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Stamatis Sekliziotis

Ministry of Co-ordination and Planning,
Athens, Greece.

W. Gordon Collins

Remote Sensing Unit,
University of Aston in Birmingham (U.K.)

URBAN OPEN SPACE AND SOCIO-ECONOMIC CLASS: AN AIR PHOTO BASED STUDY

Abstract

A methodology has been developed for identifying, classifying and measuring open space in cities. A sample survey was carried out in the Merseyside Metropolitan County in which the type, condition and extent of urban open space was derived from colour infra red aerial photography.

The results were mapped and digitised, and the provision of open space was compared with the socio-economic class of the population. The results of this comparison are presented.

This study of open space was carried out with the support and co-operation of the Greek Government; the Department of Environment, London; and the Metropolitan County Planning Department of Merseyside County U.K.

There has been a dramatic change in the U.K. government policy regarding the establishment of new towns. The emphasis is now on the redevelopment of existing cities rather than on building new ones to rehouse the urban population. This has created an urgent need to carry out detailed surveys and inventories of many aspects of urban land use in metropolitan areas: this study concentrates on just one aspect - urban open space.

In the first stage a comparison was made between 1:10,000 scale black and white and 1:10,000 scale colour infra-red aerial photographs, to compare the type and amount of open space information which could be obtained from these two sources. The advantage of using colour infra-red photography was clearly demonstrated in this comparison.

The second stage was the use of colour infra-red photography as the sole source of data to survey and map the urban open space of a sample area in Merseyside Metropolitan County. This sample area comprised eleven $\frac{1}{4}km^2$ squares, on each of which a 20m x 20m grid cell was placed to record, directly from the photography, 625 sets of data. Each set of data recorded the type and amount of open space, its surface cover, maintenance status and management (derived from its condition). The data recorded were fed into a computer and a suite of programs was developed to provide a wide variety of data; output in both computer map and statistical form, for each of the eleven $\frac{1}{4}km^2$ sample areas.

The third stage involved a comparison of open space data with socio-economic status. Merseyside County Planning Authority had previously conducted a socio-economic survey of the county, and this information was used to identify the socio-economic status of the population in the eleven $\frac{1}{4}km^2$ areas of this project.

A number of interesting results emerge from this comparison, one example of which is outlined in this paper.

An initial requirement was to define 'open space' and compile a classification which was suited to the problem, and was related to what the source of data - in this case colour infra-red aerial photographs - could supply. 'Open space' was simply defined as "Land which was not covered by buildings" and Figure 1 shows the notation which was compiled in close co-operation with Merseyside County Planning Authority. The Authority also suggested the eleven $\frac{1}{4}km^2$ areas which they selected as samples to represent a fair cross section of the population and environment of the County.

Ten groups of open space were identified, and these were broken down into thirty nine sub groups, or Units. Because

the colour infra-red photography was so useful for distinguishing the various types of surface cover, sixteen surfaces were identified and included in the description of the open space units.

A 20m x 20m grid of squares was superimposed over each $\frac{1}{4}km^2$ sample area on the colour infra-red photographs, and 625 sets of data were recorded for each. Six digits were used to record the information on each 20m x 20m square: the 'dominant' use in each square was recorded

01	02	3	4

01 The open space type (unit)

02 Surface category

3 Degree of maintenance of surface

4 Condition of surface, from which was derived its management status

Because the information was recorded systematically in rows on a 25m x 25m matrix, the subsequent handling of the data was made easier. Each 6 digit unit represented $400m^2$, hence both the distribution and amount of each type of open space and its surface cover, could easily be derived from computer handling.

One matrix (Figure 2) was compiled to show, in four categories, the degree of maintenance of the various types of surface cover, related to the various types of open space units. Another matrix (Figure 3) was compiled to show in four categories, the management situation of the various types of surface cover, related to the various types of open space units. The management situation was derived indirectly from the observed condition of the surface cover.

Figure 4 shows an example of one of the computer/calcomp maps which were compiled of each of the eleven $\frac{1}{4}km^2$ sample areas.

All this data was fed into a computer which, in addition to producing maps, provided a substantial amount of quantitative data which were printed out as statistical lists.

A set of manual maps (Figure 5) was also produced which showed the distribution pattern and amount of the 'quality of management' of the open space.

The eleven $\frac{1}{4}km^2$ sample areas were part of a major socio-economic study carried out by the County Planning Authority. Each of the sample areas contained a population which

comprised a specific socio-economic class. This class, or status, was identified in four categories from High (1) to Very low (4), and the open space data was re-organised to relate to these four categories.

The first step was, in each of the $\frac{1}{4}km^2$ sample areas, to relate socio-economic status with the amount and type of the ten urban open space groups. (Figure 6). In this case the 'Neglected Land' category is selected as an example, but the data has been recorded from the aerial photographs such that any of the ten open space groups or even any of the thirty nine open space units which occur in the sample areas can be correlated with the socio-economic status of the population.

The second step was to relate each urban open space group, such as 'Neglected Land', together with details about its extent, surface cover, maintenance and condition, with the four grades of socio-economic status (Figure 7).

In the case of Neglected Land it is interesting to note that there is a direct relation between the amount of neglected land and socio-economic status: the lower the status of the area the greater the extent of neglected land. On the other hand there is no such obvious and direct relationship between status and surface condition: whilst the percentage of neglected land with a surface cover of bare soil shows a random distribution.

The combination of remote sensing for data collection, and computers for data presentation and analysis, provide a very powerful system which can be applied to a wide range of environmental planning problems.

The value of aerial photography in general, and colour infra red photography in particular, has been emphasised in this detailed urban land use study. A suitable methodology has been developed, and some interesting man/land relationships have emerged, which the authors hope will be of some value to those concerned with planning the future redevelopment of our cities.

URBAN OPEN SPACE USE NOTATION

CODE NUMBER	URBAN OPEN SPACE UNITS	
01	Heathland	1. Semi-natural Environments
02	Woodland	
03	Moss-land	
04	Sand Dunes	
05	Beaches	
06	Marshland	
07	Streams and Rivers	2. Water bodies
08	Canals	
09	Lakes and Ponds	
10	Reservoirs	
11	Oceans	
12	Private Gardens	3. Private Gardens
13	Parks	4. Amenity Open Space
14	Amenity Open Space-general access.	
15	Amenity Open Space-limited access, Institutional etc.	
16	Amenity Open Space - Industrial, Commercial.	
17	Streets lined with trees	5. Space for Transportation
18	Streets not lined with trees	
19	Railways	
20	Motorways	
21	Open air car parks	
22	Airfields	
23	Children's Playgrounds	6. Play and Recreation
24	Sportsfields and Stadia	
25	Golf Courses	
26	Educational Playspace	
27	Industrial Sports Facilities	
28	Other Open Air Playspaces	
29	Allotment Gardens	7. Agriculture and Horticulture
30	Agriculture & Horticulture	
31	Industrial/Commercial Ancillary Open Space (other)	8. Neglected land
32	Rough grassland	
33	Scrubland	
34	Derelict land	
35	Mineral Extraction	
36	Waste Disposal Sites	
37	Cleared Land	
38	Cemeteries	9. Cemeteries
39	Other Open Spaces	10. Other
00	Built Environment	

Figure 1.

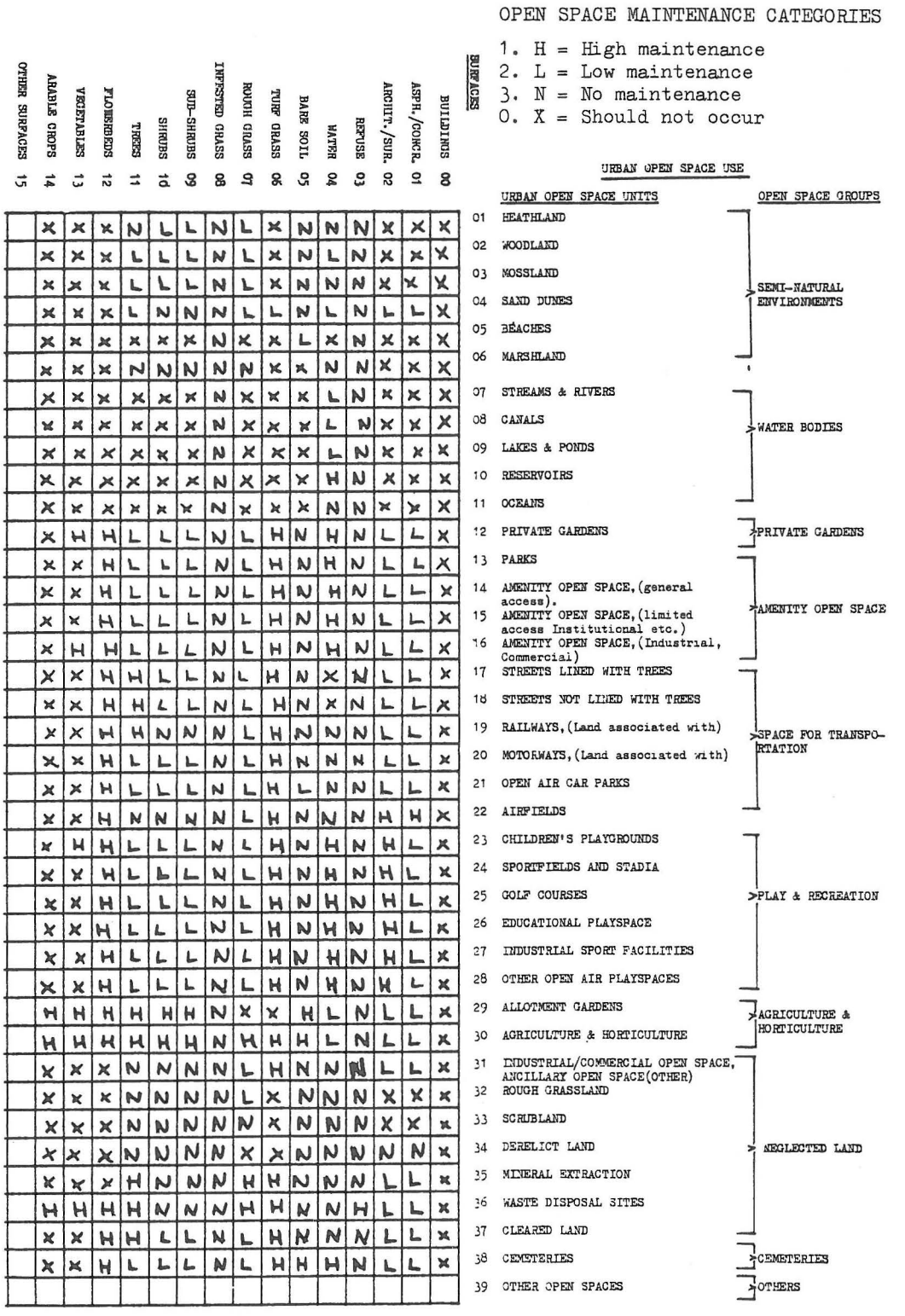


Figure 2. Maintenance matrix.

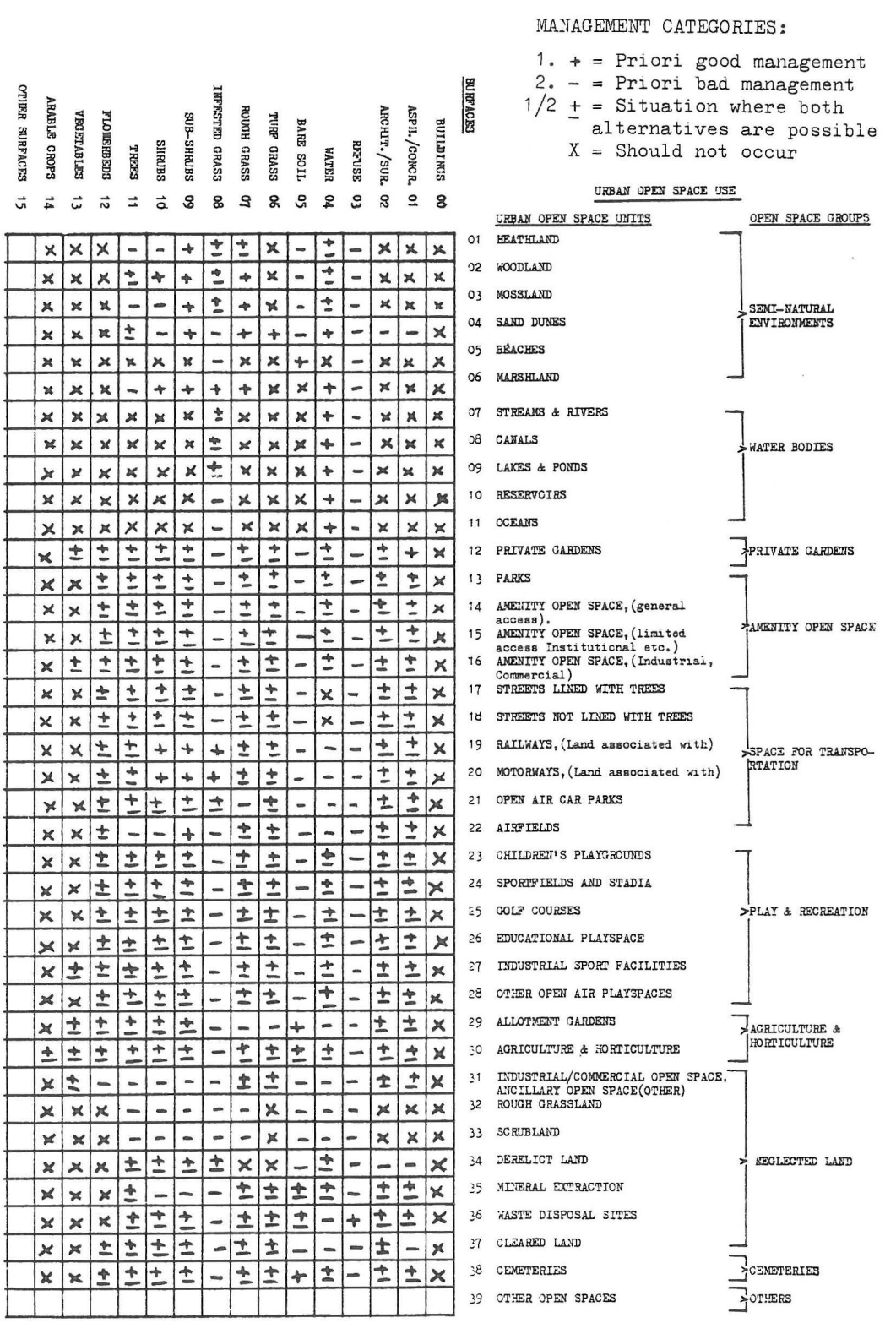


Figure 3. Management matrix.

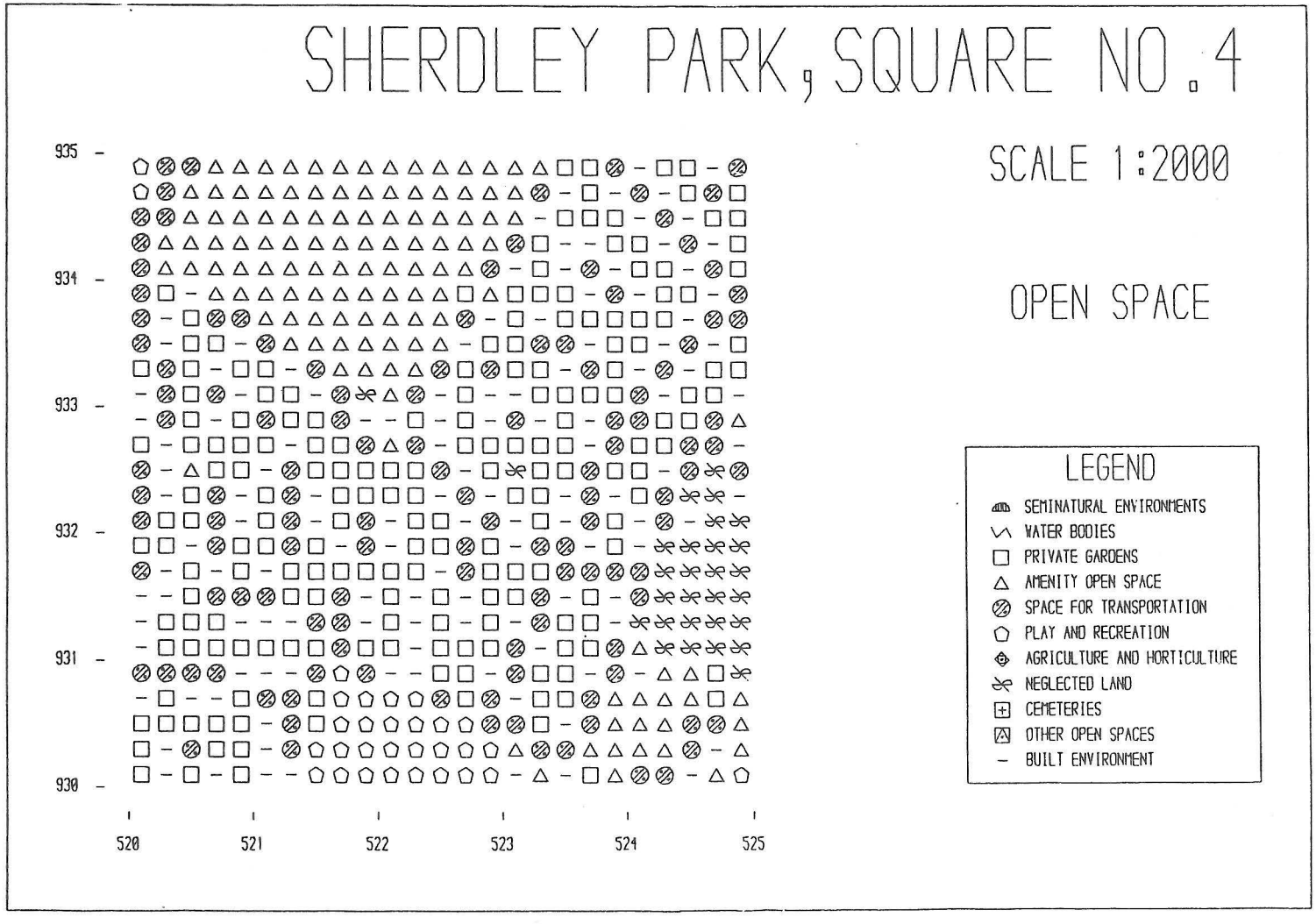
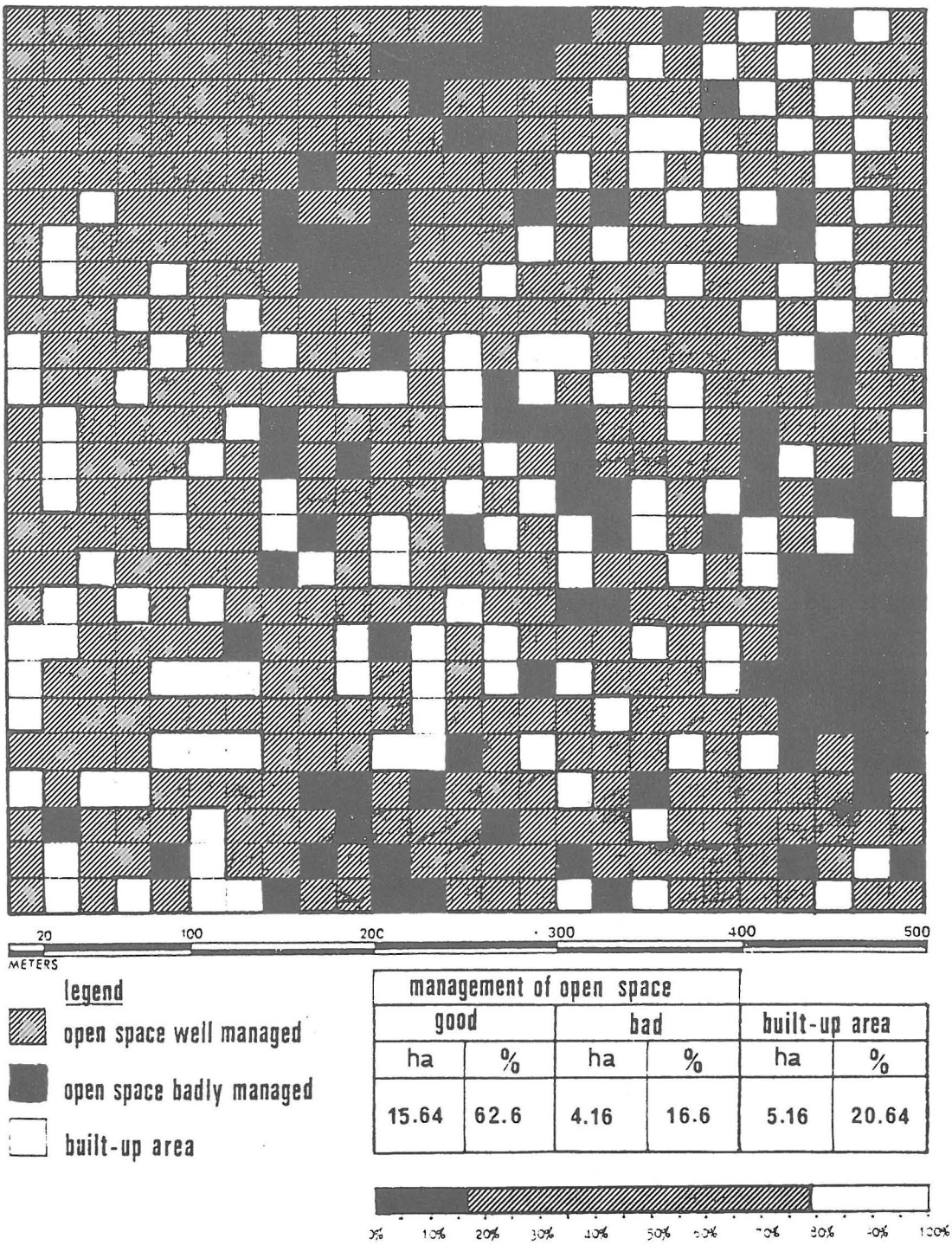


Figure 4. Calcomp map.



Management of urban open space.
Data from 1:10 000 false colour air-photography.
Sherdley Park.
Square No. 4.
High socioeconomic status.

Figure 5. Manual map.

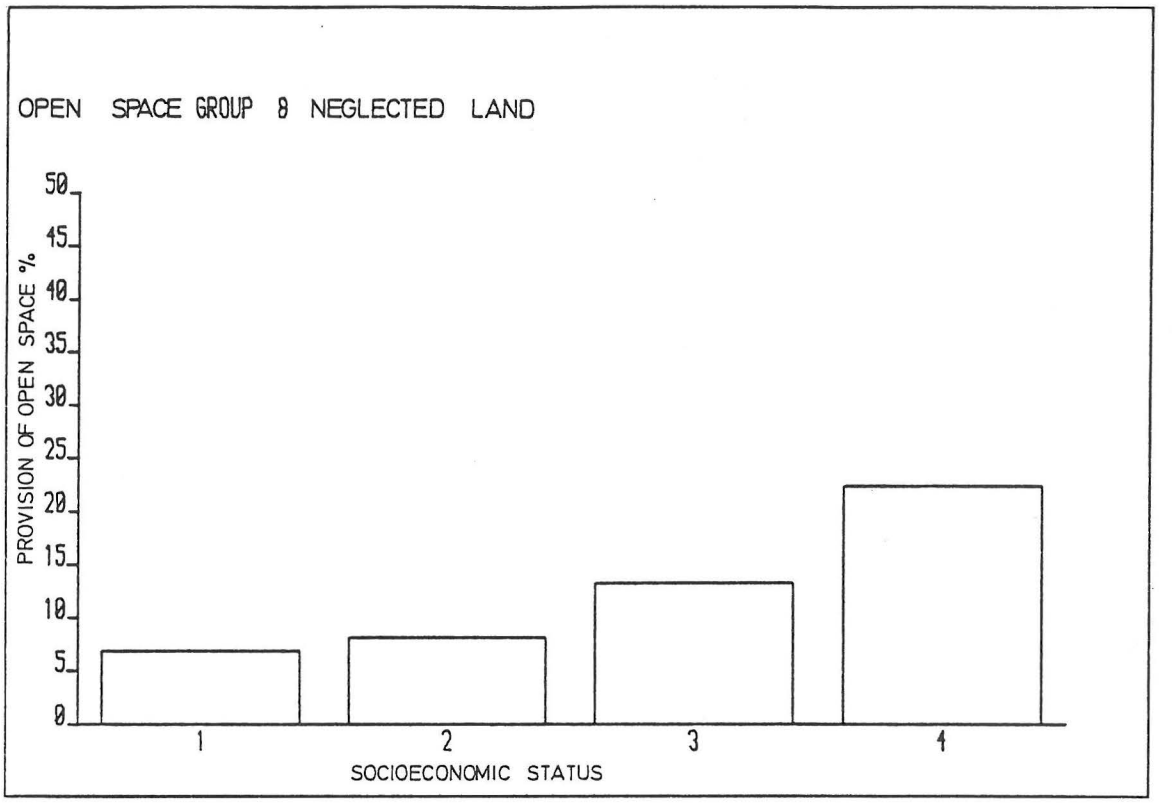


Figure 6. Amount of neglected land related to socioeconomic class.

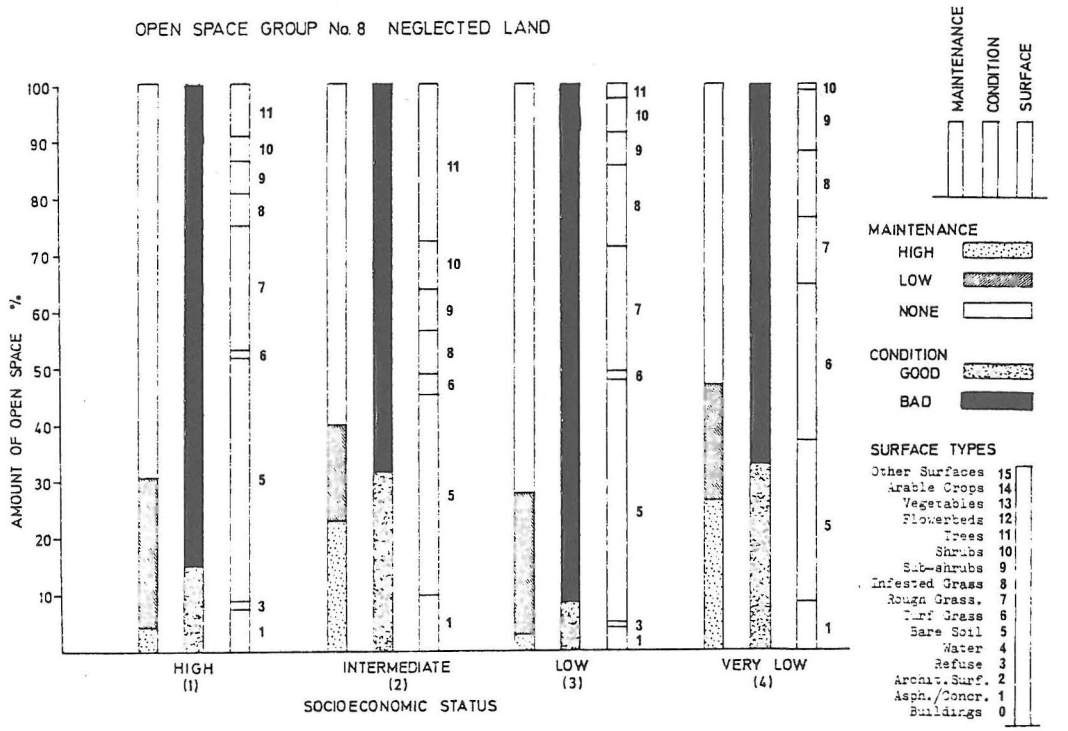


Figure 7. Type of neglected land related to socioeconomic class.