

SAQQARA GEOPHYSICAL SURVEY PROJECT

PRELIMINARY REPORT

2005

**GLASGOW MUSEUMS
GLASGOW CITY COUNCIL
20 TRONGATE, GLASGOW G1 5ES
SCOTLAND**

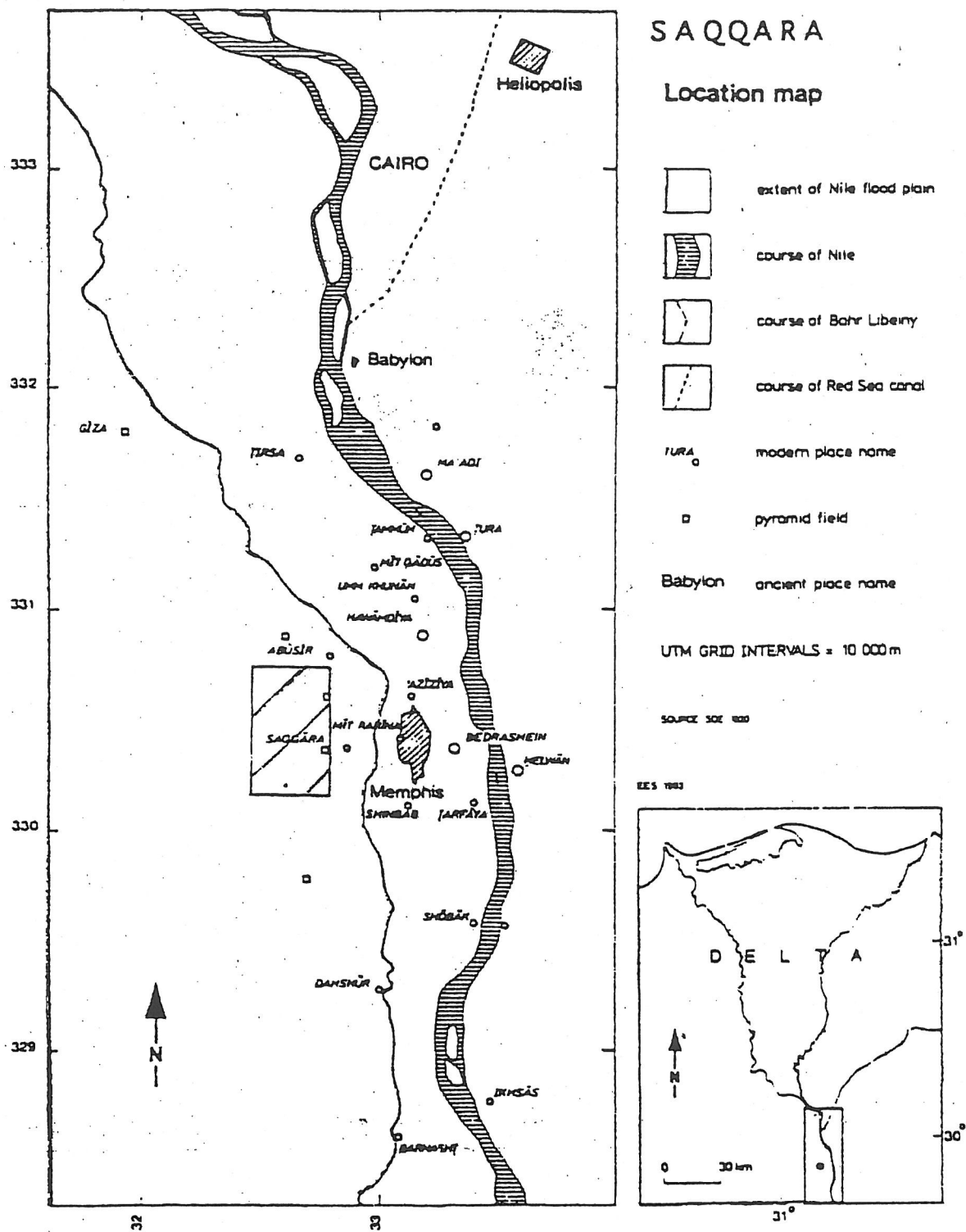
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**Elizabeth Bettles, Jon Dittmer, Salima Ikram, Elizabeth Jones
and Ian Mathieson**

Abstract: An interim report on the work carried out during the 2005 season covering the use of the model 18 Geoscan Gradiometer equipment to test previous geophysical results and record archaeological features on the north side of the Serapeum leading to the Teti Pyramid. The main discovery being the large mastabas to the north of the eastern end of the Serapeum Way.

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Glasgow Museums – Saqqara Geophysical Survey Project

THE SAQQARA GEOPHYSICAL SURVEY PROJECT

PRELIMINARY REPORT OF THE SAQQARA SURVEY PROJECT 2005

By Elizabeth Bettles, Jon Dittmer, Salima Ikram, Elizabeth Jones, Ian Mathieson

The aims of the Saqqara Geophysical Survey 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, this was 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; the structures lying to the west of the mastabas of Ptah-Hotep known as the L-shaped enclosure; the Serapeum and its dependencies; part of the Archaic necropolis; and the Sacred Animal Necropolis complex near the village of Abusir in the north.

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 under 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 Glasgow Museums, 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 Dr Zahi Hawass, Mr Magdy El Ghandour at the Secretariat, Mr Kamal Wahid Director of Saqqara, the Chief Inspector Hasama el Shami, Mr Afifi Rohiem Afifi the inspector attached to the mission.

The September – November 2005 season was undertaken with the generous financial support of grants from the Museums of Glasgow, The Friends of the Museums of Glasgow, Egyptology Scotland, The Gerald Avery Wainwright Fund, The Russell Trust, The Binks Trust, The Harris Trust, private and corporate donors.

The Glasgow Museums of Scotland field team comprised Ian Mathieson-field director, Dr Jon Dittmer-geophysicist, Dr Salima Ikram-faunal analyst, Dr Elizabeth Bettles-Egyptologist, Miss Elizabeth Jones-archaeologist. The 2005 season opened on 1st September and continued until 1st November.

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

Previous fieldwork carried out by the project - 1990 through 2005.

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, 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 confirm the structures the resistivity data had shown 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 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 southwest 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 the project was 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. The position of the South Wall of the Gisir el-Mudir and the southeast corner were located (Report 1999). In 2000 the Gradiometer was used for the first time and the results obtained showed this to be an ideal instrument for tracing mud brick structures. On the northern boundary of the L-shaped enclosure a line of rectangular anomalies was found and these formed the area for sondage excavation in 2001. In 2001 small sondages at the north side of three of the anomalies showed that they were probably temple casement foundations with entrance stairways on the north sides. In 2002 the project was sponsored by the Glasgow Museums and further geophysical findings

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

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)

showed more temple type structures and many tombs on the North side of the Serapeum and a study of the pottery from the 2001 sondage. During 2003 the entrance to one of the northern temple sites was excavated and proved to be similar to the southern temples in pointing directly at the Serapeum site. Geophysics was extended to the limit of the concession at the village of Abusir with many more tombs and structures located. A geological borehole survey was carried over the site of the assumed Lake of Abusir and showed that the lake had fluctuated between dry and wet conditions over the centuries. In 2004 the geophysical coverage was extended south towards the Step Pyramid and the ancient route of the burial of the Apis bulls, The Serapeum Way, was discovered along with attendant chapels and tombs.

The Objectives of the 2005 season under the sponsorship of Glasgow Museums were:

To continue the electromagnetic survey of the Gisir el-Mudir, the L-Shaped enclosure and extending across the Serapeum Way into the Sacred Animal Necropolis and to extend the survey east towards the Step Pyramid using the Geoscan Gradiometer instrument to measure the apparent influence of the surface material to a depth of approximately 3 metres.

To re-observe certain areas previously surveyed by other electronic means to obtain comparative results.

Fieldwork

Geophysical field work: (Fig. 1)

Following our extensive geophysical coverage of 2003 and 2004 and the discovery of many tomb structures and a complicated area of structures which could be large tombs subdivided by smaller burials, workshops or living quarters, it was decided to extend this survey to the east and south covering areas of very disturbed ground where excavations during 1850 to 1960 had uncovered many structures but the results had not been accurately surveyed and the structures were now covered by windblown sand and therefore lost to records.

Fig. 1 shows the present extent of the survey which has again discovered many new tombs and it is obvious that many of the structures are similar to early finds made by Mariette and De Morgan in the 1890's.

In addition to surveying several mastabas and smaller structures the major work of the season has been the continuing the survey of the Serapeum Way from the Tomb of Mereruka to the entrance of the Serapeum galleries at the end of the Dromos feature, which had first been excavated in 1882 by Mariette (Fig.2 & Fig.4). In addition, we found several very large mastabas to the north of the Serapeum Way which have not been recorded previously and may form part of an undisclosed new complex of structures stretching across the east of the necropolis towards the 1st Dynasty tombs at the edge of the escarpment (Fig 2 & Fig. 4).

The area lying between the Step Pyramid, the Ptah-Hotep tombs and the valley towards the Gisir el-Mudir was also investigated and several structures resembling the

previously found southern temples and small tombs were observed. Due to dumping of rubble from the old teahouse, which was heavily contaminated by metal refuse, the extent of the cut or quarry surrounding the Step pyramid could not be observed (Fig.3).

With the help of our inspector Mr Afifi and Dr Khalid Mahmoud we managed to retrieve the storage boxes from our 1994 and 1995 seasons which had been lost in the various magazines of Saqqara and Dr Bettles was able to make a full inventory of the contents of the four boxes to be published at a later date. The recovery of the Gisir el-Mudir beer jar and the internal residues being most important with the object of scientific analysis of the contents.

Conclusions

The geophysical survey was extended on the north side of the Serapeum and over to the tourist access road to the Ptah-Hotep tombs. We can now say that we have found or rediscovered the sub-surface signatures of most of the tombs and chapels reported by De Morgan and Mariette in 1882-1889.⁵ What is interesting is that there appears to be many more features in this area than those recorded by the two excavators.

Our work this year has once again proved the value and accuracy of the geophysical and topographic surveys. The use of the gradiometer to delineate sub-surface features has been amply proved by the small-scale *sondage* trenches excavated in 2001, 2002 and 2003 to test the anomalies. In all cases the accuracy of the topographic survey has enabled the *sondage* to be opened exactly over the anomaly shown by the geophysical data. The saving of labour time and the ability to keep the excavation to strict size limits means the environmental damage is controlled and at the same time the archaeological interpretation of the site is enhanced.

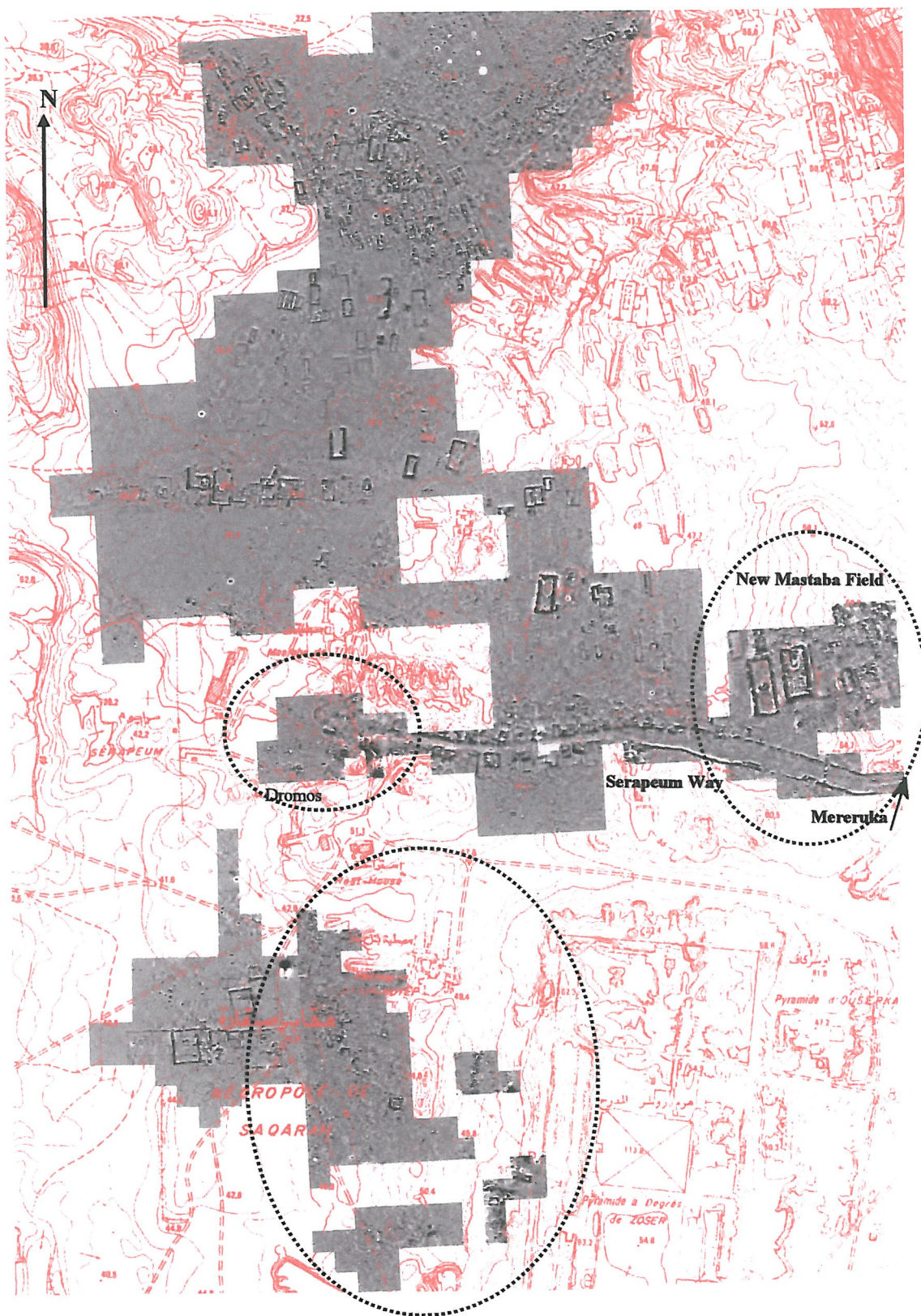
With the permission of the Supreme Council for Antiquities the Saqqara Geophysical Survey Project plan to continue the work through 2006 and complete the geophysical survey of the concession with particular reference to the area between the newly discovered mastabas and the 1st Dynasty tombs to the east and the Sacred Animal Necropolis to the north.

We also hope that permission will be granted to make some test pits to record and describe the construction details of mudbrick walls delineated by the geophysical results and to carry out scientific analysis of the beer jar contents.

Ian J Mathieson

Project Director

⁵ A. E. Mariette, *Les Mastabas de l'Ancien Empire*. G. Maspero Paris, 1889. J. de Morgan, *Carte de la Necropole Memphite*. Cairo 1897



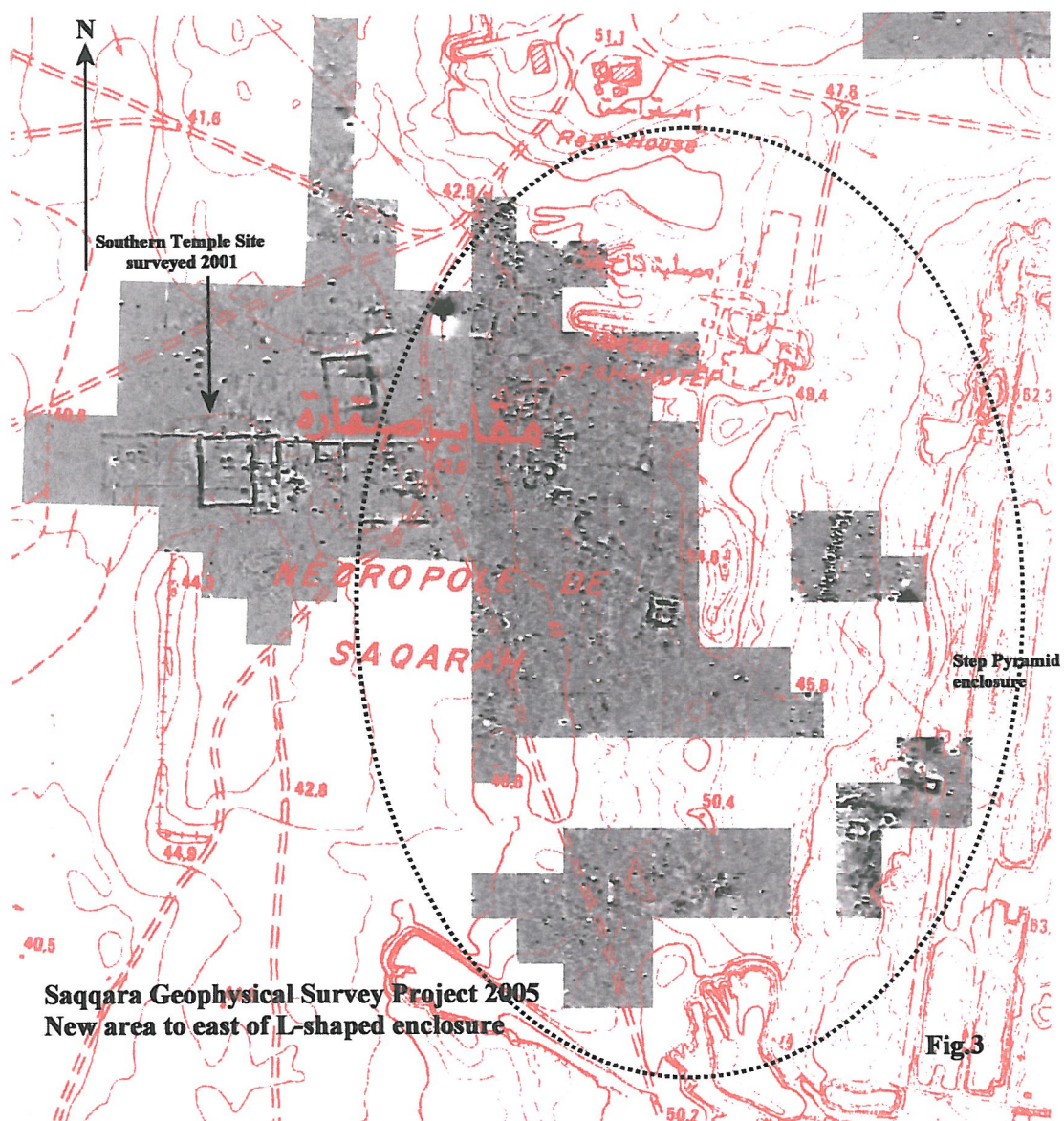
Saqqara Geophysical Survey Project
Areas surveyed in 2005

Fig. 1



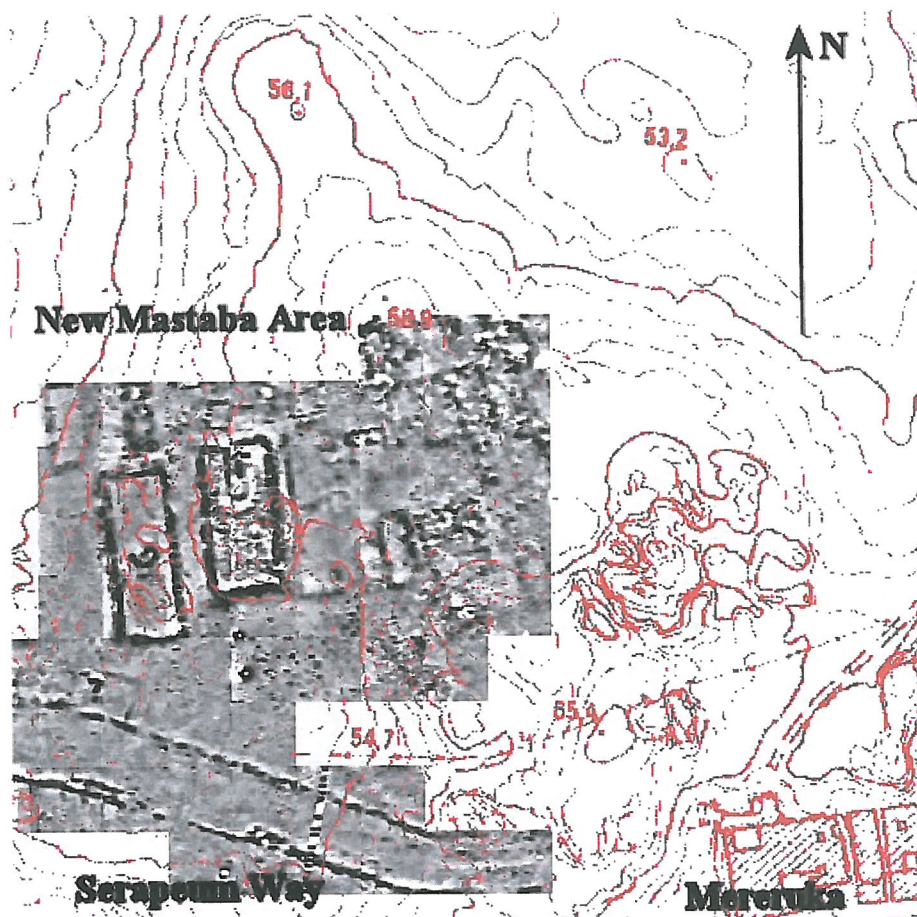
Saqqara Geophysical Survey Project 2005

Fig. 2

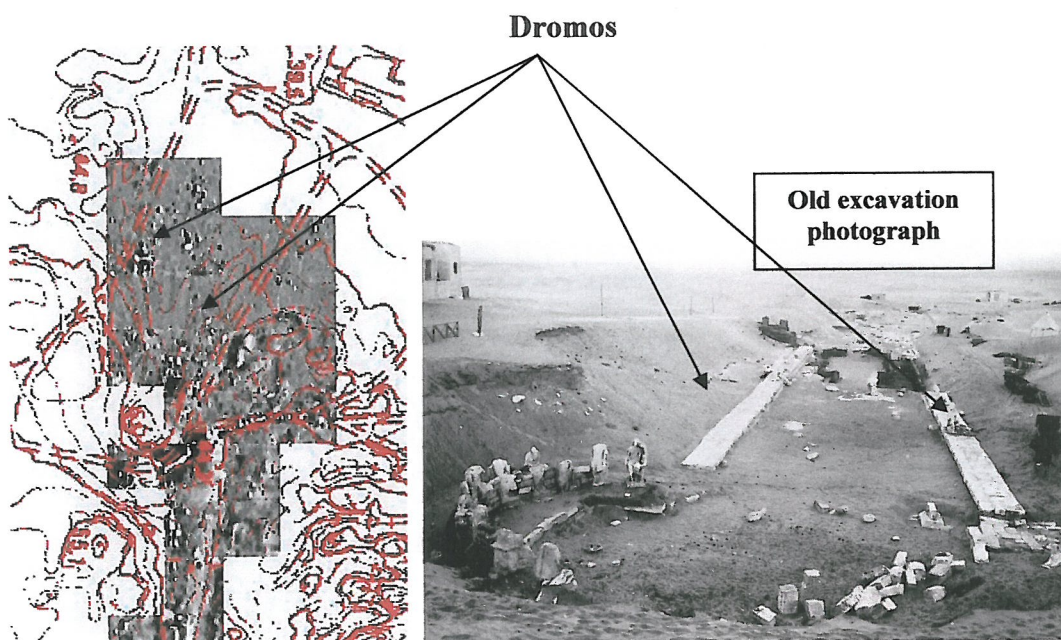


**Saqqara Geophysical Survey Project 2005
New areas to the east of L-shaped enclosure**

Fig. 3



Two unrecorded very large mastabas and several smaller structures



Faint outline of the Dromos now under several metres of sand

Fig. 4

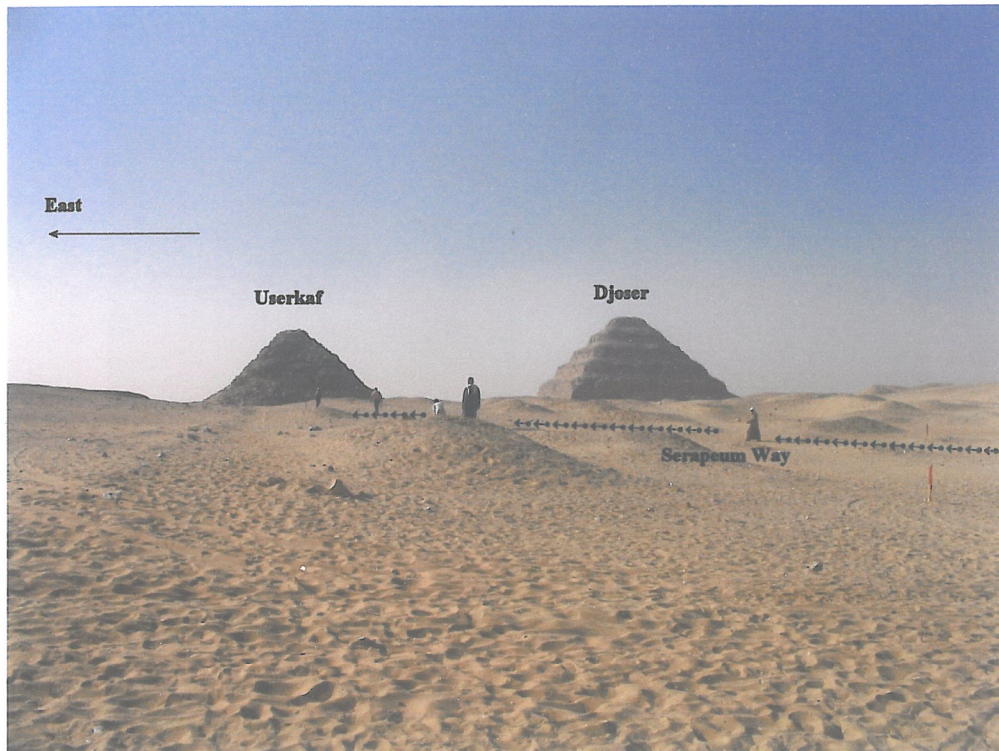


Plate 1a Serapeum Way approaching Mereruka Tomb



Plate 1b Traces of Serapeum Way above Mereruka & Kagemni Tombs



**Gisir el-Mudir Beer Jar recovered from magazines at Saqqara
Object No. 95/2 from 1995 excavations containing residues**



**Residues from Gisr el-Mudir beer jar Object No. 95/2
NMS95GMWW(620)95-2**