NATIONAL MUSEUMS OF SCOTLAND

SAQQARA PROJECT REPORT

1995

National Museums of Scotland
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Elizabeth Bettles, Joanne Clarke, Jon Dittmer, Corinne Duhig, Salima Ikram, Ian Mathieson, Harry Smith, Ana Tavares

An interim report on the work carried out during the 1995 season covering the testing of resistivity results by *sondage* trenches over selected anomalies and carrying out further resistivity profiles over areas of particular interest, topographic survey, ceramics, skeletal & faunal remains and research into previous records at the Saqqara Necropolis of Memphis, Egypt

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THE NATIONAL MUSEUMS OF SCOTLAND

PRELIMINARY REPORT OF THE SAQQARA SURVEY PROJECT, 1995

By ELIZABETH BETTLES, JOANNE CLARKE, JON DITTMER, CORINNE DUHIG, SALIMA IKRAM, IAN MATHIESON, HARRY SMITH and ANA TAVARES

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 Gisr el-Mudir ('the Great Enclosure') in the south, an area of the Old Kingdom tombs round the mastabas of Ptahhotep, the area of the Serapeum and its dependencies, part of the Archaic necropolis, and the Sacred Animal Necropolis complex near to the village of Abusir in the north (see Project Map).

b) To adapt and combine a series of well-known 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 under drift-sand and the dumps of former excavations. These techniques incorporate resistivity survey, proton magnetometer survey, sonic profiling, field inspection, archival research and test-excavation (for description see 1992/3 Report pp. 1-4).

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; Dr. Zahi Hawass at Giza, Mr Mohammad Hagara, director of Saqqara, the Chief Inspector Mr Magdi and Mr Abdel Hamid Rehan, the inspector attached to the mission.

The October - December 1995 season has been undertaken with the generous financial support of grants from the British Academy, the Gerald Averay Wainwright Fund (Oxford University), the National Museums of Scotland, the Clydesdale Bank and technical assistance in map reproduction by Survey and Development Services, Bo'ness, West Lothian, which the National Museums of Scotland acknowledge with gratitude.

The National Museums of Scotland team comprised Ian J. Mathieson, field director, Professor Harry Smith, co-director and advisor, Ms Ana Tavares, field archaeological director, Ms Elizabeth Bettles, archaeologist, Ms Joanne Clarke, ceramicist, Dr Jon Dittmer, geophysicist, Ms Corinne Duhig, skeletal biologist and Dr Salima Ikram, faunal remains specialist. The 1995 season opened on the 5th October and continued until the 6th December.

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 Gisr el-Mudir were surveyed (Concession diagram). 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 Gisr el-Mudir (the Great Enclosure). (Map Sheet Layout diagram). In 1993 sondage trenches were opened on anomalies in the south-west corner of the Gisr-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 (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 (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 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)

1995 FIELDWORK

Methodology
Sub-surface remote sensing for archaeological purposes can be carried out by:

- resistivity
- proton-magnetometry
- sonic profiling
- electro-magnetic impulse equipment
- thermal imaging

For large-scale exploration the method of resistivity survey by traverse profiles gives the fastest results and enables the area to be divided into a grid pattern for closer examination of any anomalies touched during the traverses. The techniques of resistivity survey, proton magnetometry, field inspection and archival research are fully described in the Reports of 1990, 1991,1992,1993 & 1994.

THE GISR EL-MUDIR (The 'Great Enclosure')

The Gisr el-Mudir is a vast rectangular enclosure lying west of the pyramid complex of Sekhemkhet and was described in the Report of 1992/3, and the resistivity profiles were presented in graph form in the Reports for 1990, 1992/3 and sondage results in 1994. The purpose of the work this season was to confirm by limited sondage, the existence of the features predicted by anomalies in the profiles, and to test whether inferences as to their physical character were justified (Map Sheet 1)

The area of GMMT2

Three five metre grid squares were laid out according to the resistivity grid surveyed in 1993 to check the surface deposits for signs of disturbance and to inspect dark marks showing through the thin sand cover.

The marks consisted of dark brown to black coarse crystalline sand deposits which could be the remains of lime burning and a total of five auger bores failed to find any signs of archaeological material.(Map Sheet 1 & Fig.1)

The West Wall.

During the 1995 season we aimed at tracing the full extent of the West wall. The position of the outer and inner faces of the north-west corner of the enclosure have been located at the intersection of the excavations made by Abdel Salam Hussein in 1947/48 which had exposed the base course of the outer corner and several courses of the inner corner. The upper remaining courses of east and west faces of the west wall of the Gisr el-Mudir are indicated by several exposures showing on the surface. The wall is denuded with its preserved upper courses varying from 50.89m amsl. as exposed in sondage A8(1993) to 50.64m amsl. in areas exposed by Hussein (Map Sheet 1). Eight masonry courses were excavated in sondage A8 revealing the base course to be at 45.0m amsl.(GMA8,1993 Report).

The south-west corner, however, was not apparent on the surface and had not been investigated archaeologically. Given the depth of sand to be removed it was felt that the best use of resources would be to investigate the inner face of the corner. Sondages were therefore extended south from A8 along the inner face of the wall. We had previously questioned the existence of this corner based on the data from sub-surface sensing investigation and it is now clear that the depth of sand cover had obscured our results.

Map Sheet 1 shows the positions of A9, A10, A11, A12 to A13 and A14. Sondages A9 to A12 revealed the inner face of the West wall with the upper courses being overlaid by sand deposits varying from 0.5m to 2.5m in depth. The wall construction consists of a facing of local limestone masonry and an inner rubble fill which has been truncated due to robbing of the facing blocks. In the case of sondage A12, which coincides with resistivity cross-section GMXS1(1991) and the sections covering anomaly MTA7 taken in 1993, an area of wall face, probably of locally quarried limestone blocks, was exposed to a depth of fourteen courses (Map Sheet 1 & Fig.2).

The location of the south-west corner of the enclosure was established in grid square A12B as shown in (Fig.3). The corner construction was achieved by the abutting of limestone blocks of various sizes as a straight join and filling in the fairly substantial gaps with thick mud mortar. Bonded quoining is absent as expected at this early period (ref. see D Arnold, Building in Egypt (New York-Oxford, 1991)pp125-132) In grid square A13 which lies directly over the internal fill of the south wall and extends into the fill of the west wall, several pottery beer jars were recovered in the stratified fill and have been provisionally dated to the 2nd /3rd dynasty which, if correct, would appear to confirm the early date of the Gisr el-Mudir enclosure. The fill, context 620, consists of stratified layers of compact rubble with lumps of mortar, limestone fragments, desert flints and pebbles covered by layers of surface windblown sand. Two courses of corner core masonry were exposed in sondage A13 showing large articulated limestone blocks. The blocks measure approximately 0.75mx 0.5mx 0.3m and are laid in east-west rows with some mortar in the bedding joints and smaller limestone fragments in the rising joints(Fig.3A).

Sondage A13 was extended to the south in an attempt to define the south face of the south wall. A large expanse of robbed out mortar fill and disarticulated core blocks were exposed at a depth of 53.9m amsl. Extending to the limit of the excavation some 21m south of the inner face of the corner. In all the sondages it was seen that the wall structure is sealed by deposits of fine aeolian sand (Fig.3A Section A11) which have invariably accumulated from the East and overlay both the masonry and the core fill, the latter has often been substantially removed. The absence of archaeological material in the deposits sealing the wall suggest that the dismantling and re-use of the wall masonry may have occurred soon after the construction of the wall and was probably followed by a long period of inactivity.

Three different techniques of construction are attested in the Gisr el-Mudir: a) hollow-construction for the perimeter of the enclosure wall; b) a masonry revetment against outer walls and c) solid masonry corners.

The basic structure of the wall, as described elsewhere, consists of a 'hollow-construction' of two rough masonry skin-walls with a rubble core. This technique in itself is not indicative of an early date although its execution here seems to be (ref. The 'hollow-construction' technique is attested throughout Egyptian history, see s. Clarke and R. Engelbach, Ancient Egyptian Construction and Architecture (New York 1990) p. 113).

A masonry revetment built against the outer face of the outer walls is attested in the North Wall and may probably exist on the West wall where the width appears greater than normal. This consists of masonry blacks (average dimension 0.75mx 0.60m x o.30m) extending to 6.25m in width. The blocks are not dressed and therefore this is not a final revetment but still part of the core construction of the wall. The full extent and purpose of these revetments require further investigation.

really?

The north-west and the south-west corners of the enclosure wall are constructed of solid masonry. The north-west corner was exposed by A. S. Hussein and although the masonry is quite eroded there is no corner bonding in the articulation of the blocks and no specifically cut corner stone. The blocks are larger than those used in the wall faces an a slight inclination of the masonry layers is detectable (Fig.8, 1994 Report).(ref. This is well attested in the Djoser complex and quite pronounced on the corner stones of the facing masonry, see JP Lauer Histoire monumentale (Le Caire,1962)p.248,254 and figs. 72-3,p.68). A full investigation of the corners and any possible foundation deposits associated with them may yet prove to be the only way to date more closely the Gisr el-Mudir enclosure. (ref. Although those found at the Step Pyramid complex did not help to assign the structure to a particular king, see C.M. Firth and J.E. Quibell The Step Pyramid 1(190?) p.142, fig.23;II pl.73; J. P. Lauer La Pyramide a degrees 1 (19??)p.179). For material of a comparative date see J.M. Weinstein, Foundation deposits in Ancient Egypt (1973)

?? what double masonry in 5-15 main wall fill?

Geophysical Survey

Survey by resistivity and proton-magnetometer had been carried out over the south-west corner as indicated by the mound of sand and the assumed position of the south and west walls in 1991,1993 and 1994. However the results were difficult to interpret and with the failure to find the southern face of the south wall in grid square A13+15m it was decided to resurvey the area using an improved Dipole-Dipole con- figuration of probes. As shown on Map sheet 1 a total of 12 resistivity profiles were observed by

Wenner and Dipole-Dipole probe configurations covering the south-west corner and the probable position of the South Wall and the south-east corner.

As can be seen from GMSWDDL10 & L12 (Figs. 9 & 10) the south wall anomaly shows clearly and the same anomaly on lines L5 to L9 plots at a position 30m south of the sand mound which was previously considered to be overlying the south wall.(Map Sheet 1)

25 auger holes were drilled to obtain geological information on the sub-surface materials within the area of the SW corner and the high mound in the centre of the southern half of the enclosure(Fig.4). The apparent position of the original desert floor or bedrock being noted.

From the section drawn in Fig.5 it can be seen that the large mound consists of dumped sand and desert flint nodules overlying the original desert surface and that the apparent ridge running east-west on what was thought to be the South Wall may be made of the same material as we had suspected when exposing the interior of the mound in sondage A7(1993 Report)

Ceramics

The excavation of the south-west corner of the Gisr el-Mudir produced greater quantities of pottery than had been found in the previous seasons of survey and excavation: 378 sherds and 4 whole vessels were recovered from the surface and sub-surface deposits in and around the corner of the wall. 74% (279 sherds) of the pottery assemblage was identified as Old Kingdom, Nile C beer or water jars of a standard, coarse, hand-made variety which was common from the 2nd Dynasty through to the end of the Old Kingdom. The other 26% of the assemblage consisted of abraded body sherds of handmade Old kingdom wares (18%), some recognisable as Maidum bowl sherds, and abraded Marl A and C and Nile B body sherds (8%) dating to the Ptolemaic and Coptic periods.

208 sherds and 2 whole beer jars came from one deposit (A13:620) - the degrading rubble and mortar lying directly above the south west corner of the wall and within the infill of the south wall. 193 sherds were from Old Kingdom beer jars[1], 11 sherds belonged to a red slipped large closed vessel, possibly a water jar similar to the whole jar found in deposit A12c:650, and 4 Marl A abraded and unidentified body sherds of later date. Just north of this deposit on the line of the wall, a third beer jar was discovered in situ in the rubble fill (deposit A12B:642) giving *a terminus anti quem* for the construction of the wall. The beer jar (Figs.6 & 7: Obj.No. 95-2) is of the standard type found at the Gisr el-Mudir with slightly thickened rim, elongated ovoid body terminating in a pointed base and finger ridges. This type of beer jar was dated by Dr's P. French and J. Bourriau to the end of the 2nd Dynasty - beginning of the 3rd Dynasty, based on the vessel's technology and shape. This would suggest that the construction of the Gisr el-Mudir was, most likely, undertaken during the reign of one of the Pharaohs of the end of the 2nd Dynasty, beginning of the 3rd Dynasty[2] and therefore should date to c2700-2600BC.

A fourth vessel was recovered from underneath the wall collapse. It was a large red slipped and highly burnished wheel-made water jar with a wide ovoid body and flaring neck ending in an out turned slightly rolled rim. The jar is later than the previously discussed vessels and most likely dates to the end of the Old Kingdom or the beginning of the First Intermediate period[3]. The excavators are of the opinion that this vessel, found beneath the wall collapse may date the initial destruction of the wall.(Fig.7, Obj. No.95-16)

Graph1 and Table 1 (below) give a percentage breakdown of pottery types by context. The presence of large quantities of early Old Kingdom beer jars in the deposits directly associated with the wall and the

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[1] The beer jar sherds are identical to the whole vessels which have been dated by Dr Janine Bourriau to the end of the 2nd Dynasty/beginning of the 3rd Dynasty.

[2] The most likely reigns under which the enclosure could have been constructed would include Peribsen, Kha'sekhem(wy), Zanakht (Nebka), Djozer (Netjerykhet), but there is no evidence to suggest which, if any, of these kings were responsible for its commissioning.

[3] We wish to thank Dr J. Bourriau for her help in dating the vessels recovered from the excavation of the wall.

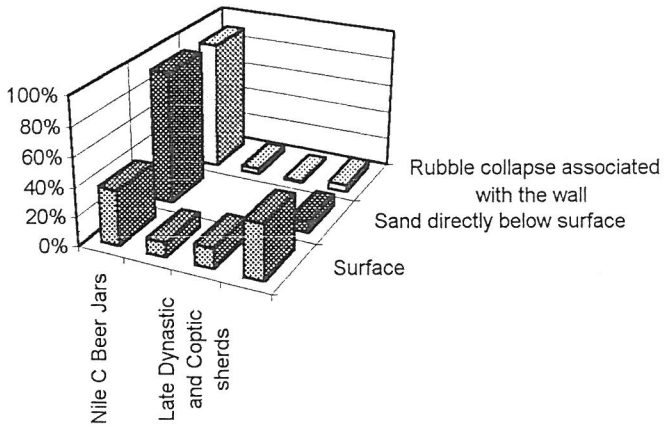
later and abraded material found in well disturbed contexts supports the hypothesis that the wall was constructed early in the Old Kingdom.

Table 1

	Surface	Sand below surface	Rubble collapse
Nile C Beer Jars	8 (38%)	13 (92%)	243 (90%)
Other OK sherds	2 (10%)		15 (4%)
Late Dynastic and Coptic	3 (14%)		4 (1%)
Unidentified abraded sherds	8 (38%)	1 (8%)	18 (5%)

Many of the earlier beer jars contained a black, silt-like substance which lined the inside of the vessel. Traces of this substance, or a similar substance, could also be recognised on the outer surface of the vessel around the rim and shoulder. The way in which the substance was deposited within the vessels tends to negate its being a residue of the vessel's original contents. The fact that the material lined the inside of the vessel and was not deposited in the base (as it would be if the jar was left in an upright position), or on one side of the vessel (as would be expected if the vessel was lying down) suggests that the substance may be attributable to something other than the contents. Many examples of this type of beer jar were sealed with a mud stopper and one can assume that the outer surface deposit is all that remains of this. The residue on the inside of the vessels is harder to interpret. It may be that the vessels were lined with a silty substance before use, either to ensure the vessels were water tight or for some other, as yet unknown, reason. It cannot be assumed outright that the vessels carried liquid - water or beer - and it is hoped that analysis of the residue can be undertaken in the near future.

Graph 1



Human Skeletal Remains

Fifteen groups of disarticulated but relatively undamaged human bone material were examined, which derived from burial contexts collected over the period 1993 to 1995. A full report covering the material, methods of skeletal recording and analysis which includes stature, body form and pathological condition will appear in the final publication of the five year period 1990-1995 which is due to be published in 1997. (Fig.8)

Faunal Remains

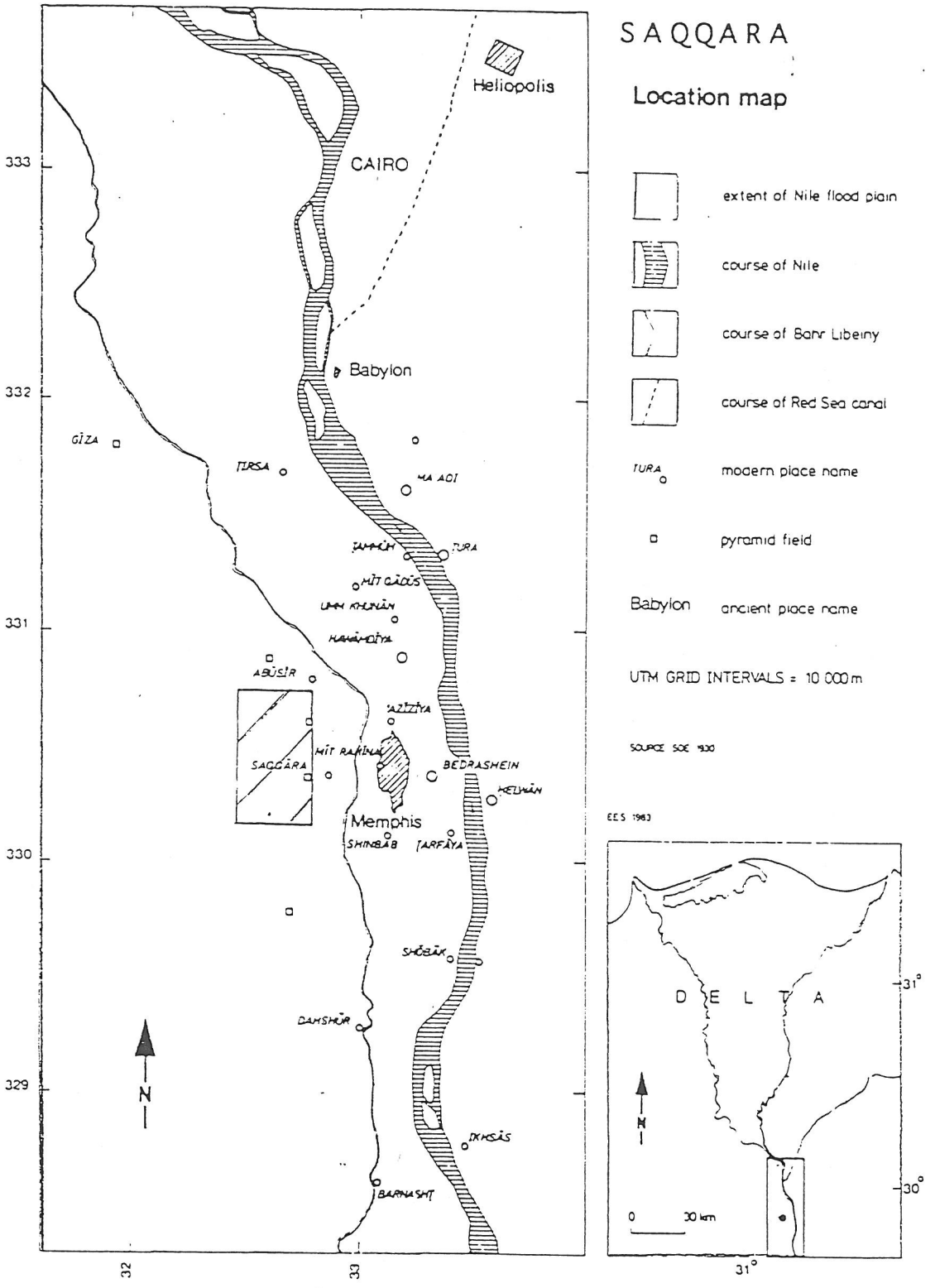
A similar study of faunal remains collected over the 1993 to 1995 seasons has been made and the full report will be published in 1997. (Fig.8)

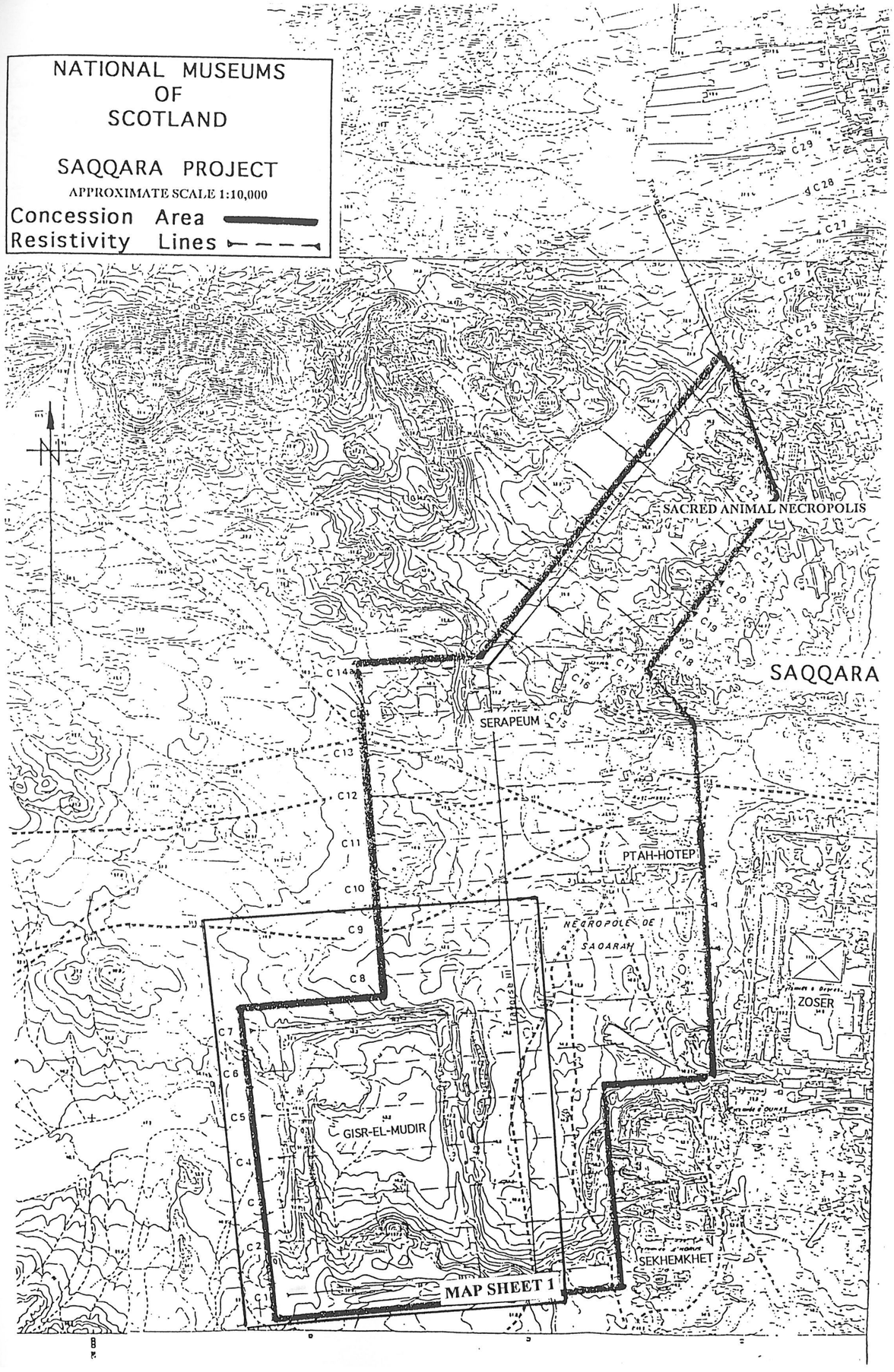
5. CONCLUSION

The National Museums of Scotland expedition feels that having achieved most of its principal objectives regarding the testing of techniques of remote sensing in the conditions of disturbed desert necropolis, the geophysical survey, the topographic location of principal structures and the detailed survey of the Gisr el-Mudir having been achieved, that the work of the last five years should now be published.

1. The Gisr el-Mudir continues to provide information which points to the probability that it must be one of the earliest large-scale stone buildings in Egypt. However, no clear proof of ownership nor precise date of construction has as yet been ascertained. The failure to locate any structure within the enclosure certainly appears to give the monument a different character from that of Sekhemkhet and Zoser, and tends to strengthen the supposition that in this case we have an intermediate phase between the pyramid complexes and the Abydos mud-brick funerary monuments.

2. It is important to develop our methods of ground-based sensing so that interpretation of the data can be relied upon. We have seen this season that our design of new electrode arrays and introducing various methods of computer analysis of the results enables a better sub-surface picture to be drawn. By using electro-magnetic impulse equipment to supplement the resistivity results we hope that further advances can be made into this extremely useful tool for the archaeologist.


SAQQARA
Location map
Heliopolis
CAIRO
Babylon
GIZA
TURA
MA'ADI
MIT 'OQBA
UMM EL-QA'AB
ABUSIR
'AZIZIYA
SAQQARA
MIT RAHINA
BEDRASHEIN
HELWAN
Memphis
SHINBAB
TARFAYA
SAQQAR
DAHSHUR
IKHSAS
BARNASHT
extent of Nile flood plain
course of Nile
course of Bahr Libeiny
course of Red Sea canal
modern place name
pyramid field
ancient place name
UTM GRID INTERVALS = 10 000 m
SOURCE SOE 1930
EES 1983
D E L T A
0 30 km
31°
30°
N
329
330
331
332
333
32
33



LEGEND

Topographic

- Contour — 35
- Spot Height — .29
- Triangulation Point — T9
- Building (modern)
- Track

Geophysical Sensing

- Resistivity Line (& direction)
- High Readings
- Cross-section & Profile
- Anomaly
- Proton-magnetometer sites

Archaeological

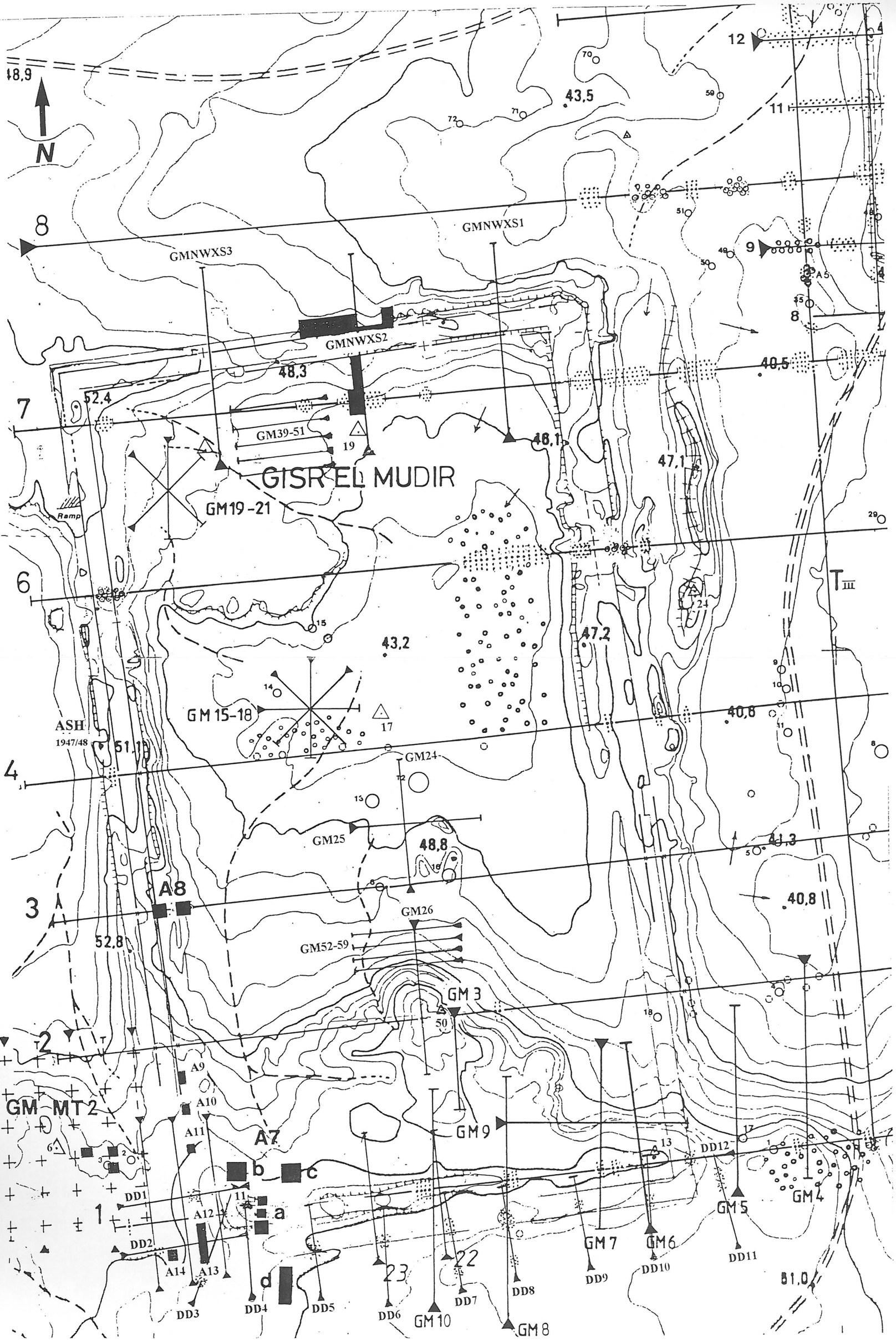
- Mariette's numbered tombs — 39
- Surface features-surveyed & numbered (Mathieson & Tavares) — 46
- Serapeum Enclosure (as shown by De Morgan) — A
- Serapeum Enclosure (as shown by Rhone) — B
- Early Dynastic Cemetery
- Probable shallow burials

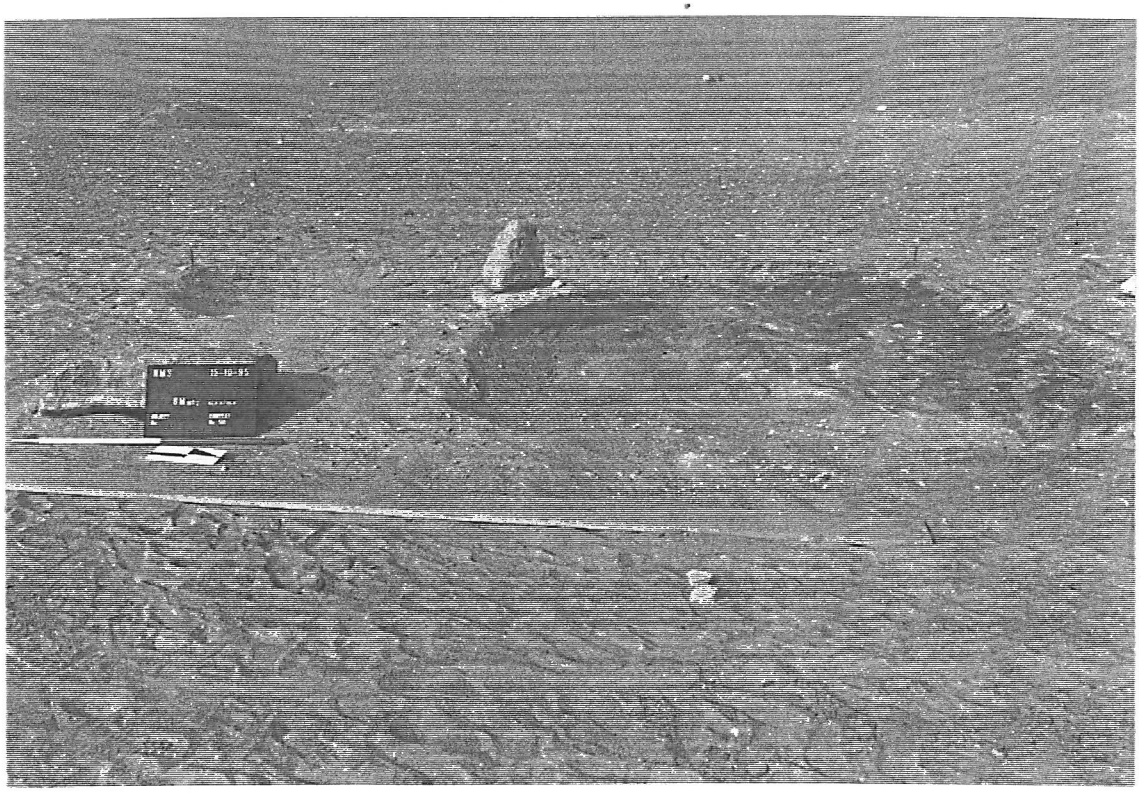
Scale

1/2500 — 0 100 200

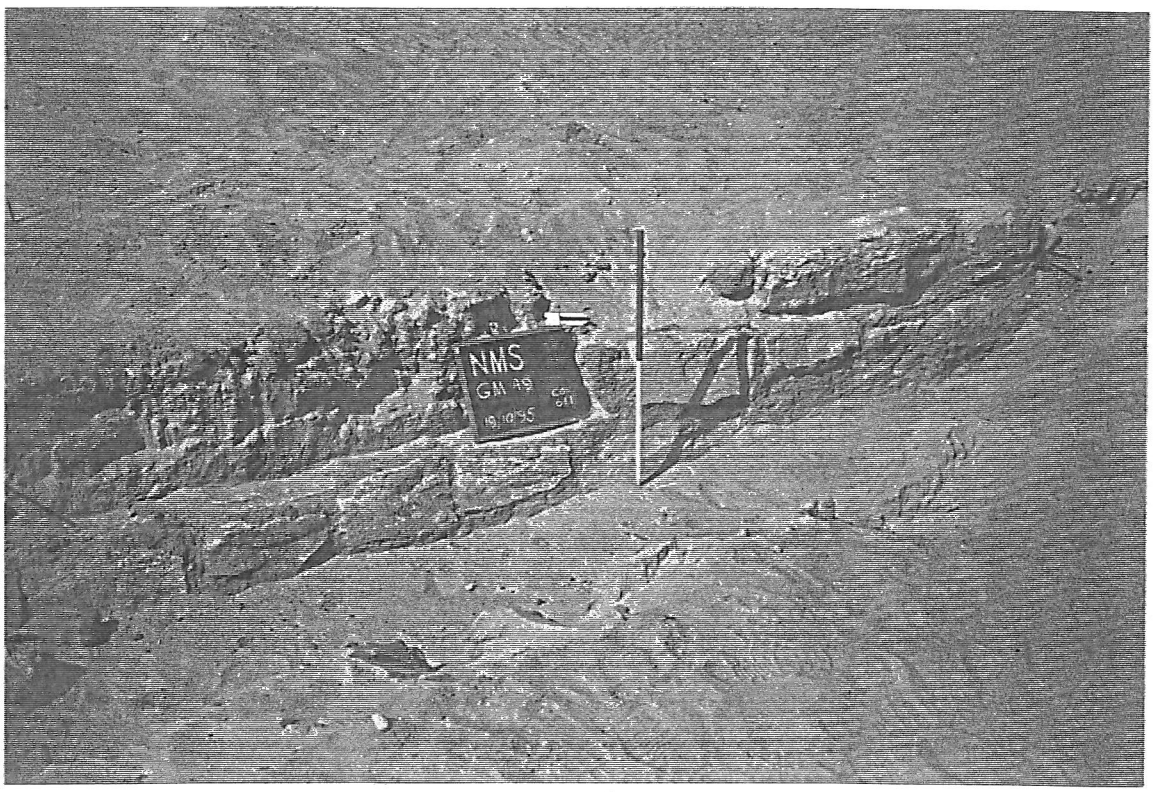
Elevations in metres above Mean Sea Level

Topographic information from 1978 Map Sheets for the Ministry of Housing and Reconstruction
UTM Projection - Hayford 1909 Int.Ellipsoid


N
GMNWXS1
GMNWXS3
GMNWXS2
GM39-51
GISR EL MUDIR
GM19-21
GM15-18
GM24
GM25
GM26
GM52-59
GM 3
GM9
GM10
GM8
GM7
GM6
GM5
GM4
GM MT2
A7
A8
A9
A10
A11
A12
A13
A14
A5
DD1
DD2
DD3
DD4
DD5
DD6
DD7
DD8
DD9
DD10
DD11
DD12
ASH
1947/48
Ramp
MAP SHEET I
43,5
48,3
52,4
48,1
47,1
40,5
43,2
47,2
40,8
48,8
41,3
40,8
52,8
51,1
81,0

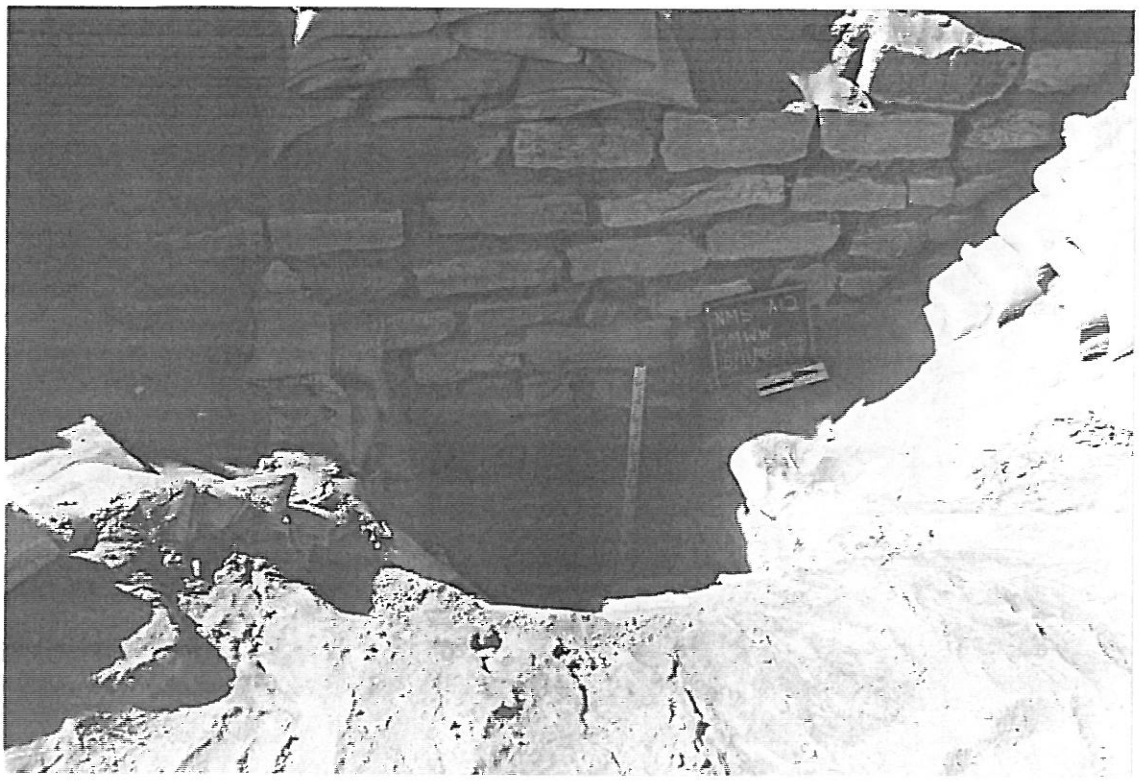


GMMT2 Probable remains of lime burning.

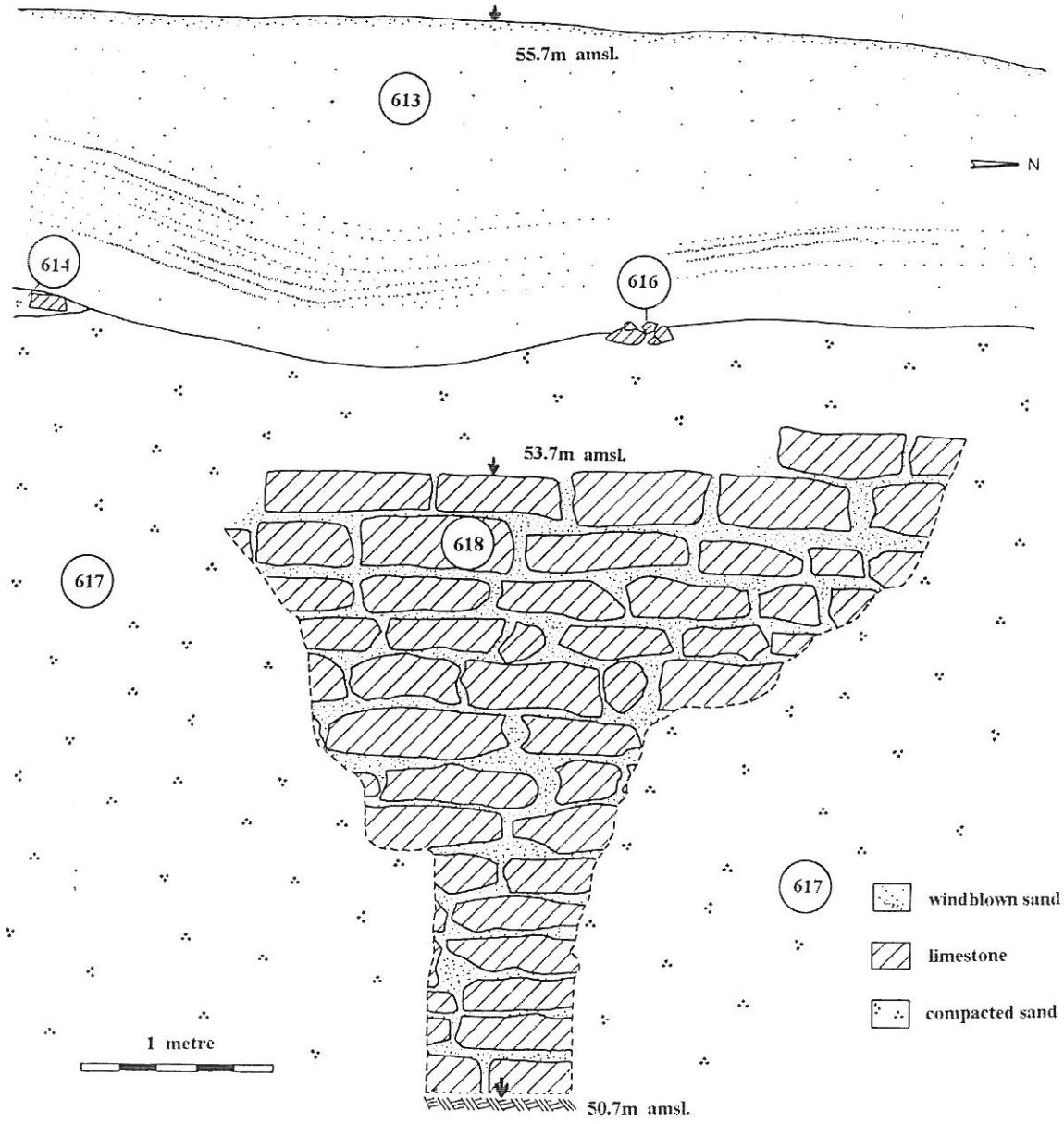


Sondage A9 East Face of West Wall (near surface exposure).

Fig. 1

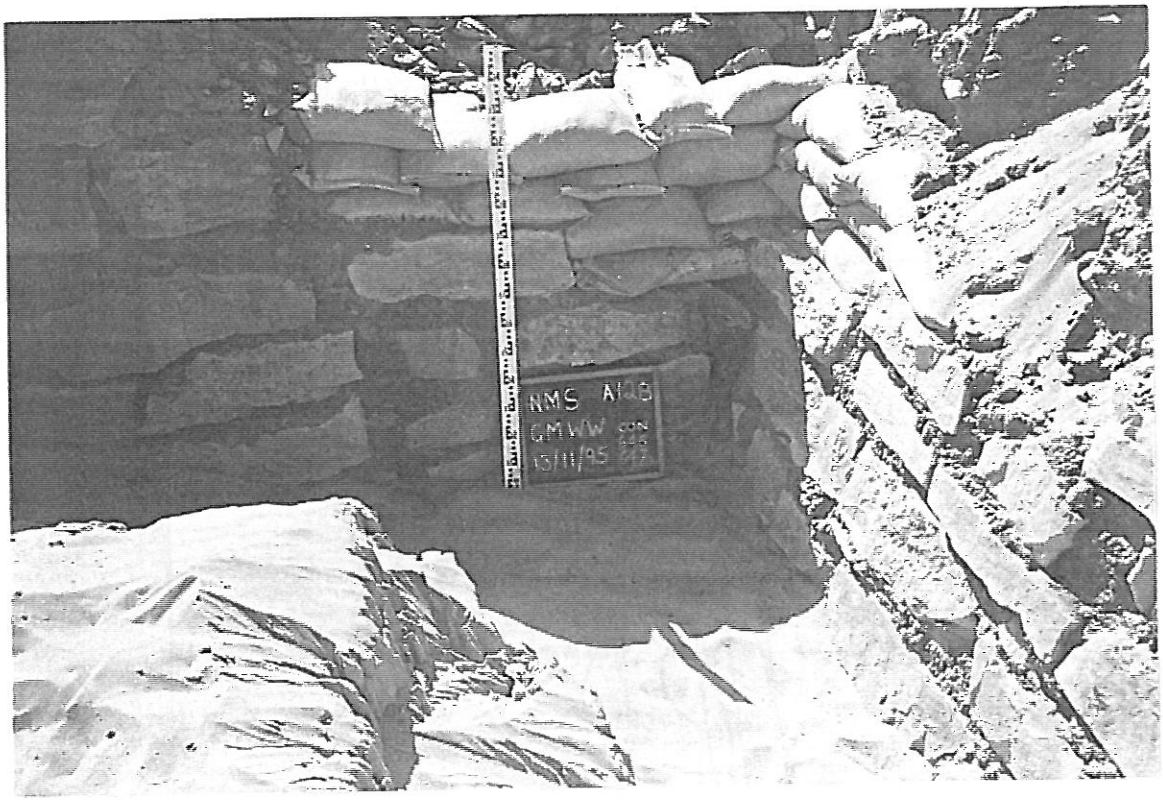


Sondage A12 East Face of West Wall 14 courses of local limestone.

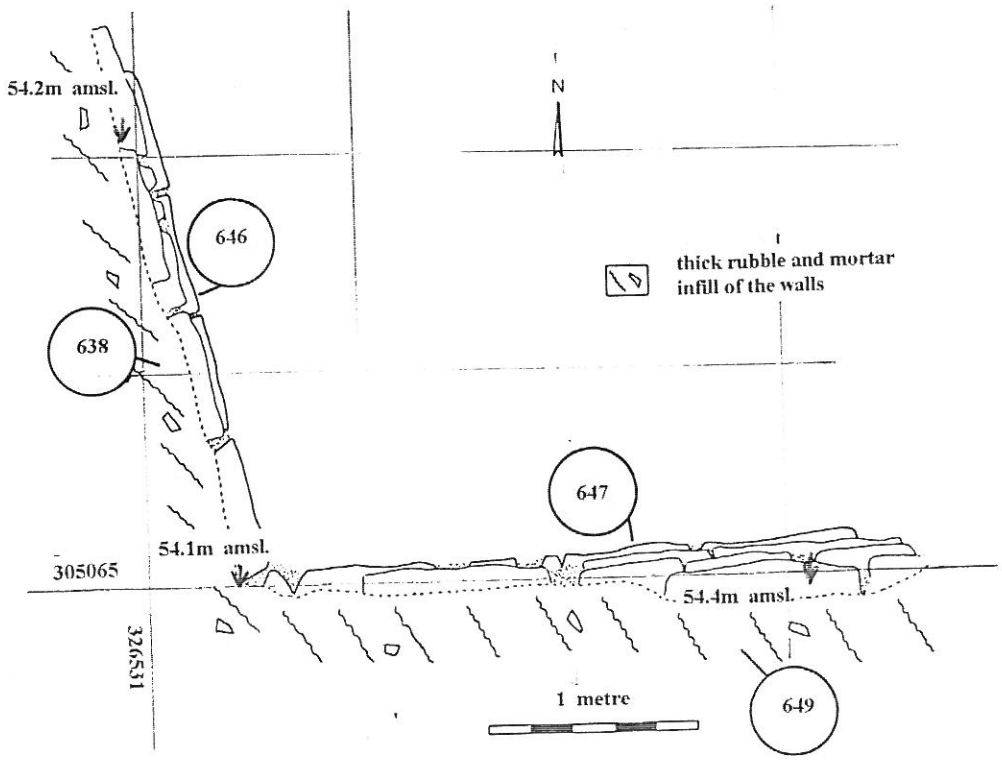


Sondage A12 Elevation of exposed East Face

Fig. 2

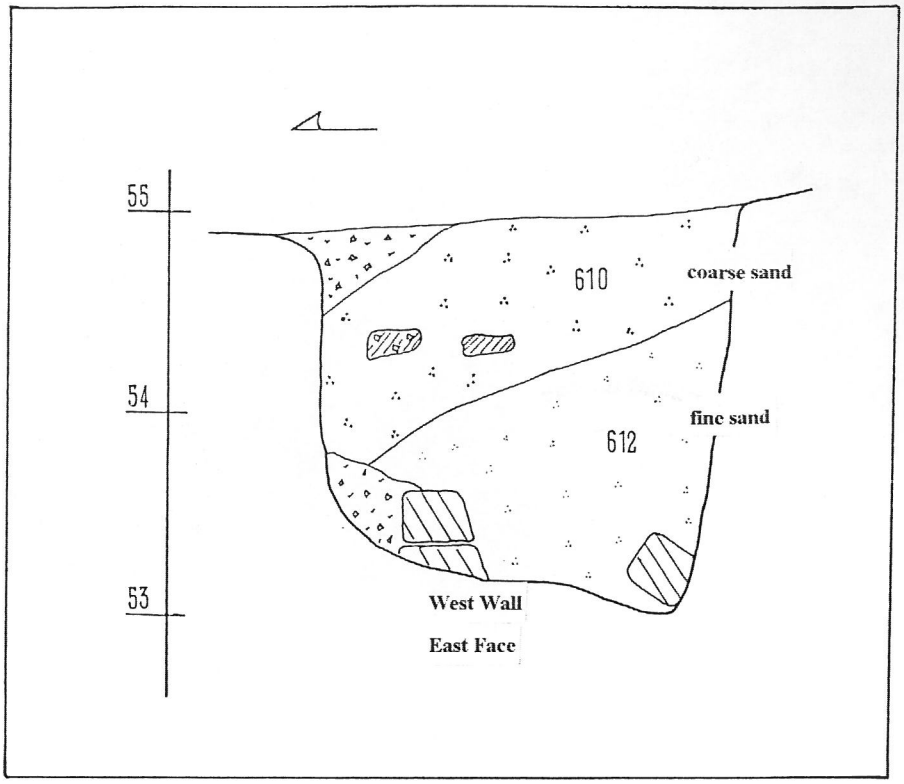


Sondage A12B South West Inner Corner of Gisr el-Mudir.



Sondage A12B Plan of South West Corner.

Fig. 3



Sondage A11 Section of deposits sealing the inner face of the West Wall
UTM metre grid Elevation 53.50m amsl.

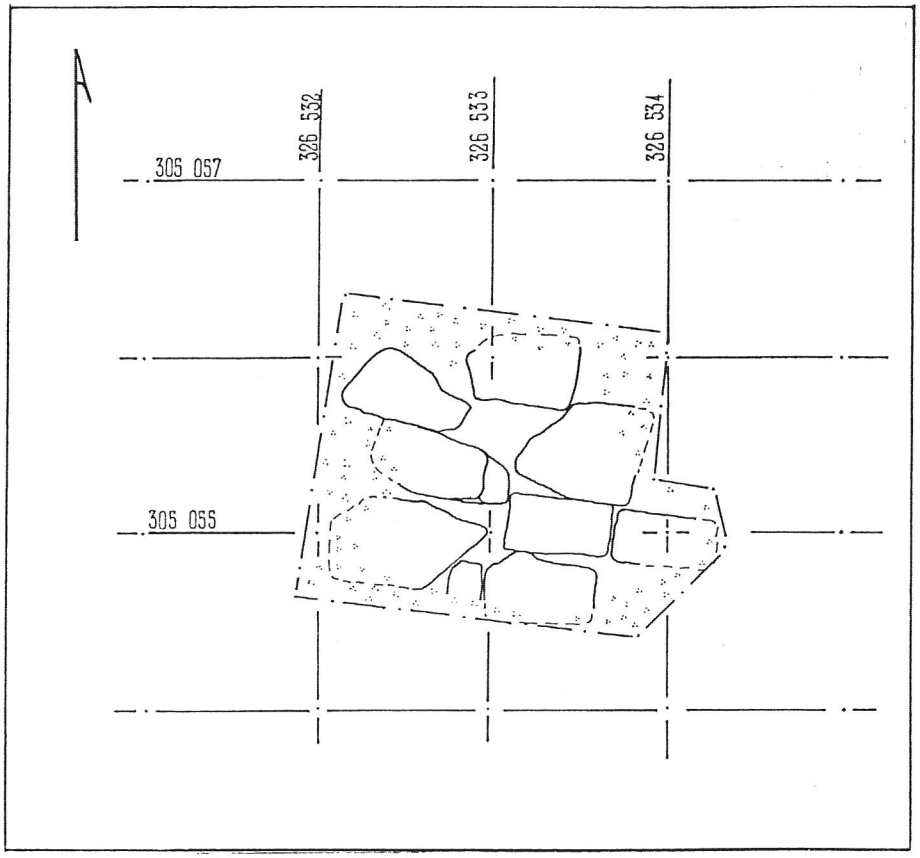
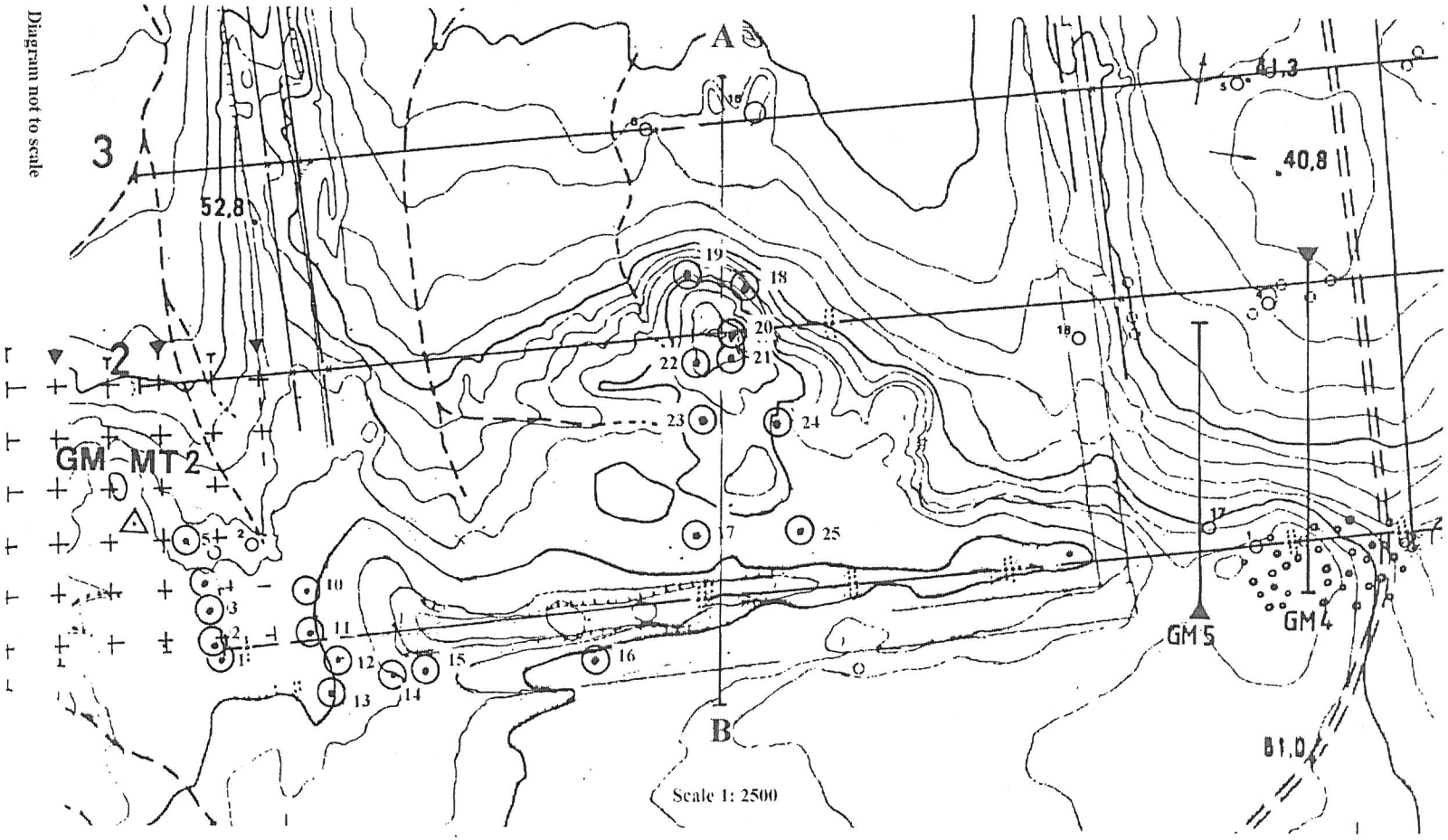


Fig. 3 A

Sondage A13+5m Plan of the articulation of the core masonry
UTM metre grid Elevation 54.0m amsl.

Diagram not to scale

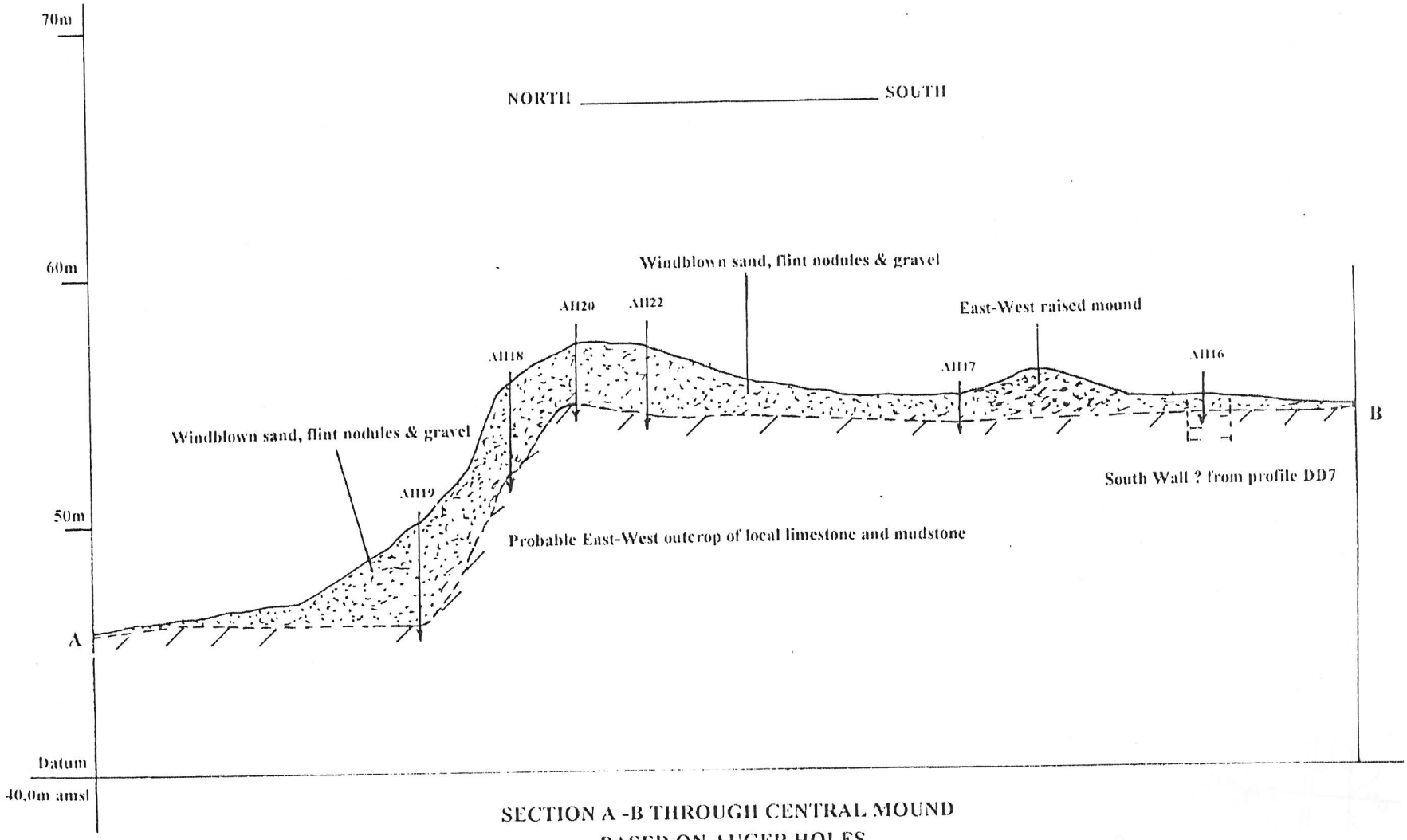


GISR EL-MUDIR SOUTH WEST CORNER AND CENTRAL MOUND

POSITION OF AUGER HOLES & SECTION A - B

Fig. 4

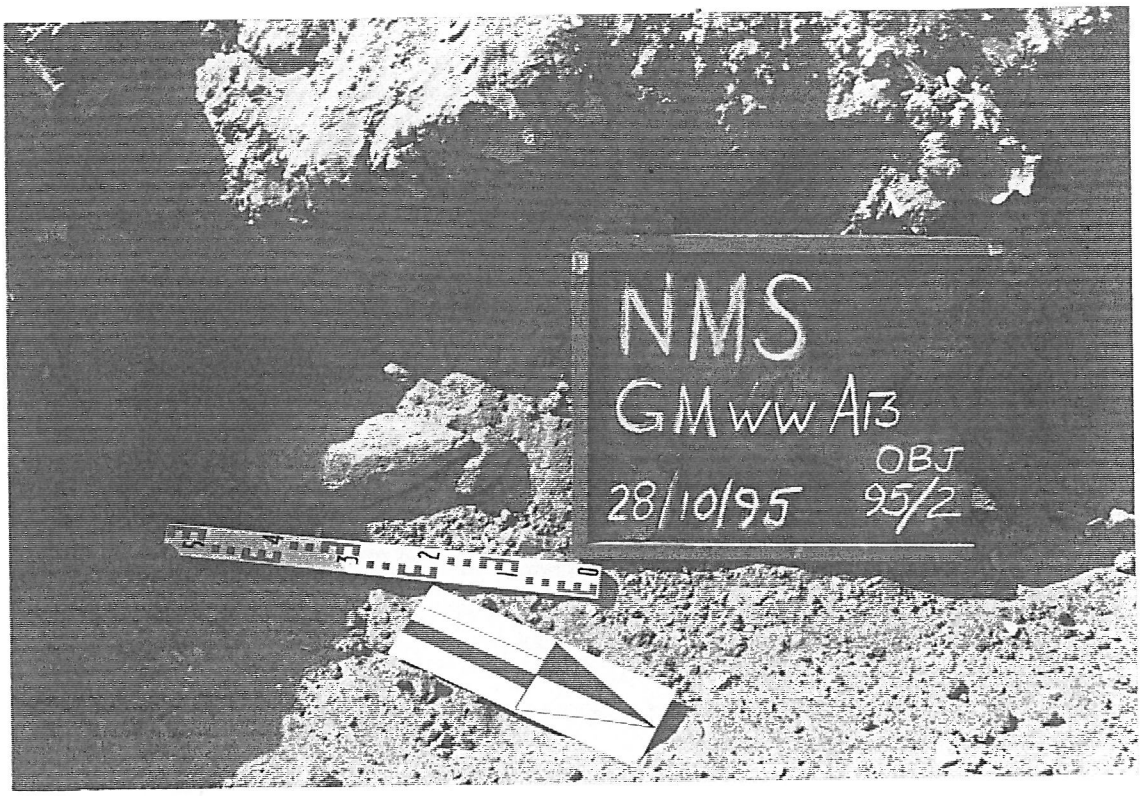
Fig. 5



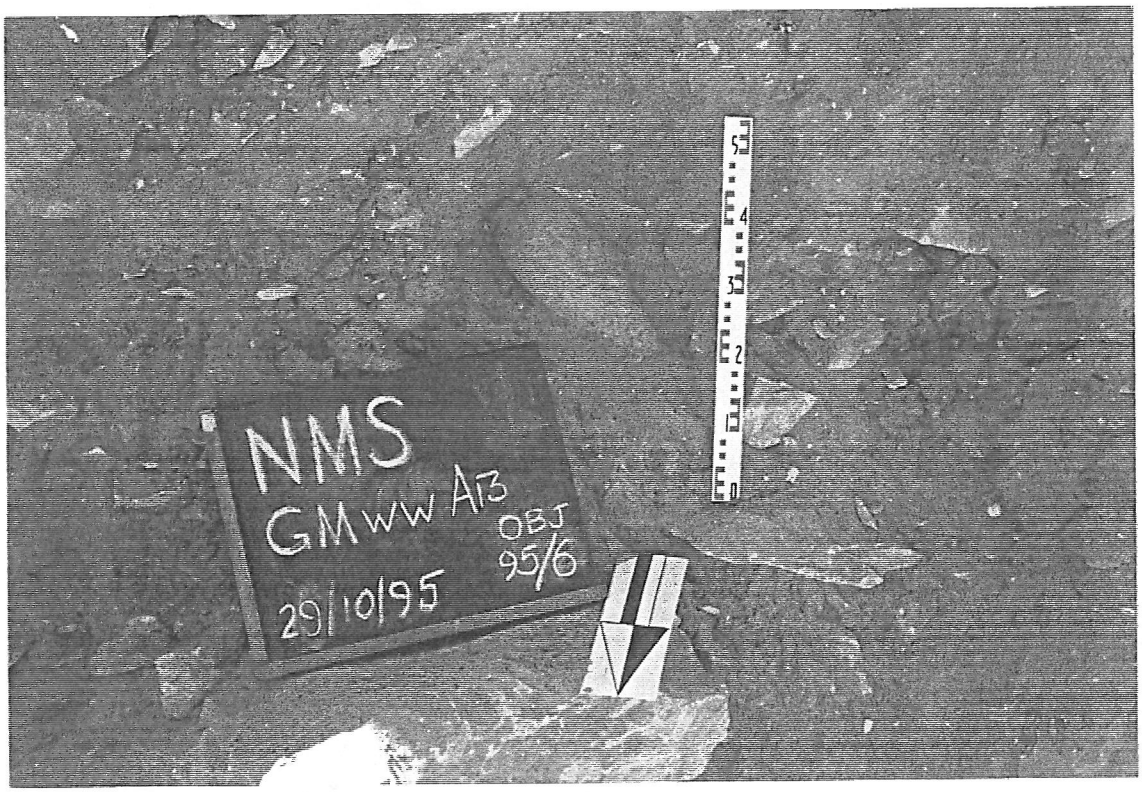
SECTION A -B THROUGH CENTRAL MOUND
BASED ON AUGER HOLES

Horizontal scale 1: 1250

Vertical scale 1: 200

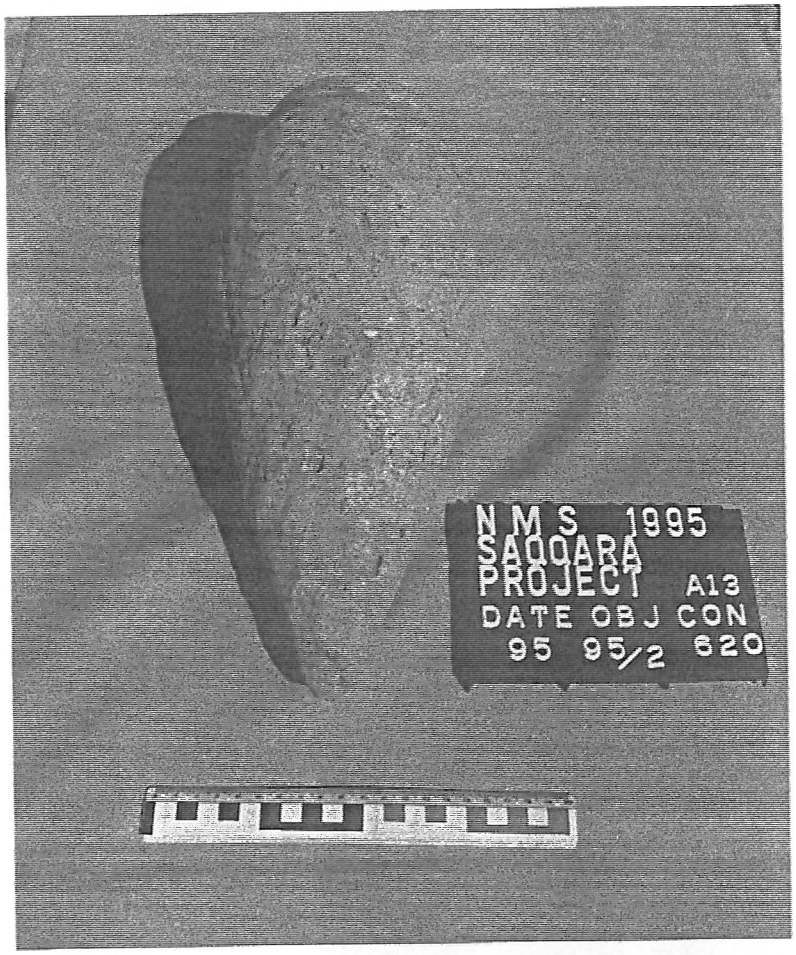


Sondage A13 Pottery beer jar Object No.95/2 as found within fill of wall.

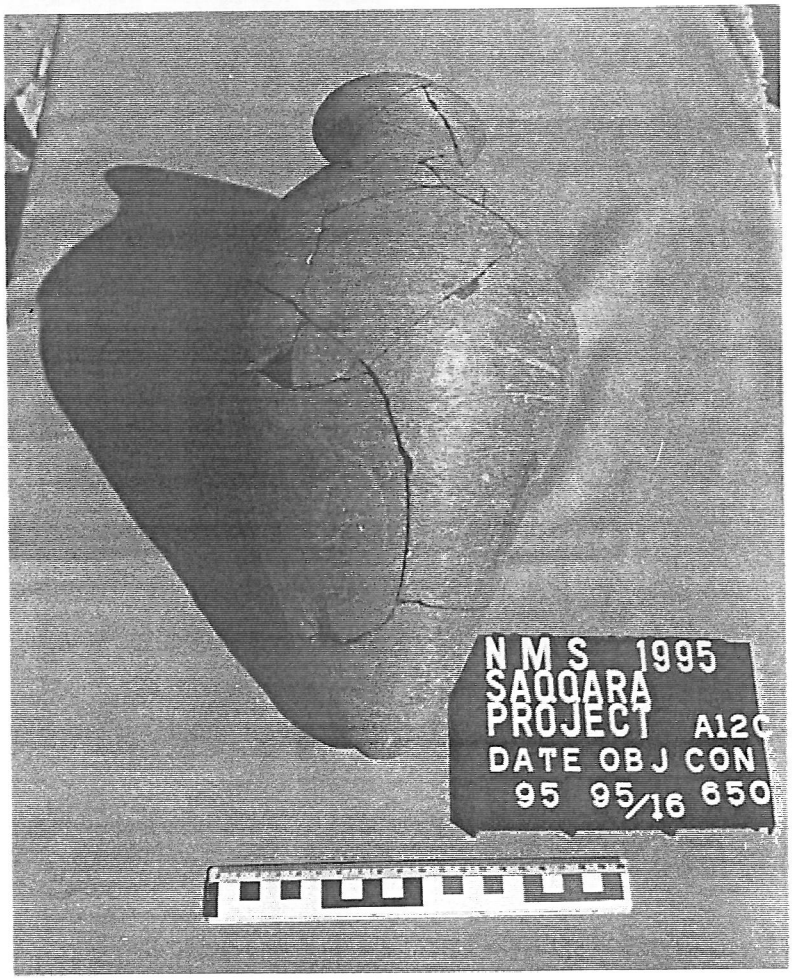


Sondage A13 Pottery beer jar Object No. 95/6 within South West corner fill.

Fig. 6



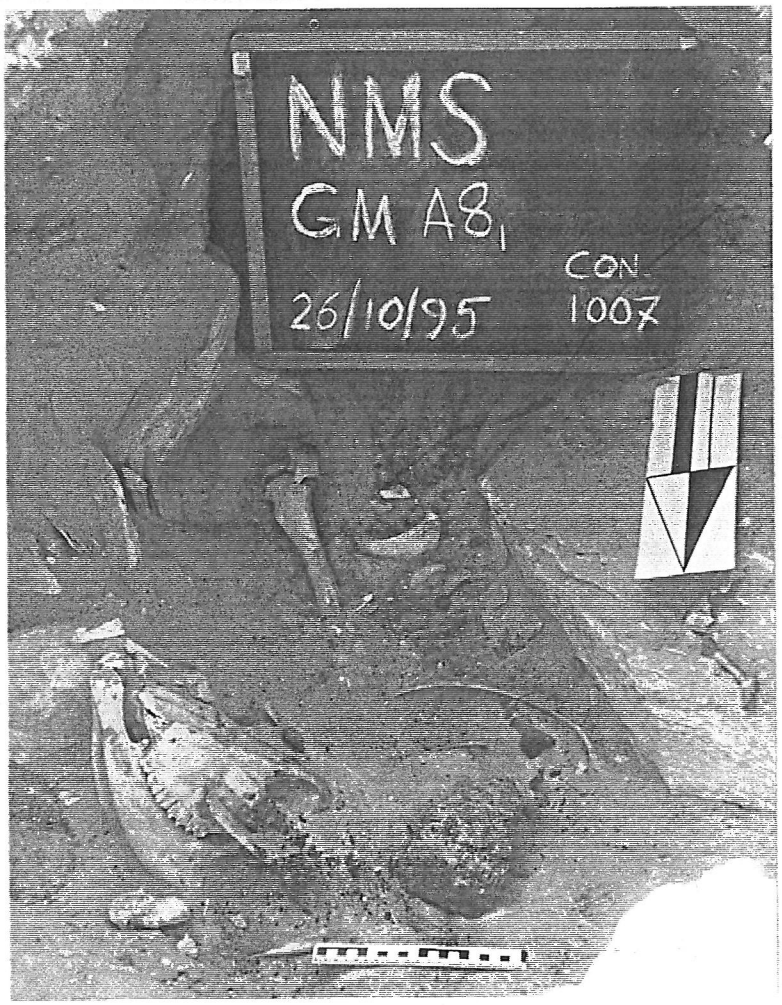
Beer Jar Object No.95/2
Sondage A13 Context 620
(within the fill of the wall)



Water Jar Object No. 95/16
Sondage A12C Context 650
(North face of South wall)

Fig. 7

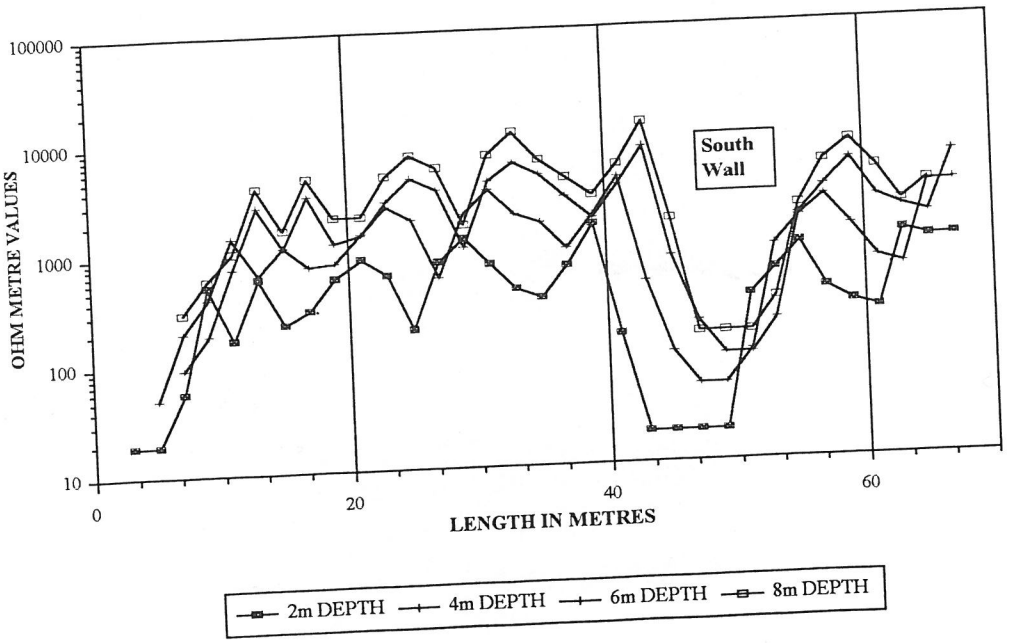
Human Skeletal Remains
(Young child)
Sondage B14A(1994)
Grave 17B Context 21



Faunal Remains
(Young Cow)
Sondage A8 Context 1007
(Under collapse of West wall)

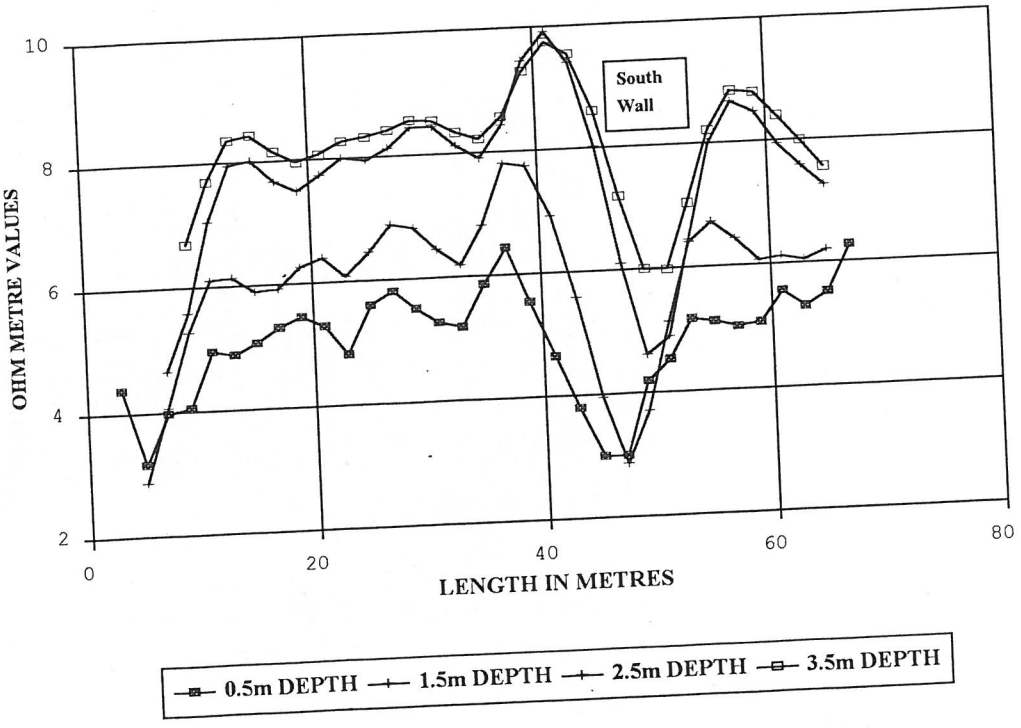
Fig. 8

SAQQARA NATIONAL MUSEUMS OF SCOTLAND
Pseudo-section of Line GMSWDDL10



Dipole-dipole pseudo-section of Gisr el-Mudir South Wall Line 10

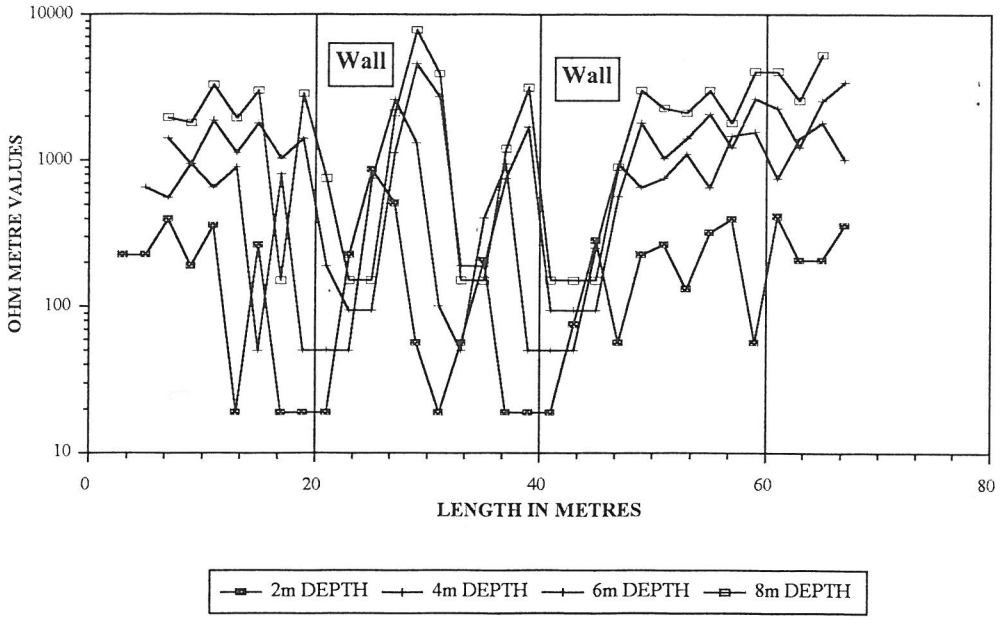
SAQQARA NATIONAL MUSEUMS OF SCOTLAND
Inversion Profile of GMSW95DD10



Dipole-dipole inversion profile of Gisr el-Mudir South Wall Line 10

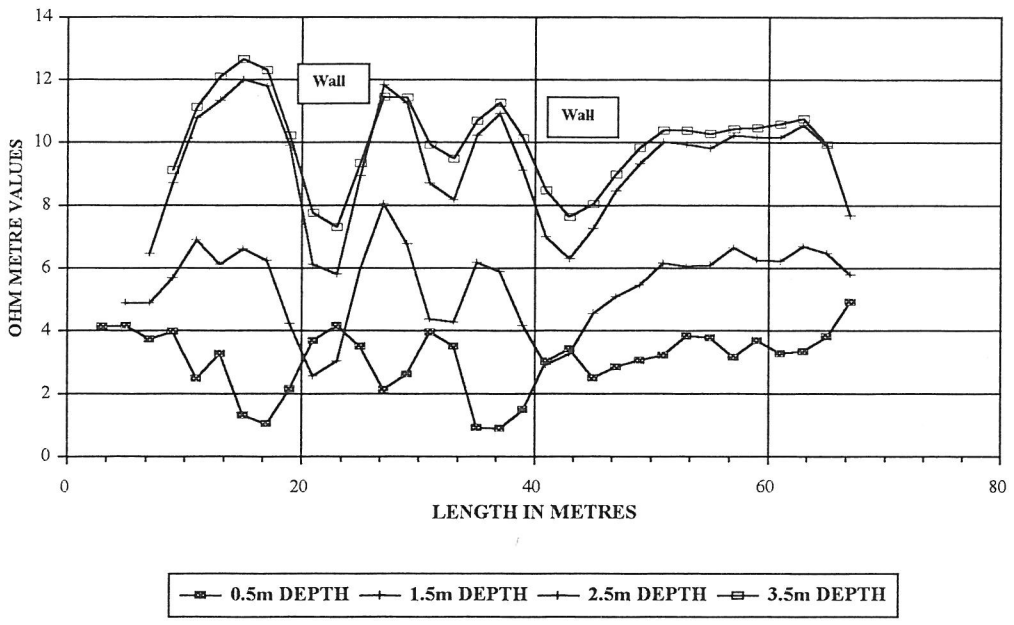
Fig. 9

SAQQARA NATIONAL MUSEUMS OF SCOTLAND
Pseudo-section of Line GMSWDDL12



Dipole-dipole pseudo-section of Gisr el-Mudir South Wall Line 12

SAQQARA NATIONAL MUSEUMS OF SCOTLAND
Inversion Profile of GMSW95DD12



Dipole-dipole inversion profile of Gisr el-Mudir South Wall Line 12

Fig. 10