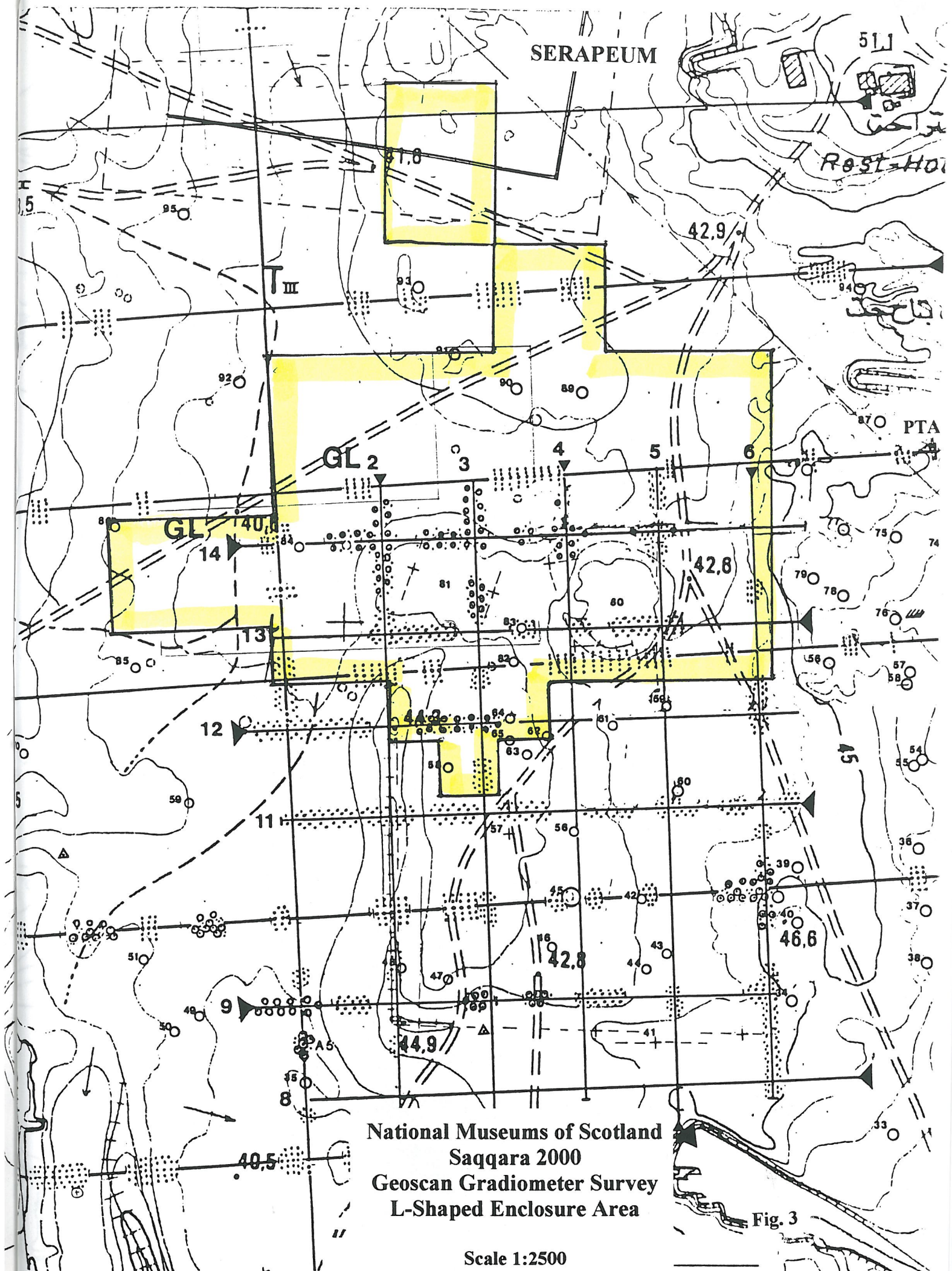


GISR EL-MUDIR & L-SHAPED ENCLOSURES
IN RELATION TO THE STEP PYRAMID



Gisir el-Mudir Grid Layout
Excavations  1994

Fig. 2



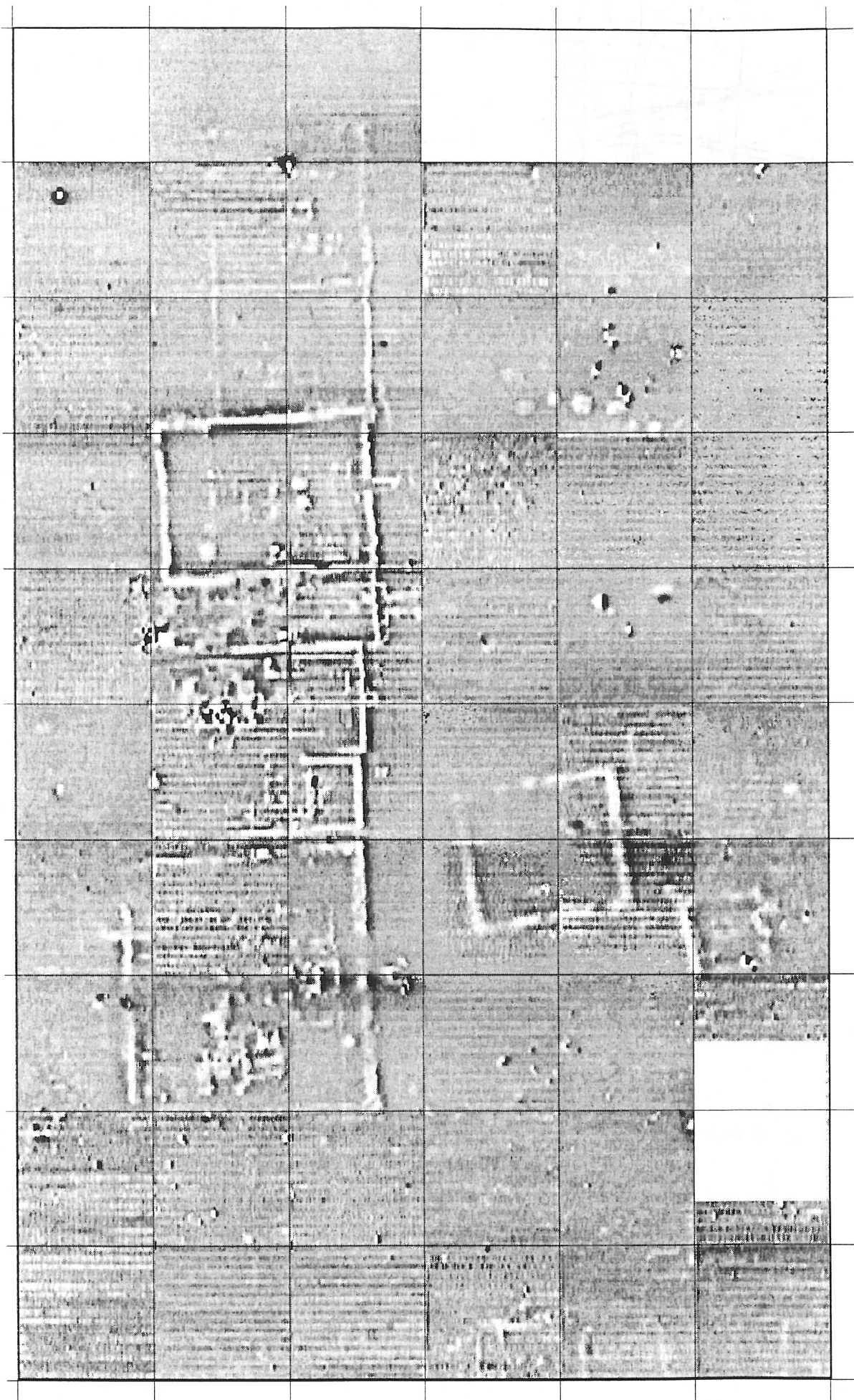


Fig. 4

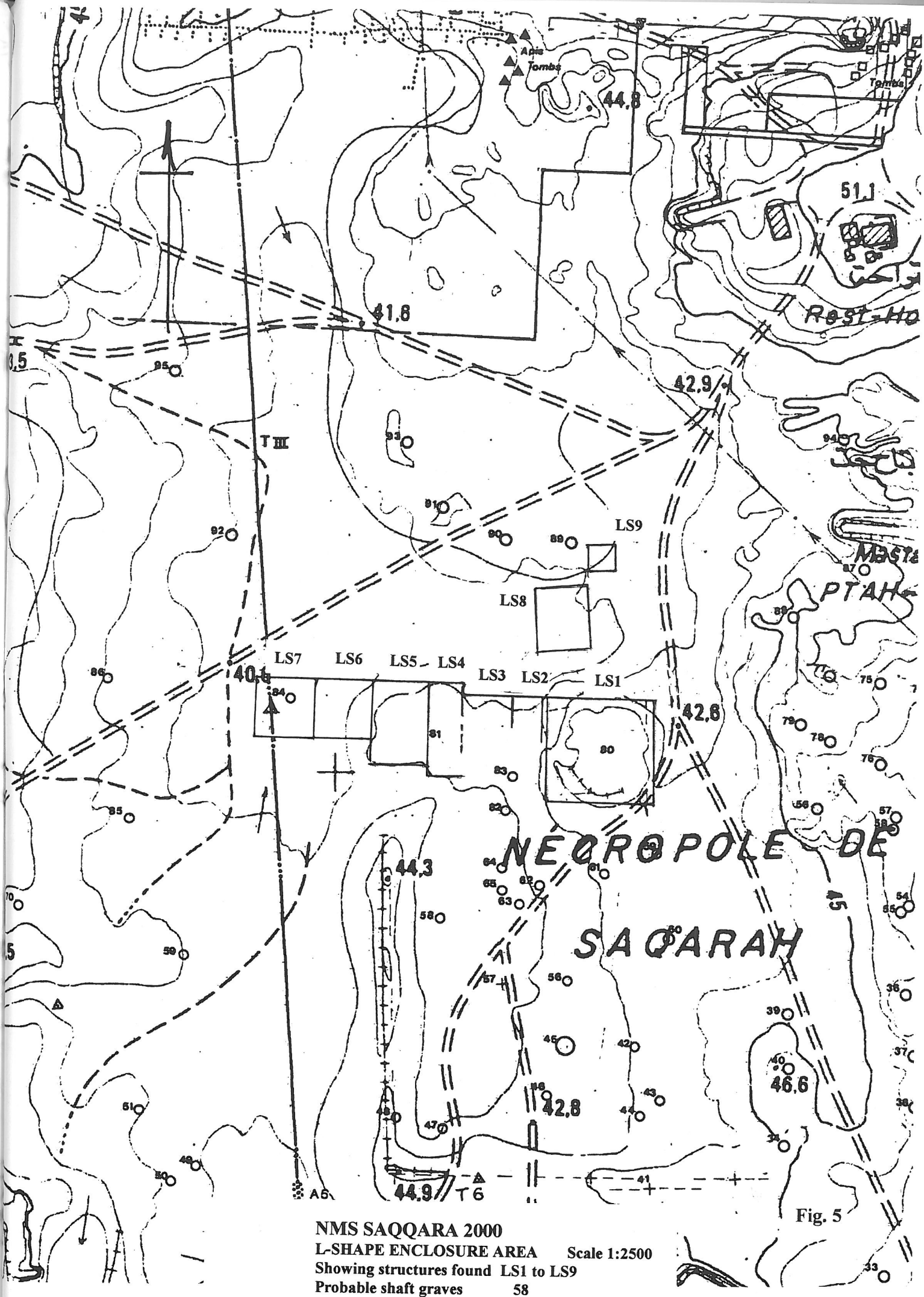
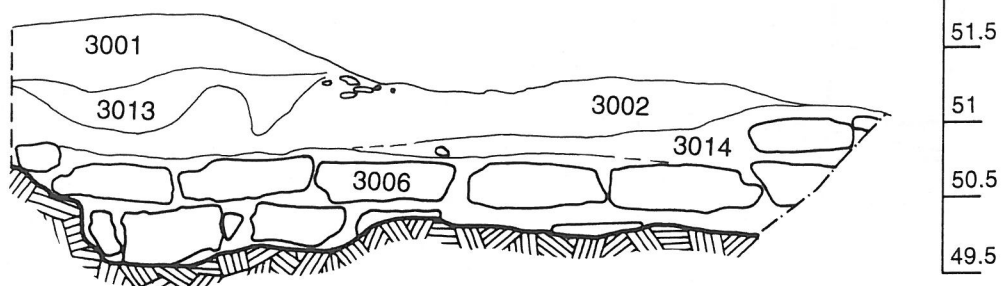


Fig. 5

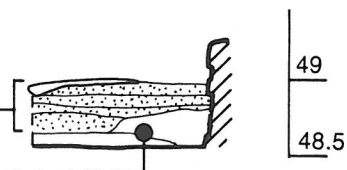
Section 1



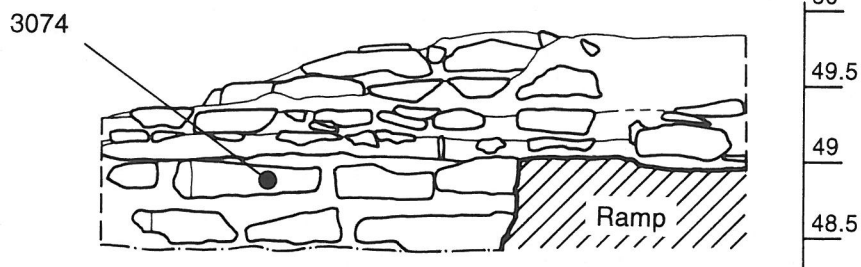
Section 2

Sand, mud mortar
& small stones

Large stones, mud
mortar & some sand



Section 3



Section 4

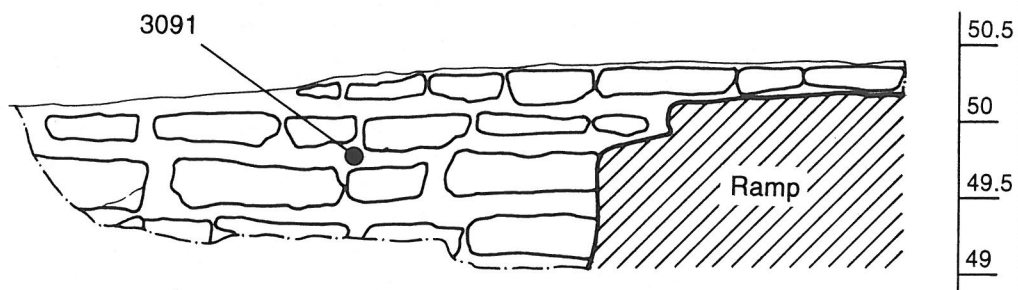


Fig. 6

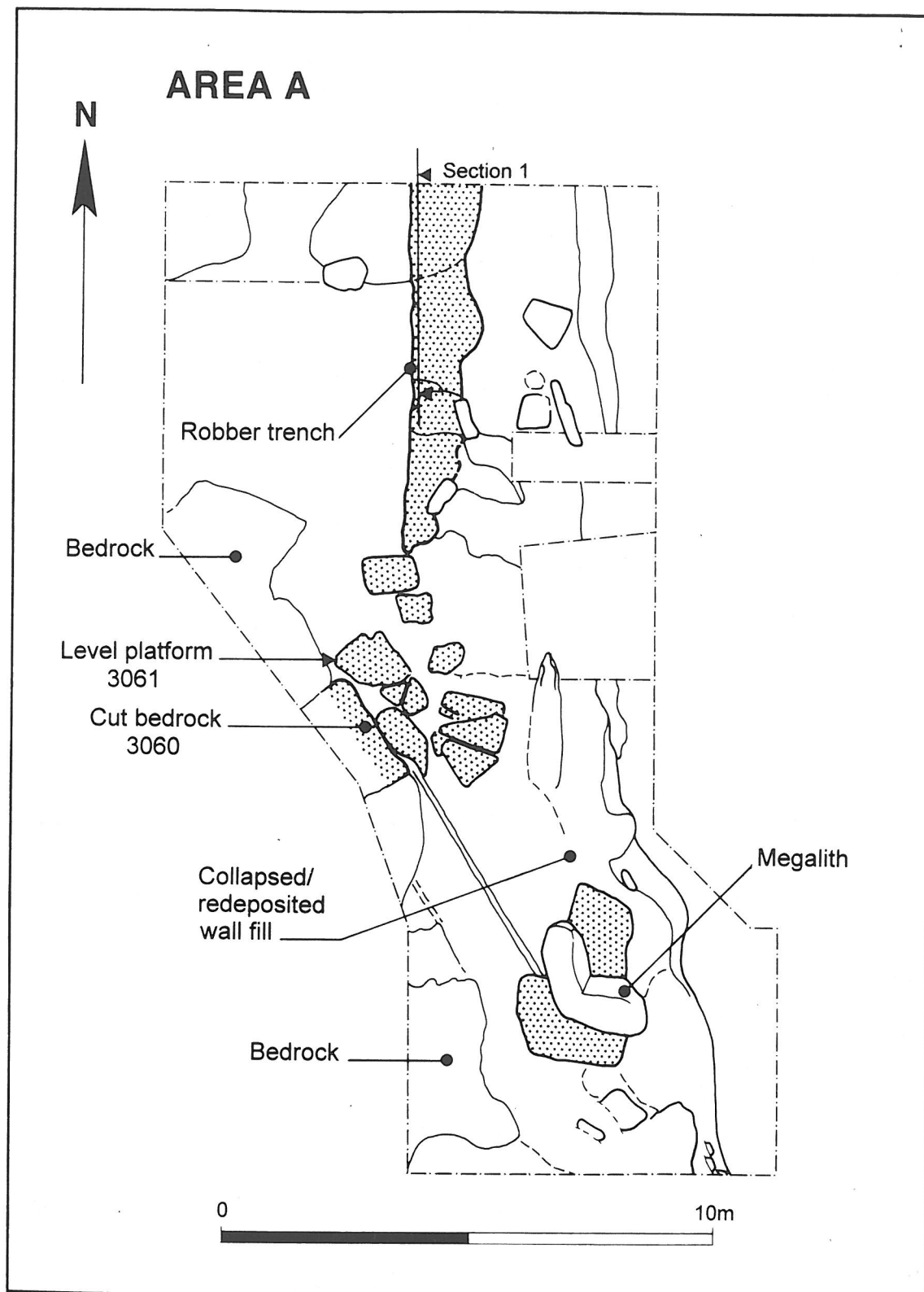


Fig. 7

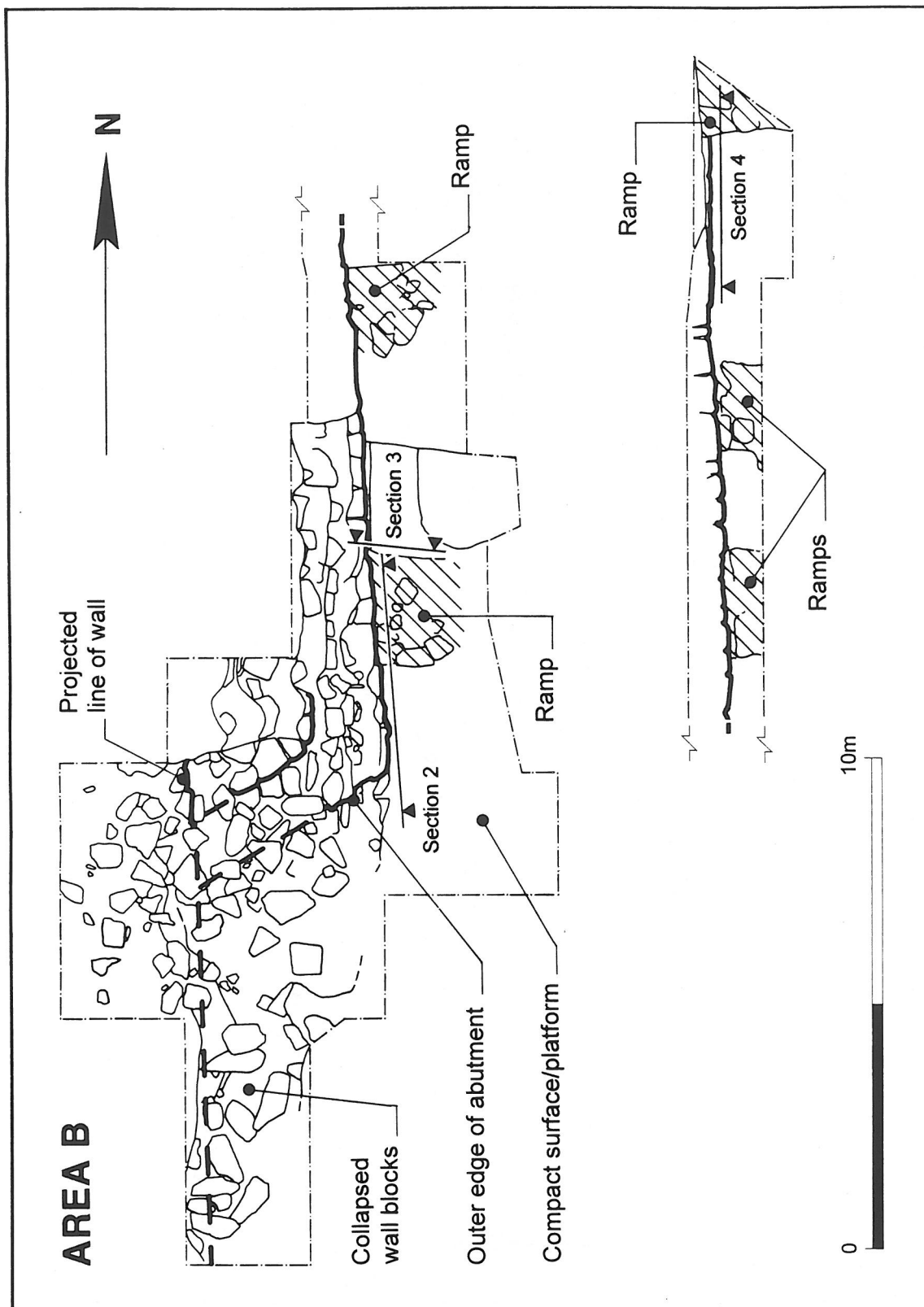
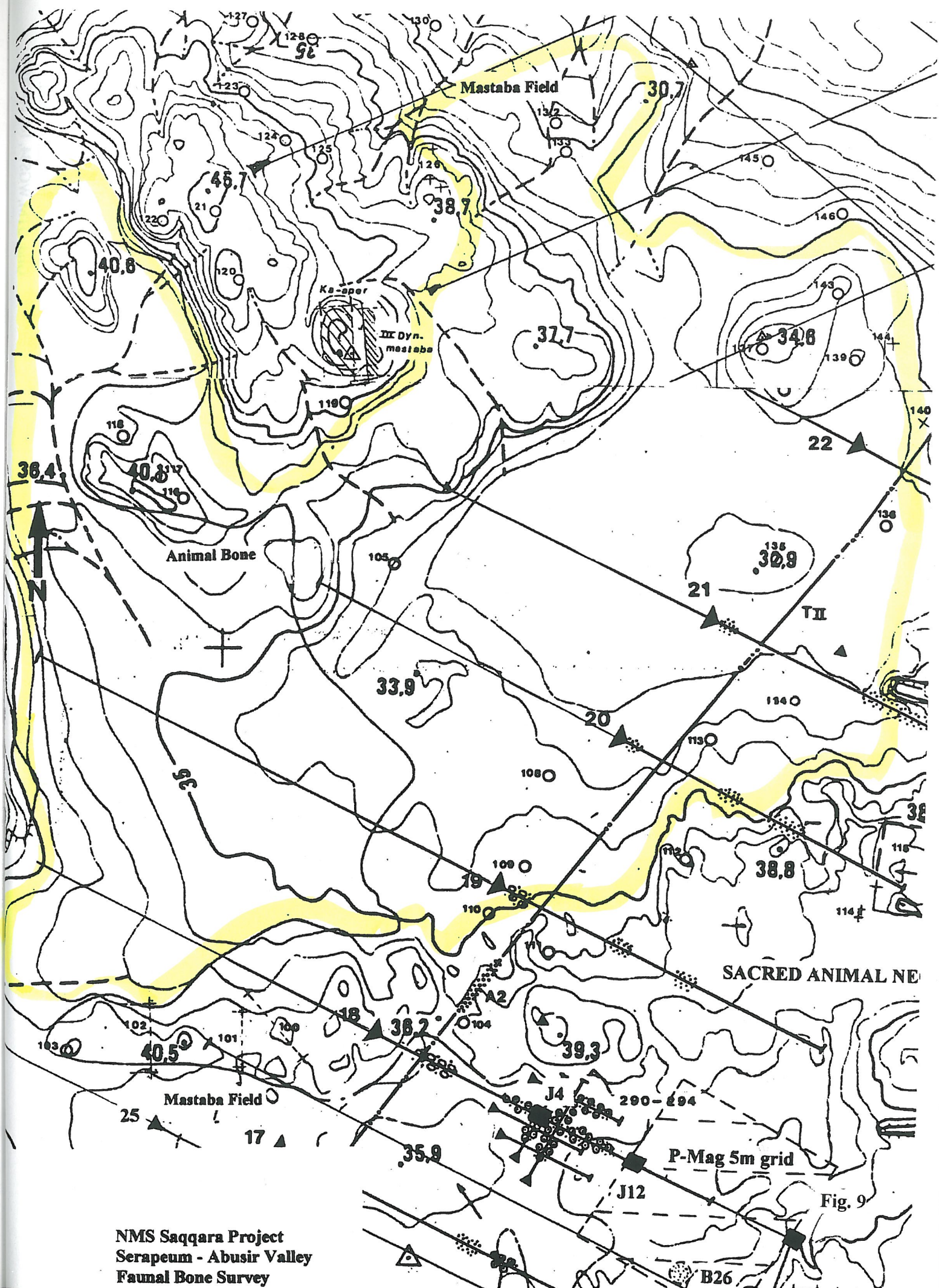
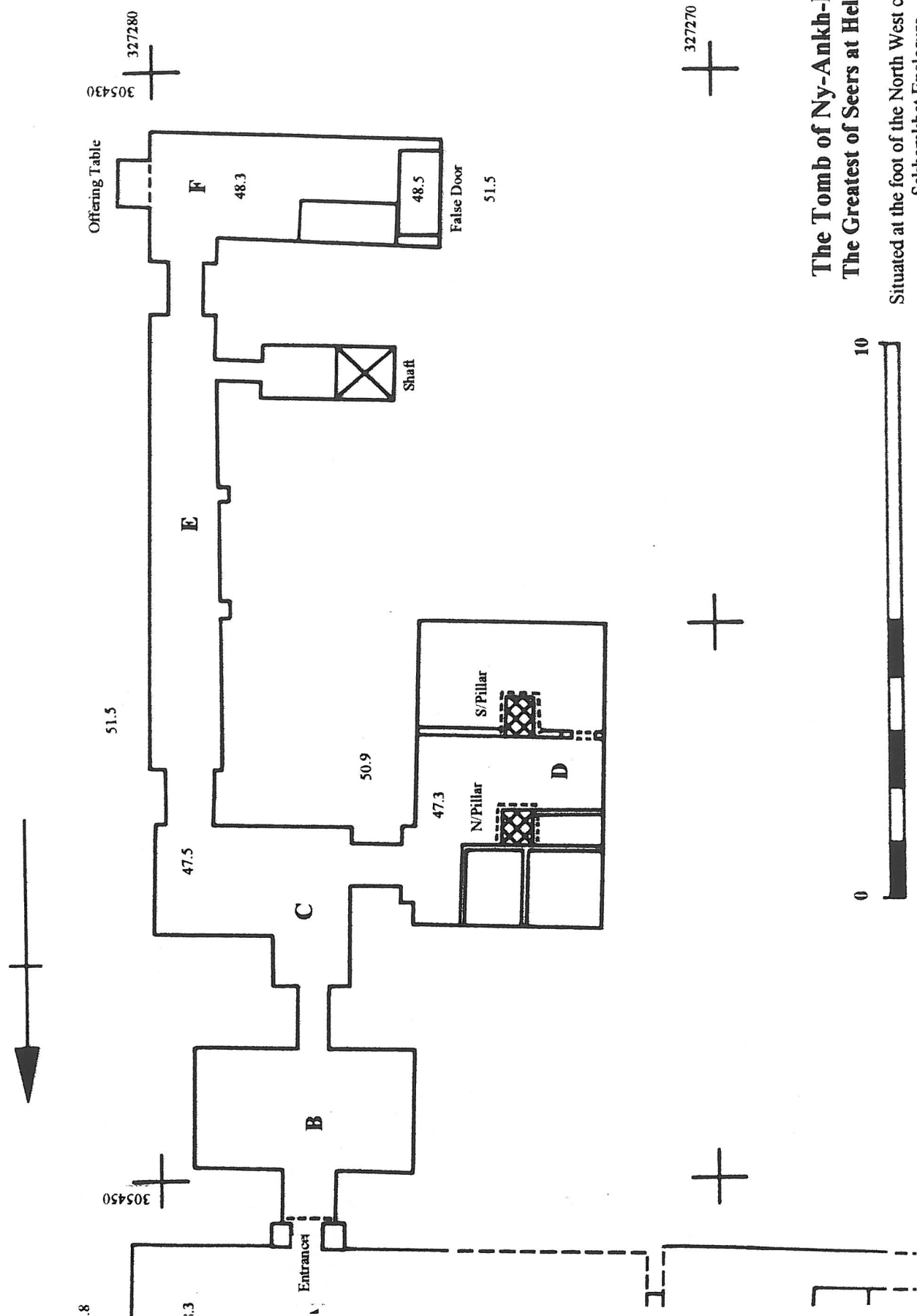


Fig. 8

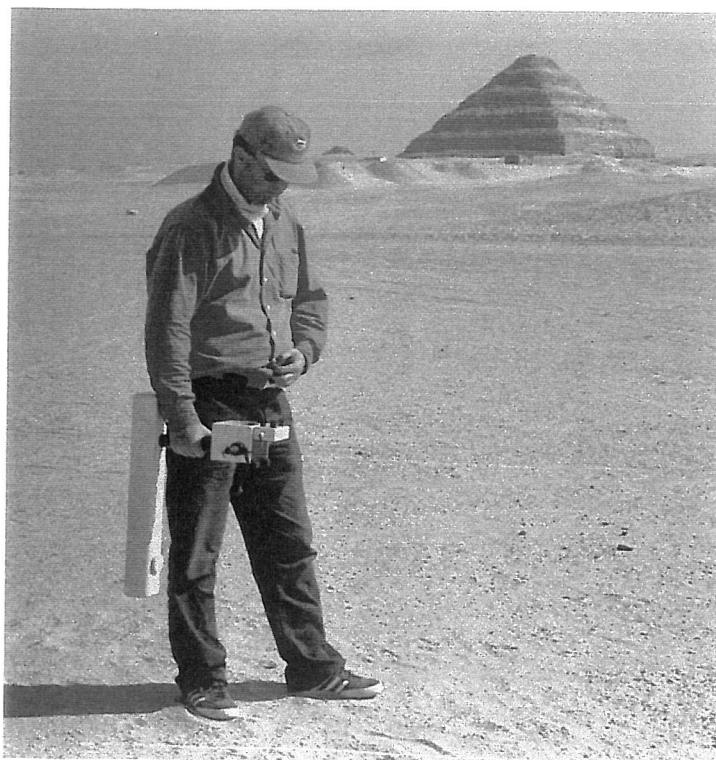


NMS Saqqara Project
Serapeum - Abusir Valley
Faunal Bone Survey

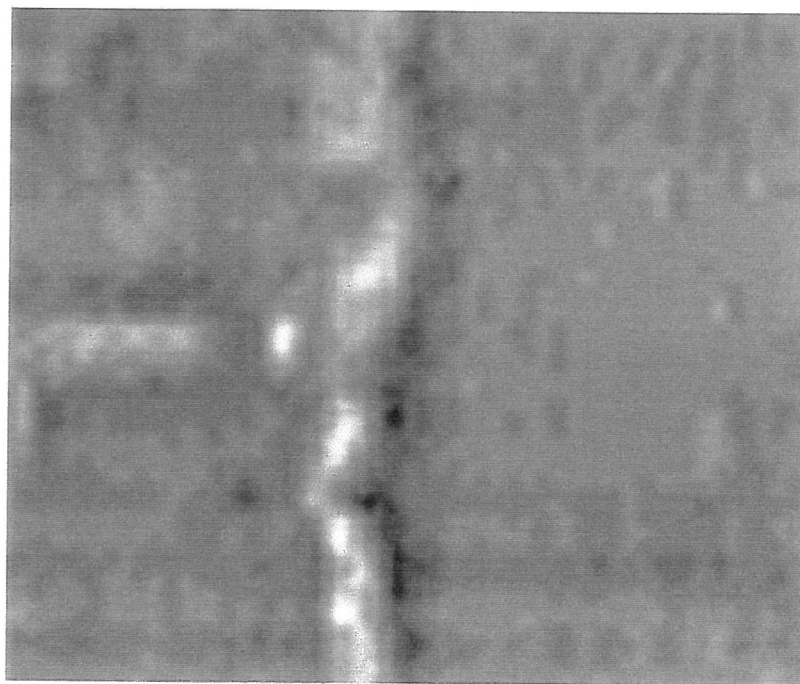


The Tomb of Ny-Ankh-Nesut
The Greatest of Seers at Heliopolis
 Situated at the foot of the North West corner of the
 Sekhemkhet Enclosure
 Scale 1:100
 Elevations in metres amsl.
 C.A.D. TITM 11/2001 Int. Coloured

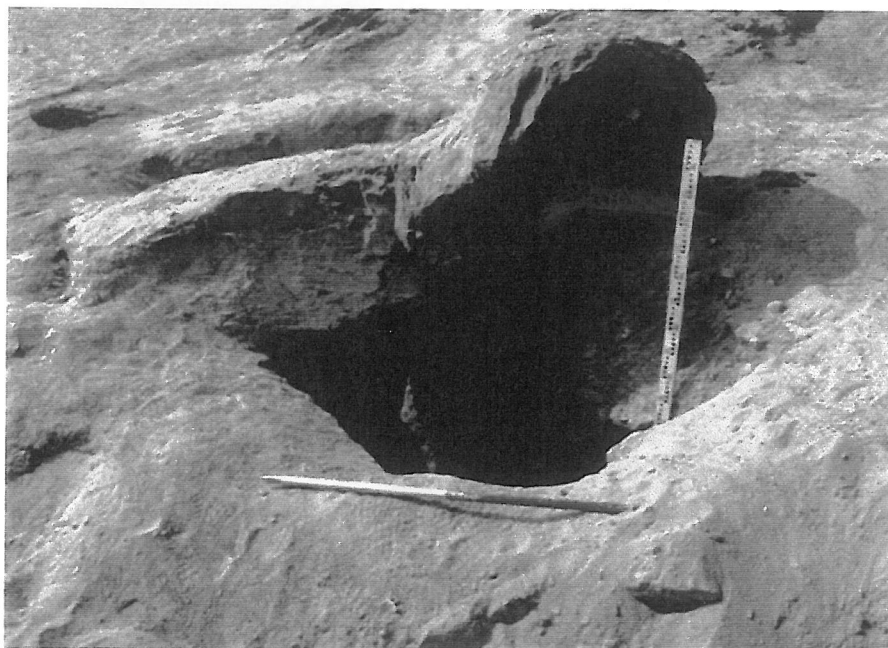
Fig. 10



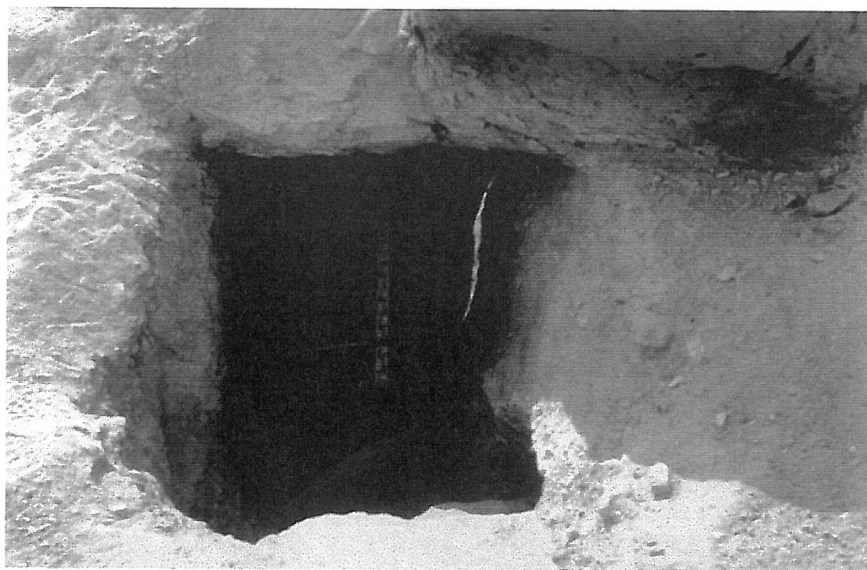
Gradiometer survey of the L-shaped enclosure area



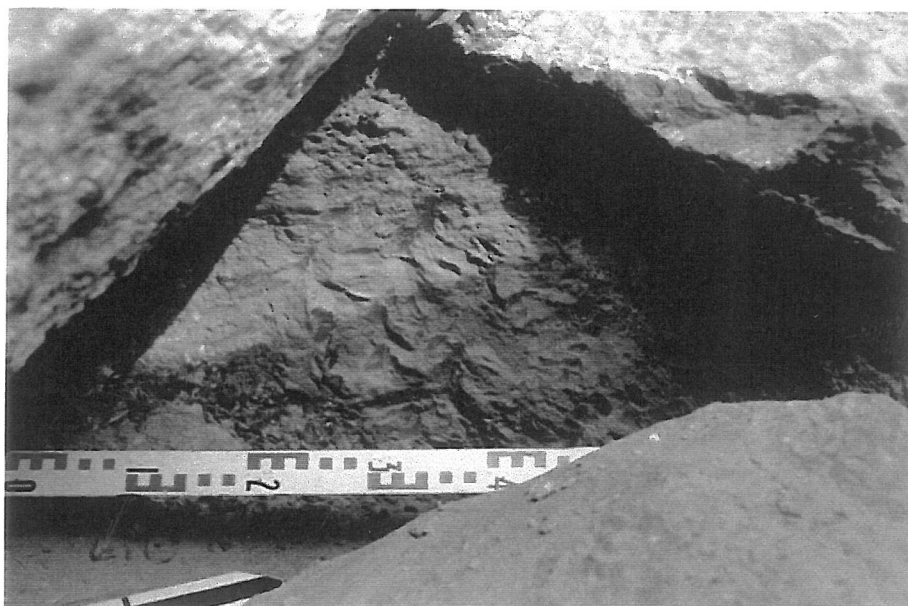
Plot of gradiometer data showing mud brick wall



Large T-shaped monolith of worked limestone which could be collapsed architrave



Cavity under monolith fully cleared



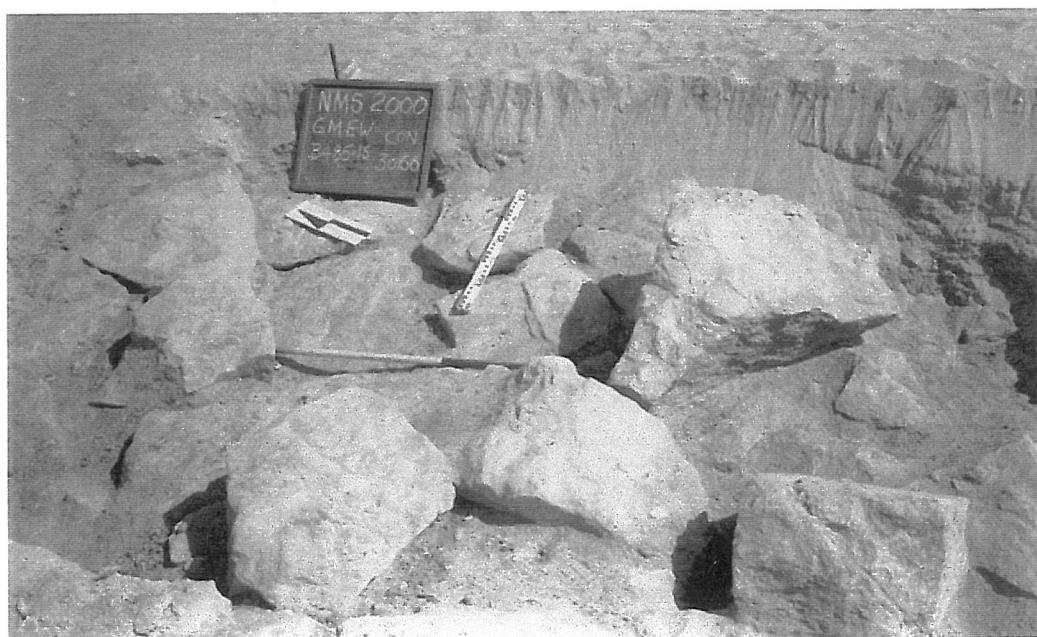
Cavity under Γ -shaped monolith showing tool marks



Tool marks on mortar from cavity below monolith



East face of the East Wall of the Gisir el-Mudir



Collapsed wall blocks due to robbing in antiquity