Merton Open Space Study:
Implementing a GIS

An Interactive Qualifying Project Report

Submitted to the
Environmental Services Department of the
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and to the Faculty of
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Abstract

This project, sponsored by the Plans and Projects Section of the London Borough of Merton, was a study of the ways that our sponsors could use Geographic Information Systems (GIS) to make decisions regarding open spaces, and other matters, in the Borough. The project involved training the Merton staff to use GIS and the software package, MapInfo; writing and presenting tutorials; and producing sample maps. Besides illustrating the capabilities of MapInfo, these maps visually presented the Borough's open space data.

Acknowledgements

Our project team would like to thank the following for their assistance throughout our project: The London Borough of Merton, The Plans and Projects Section of the Environmental Services Department, Richard Ainsley, Steve Cardis, Rob Naylor, David Lumb, Professor Laura Menides, Professor Stephen Weininger, Professor Fabio Carrera, Professor Seth Tuler, and Jennie Hawks.

Executive Summary

The London Borough of Merton hired WS Atkins planning consultants to assess the open spaces in the Borough for the Merton Open Space Study (MOSS). The MOSS represented the first stage in the production of an open space strategy for the Borough. The *WS Atkins Study* provided Merton with an evaluation of the quality of the open spaces, a list of the facilities available at the open spaces, a playing pitch assessment, and an initial analysis of this information.

The sponsor of our project, the Plans and Projects Section of Merton's Environmental Services Department, wanted to further analyse the *WS Atkins Study* using Geographic Information Systems (GIS). However, the Section did not have sufficient knowledge of MapInfo, the newly introduced GIS software package, to evaluate the findings using this method. As a result, we were commissioned to assist the Borough.

There were four objectives of the project. First, we examined the Greater London Authority (GLA) *Open Space Strategy Guide* to see how GIS could be applied to open space in the Borough. Second, we trained members of the Section in MapInfo, their newly introduced mapping software package. Third, we demonstrated how GIS can be applied to the MOSS, given in the context of the GLA's recommendations, by producing sample maps that provided the Plans and Projects Section with an overview of the possible uses of MapInfo. Lastly, we recommended how the Section can use GIS for other areas of their work, beyond the open space study.

We studied four documents that assisted us in various ways throughout our project. During our work on the PQP, we studied Merton's Unitary Development Plan (UDP). The UDP introduced us to Merton's current course of action for dealing

with open space. We were also supplied with a copy of the Borough of Sutton's completed open space study. Sutton's Study familiarised us with what is contained in an open space study. Upon our arrival in Merton, we were given a draft of the GLA's *Open Space Strategy Guide*. The Guide provides a framework for the production of a borough's open space strategy. Concurrently, our liaison provided us with a draft of the *WS Atkins Study*, which was the first stage in the MOSS. These four documents provided us with the relevant information to our project.

An aspect of our project that was of great importance was training the members of the Section. Before introducing the Section to MapInfo, we first gave a presentation on GIS. The presentation contained a definition of GIS and the concepts that make up a GIS. This presentation provided the Section with a greater understanding of GIS and how it will affect their work. Next, we created and presented a MapInfo training session. This session contained both a PowerPoint slide show and a MapInfo demonstration. We provided a step-by-step tutorial that allowed the members of the Section to follow along with the demonstration. The members can also use this tutorial at a later time to further their skills with MapInfo. As a follow-up to the initial MapInfo training session, we worked with the members of the Section who will be working frequently with MapInfo. These follow-up sessions went into greater detail, dealing with more advanced features of MapInfo.

To get reactions from our GIS and MapInfo training presentations, we created a follow-up questionnaire, which we sent to the members of the Section that attended the presentations. The members reported that although GIS is an extremely broad topic, our GIS presentation provided an adequate, clear, informative, and helpful introduction to GIS. For the MapInfo I training session, the Section members

considered the presentation, combined with the guided tutorial, to be an effective means of introducing MapInfo.

Our work with MapInfo, outside the training sessions, showcased the possible ways the Borough's planners may carry out the actual GIS analysis of the data for generating their open space strategy. We used MapInfo to provide the Plans and Projects Section with sample maps and charts from the WS Atkins' data. These maps and charts will be useful to the Section because they demonstrate different means of using MapInfo for the MOSS. The maps and charts that we created were based on certain criteria that we obtained from the GLA Guide, the suggestions within the *WS Atkins Study*, and the advice of our liaison.

Throughout the project, we encountered technical issues dealing with MapInfo. We provided recommendations for methods to improve or fix these problems. One such issue was using existing databases with the new GIS; we advised the Borough that there must be a common field within all databases. We also advised the Borough that it was necessary to develop a standard for file naming, map colours, and coordinate systems. For each of these issues, we provided the Borough with methods for a standard scheme. We recommended in-depth and specialised training sessions for the members of the Section that will be using MapInfo on a regular basis. Additionally, we suggested more hands-on use of MapInfo. The more use and practice the user has with the software, the more effective he or she will be with it. We also stated that MapInfo should be installed on more computers, allowing members of the Section better accessibility to the software.

Our training sessions and sample maps gave Merton's Plans and Projects Section a head start with their use of MapInfo. This was an important step, because MapInfo will impact the work of the Plans and Projects Section. Using this new

technology, the Section will be able to perform analysis that was previously not possible. Planners will increase their productivity by producing maps that will allow them to uncover patterns and trends within the data more quickly. The ability to create electronic versions of maps will both reduce paper usage and allow the Section to save backups of the data. Overall, this will allow Merton's Plans and Projects Section to provide a better service to the Borough of Merton.

Authorship Page

This project was the result of a collaborative effort by Neal Bradbury, Timothy Fox, and Steven Frank. All partners contributed equally to the report by working as a team and approving all sections.

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1 Introduction

The sponsor of this Interactive Qualifying Project (IQP) was the Plans and Projects Section of the London Borough of Merton's Environmental Services Department. As part of the Merton Open Space Study (MOSS), the Borough commissioned the WS Atkins planning consultants of Epsom in Surrey to conduct an assessment of the open spaces in the Borough of Merton. The *WS Atkins Study* provided Merton with an evaluation of the quality of the open spaces, a list of the facilities available at the open spaces, a playing pitch assessment, and an initial analysis of this information. The staff of the Plans and Projects Section wanted to further analyse this data using Geographic Information Systems (GIS). However, the Section did not have sufficient knowledge of MapInfo, the GIS software package newly introduced to the Section, to evaluate the findings using this method. As a result, we were commissioned to assist the Borough.

There were four objectives of the project. First, we examined the Greater London Authority (GLA) *Open Space Strategy Guide* to see how GIS could be applied to open space in the Borough. Second, we trained members of the Section in MapInfo, their newly introduced mapping software package. Third, we demonstrated how GIS can be applied to the MOSS, given in the context of the GLA's recommendations, by producing sample maps that provided the Plans and Projects Section with an overview of the possible uses of MapInfo. Lastly, we recommended how the Section can use GIS for other areas of their work, beyond the open space study.

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concepts that make up a GIS. This presentation provided the Section with a greater understanding of GIS and how it will affect their work. Our next presentation covered the basics of MapInfo. This session contained both a PowerPoint presentation and a MapInfo demonstration. We provided a step-by-step tutorial, which we created, for the MapInfo demonstration. As a follow-up to the MapInfo presentation, we provided three one-on-one advanced MapInfo sessions with members of the Plans and Project Section.

The IQP is a requirement for all students who plan on graduating from Worcester Polytechnic Institute. The purpose of the IQP is to expose students to the interaction between technology and contemporary society. It also opens future engineers' eyes to the projects that they are working on and to see how they will influence society. Organisations come to WPI because of its strong technology programme. The organisations benefit from IQPs because the students bring this technical aspect to the table. The students benefit in being exposed to a real world technical problem that has societal components.

The Merton Open Space Study Project was a true representation of the ideal IQP experience. As students, we learned the effect that open spaces had on the community of Merton; and in turn, the Borough of Merton profited by having students solve a technical problem for them. All involved benefited from the new skills and greater knowledge acquired from the project.

2 Background and Literature Review

The background and literature review section reflects the basis of our knowledge for assessing the Merton Open Space Study (MOSS). In this section, we reviewed literature that helped us understand the key topics of the MOSS. These topics include: The London Borough of Merton (LBM), open space, the *Unitary Development Plan* (UDP) of Merton, Geographic Information Systems (GIS), and the *Sutton Open Space Study*. GIS and open space are broad topics. We refined these two topics to extract the ideas that applied to our project. We researched the Borough of Merton by using its websites, which presented us with both the background and the structure of the Borough. The UDP lays out the future of open space within Merton, which provided us with a focus for our research. The *Sutton Open Space Study* provided us with ideas for the analysis of the data from the MOSS.

2.1 Merton

The LBM is one of thirty-two Boroughs in London. Merton is located approximately twenty kilometres south of the Thames River and is surrounded by six neighbouring boroughs: Wandsworth to the North, Sutton to the South, Richard-upon-Thames to the Northwest, Lambeth to the Northeast, Kingston-upon-Thames to the South-Southwest, and Croydon to the Southeast (Neighbourhood Statistics – London).

The LBM was created in 1965 when Mitcham, Morden, Merton, and Wimbledon merged to form the Borough that exists today. The motto of the Council is "Stand fast in honour and strength" (Merton – Your Council).

The population of the LBM in 1998 was approximately 184,300 people (Neighbourhood Statistics - Display Table). The area of the Borough is 9,380 acres

(3,795.68 hectares) or approximately 14.7 square miles (Merton - Neighbourhood - Areas Overview).

The Borough consists of twenty different Wards: Abbey, Cannon Hill, Colliers Wood, Dundonald, Durnsford, Figge's Marsh, Graveney, Hillside, Lavender, Longthornton, Lower Morden, Merton Park, Phipps Bridge, Pollards Hill, Ravensbury, Raynes Park, St Helier, Trinity, Village, and West Barnes. The open space that will be dealt with in the MOSS is located within these twenty wards (Merton – Your Council – Ward Index).

A mayor and a council of fifty-six councillors run the government of Merton. The current Mayor of Merton for 2001/2002 is Councillor Stuart Pickover. The Council is divided into different departments to manage the running of the Borough. These departments are Chief Executive's Department, Education, Leisure and Libraries, Environmental Services, Financial Services, and Housing and Social Services (Merton –Your Council – Council Departments).

2.1.1 Why is Merton Concerned with Open Spaces?

The LBM would like an up-to-date assessment of the open spaces in the Borough to see if the needs of the residents are being met now and will be met in the future. Councillor Russell Makin, who is a Cabinet Member for the Environment in Merton, said the following about the Merton Open Space Study: "The findings of the study and consultation will help to set out a Landscape and Open Space Strategy for the Borough. This will be very useful when setting out plans for the future use of open space and may help the Council bid for Funds to improve its open space in the future" (Merton - Living - Open Spaces). To achieve these objectives, the LBM has hired the consulting firm WS Atkins to plan and conduct a survey of the Borough's

open space. This study was completed in February 2002 (Merton - Living - Open Spaces).

The goals of the WS Atkins study were to gather information about the Borough's open space and then draw conclusions from the findings. The key questions that were addressed in this study are shown in Table 1:

Table 1: Key questions addressed in the MOSS

▪ Are there enough open spaces, outdoor sports, and recreation facilities in Merton?
▪ Which parks need more facilities, investment, improvement, and enhancement?
▪ Who uses the open space, what do they use it for, when and why do they use it?
▪ What prevents people from using open space?
▪ What are the likely future recreational needs?
▪ Does Merton need investment and improvement to its open space?

(Merton - Living - Open Spaces)

WS Atkins obtained such information by carrying out an assessment of the open spaces. They surveyed all the open spaces in the Borough; a copy of the survey used in the WS Atkins assessment appears in Appendix B. WS Atkins also conducted focus groups to determine what the residents of Merton think of the open spaces in the Borough (Merton - Living - Open Spaces).

2.1.2 Focus Groups

Four focus groups were held in January 2002 in the wards of Mitcham, Morden, Wimbledon, and Colliers Wood. These focus groups were located in four different wards around the Borough, so that they were accessible to everybody. In the focus groups, individuals from the community were able to express their opinions about the open spaces that they do or do not use. The issues that were covered in the focus groups were somewhat different for the informal user and the formal user. An informal user does not require an open space for his or her particular activity, whereas formal users require an open space for their activity. One example of an informal user

is someone who uses the park to walk his or her dog. An example of a formal user is someone who plays football every week in an organised league (Merton - Living - Open Spaces: Focus Groups).

The issues covered with the informal users were: how and when people used different types of open spaces, was there enough open space to use it the way that they wanted to, quality and condition of the facilities available at different spaces, access, safety, security, parking, accessibility, new ideas such as dual use for a space, comparisons to other boroughs, future needs, why nonusers were not using the open space, and any desired improvements or enhancement to the parks and open spaces of Merton (Merton - Living - Open Spaces: Focus Groups).

The issues covered with the formal users were the same as the informal users, except that other issues were added: quality and condition of existing pitches, quality of the changing rooms, parking, and floodlighting at these facilities; what were the users' experiences in other boroughs during away games; and does the Borough need different sports facilities. The four focus groups allowed the informal and formal users of the open space in Merton to express their issues, concerns, and new ideas about the open spaces in Merton. This information, along with the information about every open space in Merton, is intended to aid the planners of the Borough to determine what needs to be changed in the current open spaces, and what new facilities should be built in the future (Merton - Living - Open Spaces: Focus Groups).

Our project built on this study by helping the Plans and Projects Section of Merton use GIS to analyse the data from the survey to answer the questions that Merton has about the open spaces in the Borough. These questions are listed above in Table 1: Key questions addressed in the MOSS.

2.2 *Management of Open Space*

The readings of the literature for this particular section offered parallel attitudes toward the management of open space. The authors of the four books studied regarding this topic, Girling's *Yard Street Park,* Garvin's *Urban Parks and Open Spaces,* Francis's *Community Open Spaces,* and Cranz's *The Politics of Park Design,* share similar viewpoints on the subject of the development and management of open space. The following sections reflect these views.

2.2.1 Open Space

Open space is an extremely valuable commodity for communities for nature preservation, recreation, education, cultural heritage and aesthetics (Francis 11; Girling 1). The basic categories for open space include farmland, wetlands, rangeland, woodlands, parks, coastal lands and urban open space. Any of the undeveloped land in an urban area may constitute open space.

Open space can be designated as either functional or natural (Girling 2). Functional open space, for example, can include recreational areas as well as vegetated areas and drainage that contribute to erosion control and groundwater recharge. Natural open space is land that is set aside in an undeveloped state in perpetuity.

People benefit from the use of recreational services and activities supplied by urban open space and parks (Cranz 12; Garvin 205). Non-user benefits, such as the aesthetic value of a scenic view, are also afforded by open space. Other amenities include the intrinsic value of the flora and fauna preserved within open space, the role of open space as habitat in sustaining genetic diversity or stability in ecosystems, and the security of knowing that valuable natural areas will be available for appreciation

by future human generations. Only through proper planning and implementation can land be preserved, acquired and developed for open space purposes.

2.2.2 Social and Aesthetic Values of Open Space

Studies suggest that humans appreciate and desire areas of open vegetation (Garvin 30). It is somewhat less obvious what constitutes open space in the public eye, and what specifically is valued about open space. This section focuses on two specific dimensions: the social and aesthetic values of open space.

Open space has an aesthetic value: humans prefer natural landscapes over urban landscapes due to certain characteristics (Kaplan 340). Such characteristics are spatial openness, scattered trees or small groupings of trees, water, and uniform grassiness. In present day urban environments, these characteristics are most often found in parks and areas of recreation. The properties consistently yielding low preferences included restricted depth, disordered high complexity, and rough textures, which are commonly found in cities (Kaplan 340).

There is a large amount of literature addressing the social and emotional values of contact with natural open spaces. The discussion will be limited to issues related to stress reduction and social/emotional well being. Exposure to nature fosters a sense of psychological well being, reduces stress of urban living and promotes physical health (Parsons 3). Several studies provide evidence for the restorative effects of viewing natural settings (Kellert par. 8). Ulrich noted several psychological benefits of exposure to natural settings including: a recharge in physical energy, rapid decrease in stress, and reduction in aggression (18).

In studies of perceived benefits of wilderness recreation, stress reduction is consistently one of the major perceived benefits (Knopf par. 3; Ulrich 17). Moreover, it is interesting to note that people may actually seek out natural settings to promote a

sense of psychological well being. A large majority (75%) of university students, studied in the San Francisco area, report seeking out natural settings or urban areas dominated by natural elements when feeling stressed or depressed (Francis par. 21).

The restorative aspects of exposure to natural settings extend beyond issues of emotional well being to physical healing (Ulrich 21). A study by Ulrich of hospital patients identifies shorter postoperative hospital stays, fewer notations of distress in nurses' notes, reduced need for painkillers, and fewer minor postoperative complications in patients with a window overlooking a small strand of trees as compared to a brick wall (22). When one considers the restorative (both emotional and physical) effects of open space, the importance of open space becomes particularly important in relation to city planning. It takes open space out of the arena of "privilege" for wealthy elite, and places open space issues in the realm of public health necessity (Kellert par. 10).

In summary, theory and research support the social and aesthetic value of natural open space within the urban and surrounding environment. In general, there is a notable general preference for park-like settings that is unrelated to demographic characteristics of people. The preference for natural settings goes beyond aesthetic considerations and has implications for emotional and physical well being.

2.2.3 Parks

Parks encourage social interaction (Cranz 12). Parks provide a place for people to visit and enjoy life. Some parks focus on recreation, such as football and cricket, whereas others encompass nature and contain many trees and trails that instil a sense of relaxation. Parks are also critical to areas where few residents have backyards, and children need a safe place to play (Girling 120).

Larger sized parks can provide space for community events, large-scale recreational activity, and public or civic celebrations. In many towns and cities, it is a tradition to have a reoccurring event at a park, such as a circus or fair. These events bring the community together for enjoyment and interaction.

Often times, in the development of a community, parks act as a framework for the layout of the land (Girling 42). This is due to the simple fact that parks and green spaces significantly add to property values. Property values in Manhattan doubled during the 15 years after park development began in the 1940's (Girling 42).

Parks for Community Revitalisation

American cities, large and small, are creating parks as focal points for economic development and neighbourhood renewal (Economic Benefits Report, par. 9). "Revitalizing public parks is a phenomenally cost-effective way to generate community economic development," says Steve Coleman, a Washington, D.C., open space activist who helped restore Meridian Hill Park (Economic Benefits Report, par. 9). "If you think of [a park] as an institution, it can be a site for job training, education, or cultural performances" (Economic Benefits Report, par. 9).

Today, the restored park is frequented not only by residents, but also by busloads of tourists who enjoy the multiethnic ambience of the Meridian Hill neighbourhood. Visitation has tripled, and many park visitors patronise local restaurants and retail businesses. Occupancy rates in surrounding apartment buildings have soared (Economic Benefits Report, par. 10).

None of this would have been possible without the investment in the national historic site, says real estate developer Bruce Gunter, who has developed non-profit, low-income housing within the district. "The National Park Service is there for the long haul," Gunter says. "People considering commercial or residential development

can be confident that the benefits of the park aren't going to disappear" (Economic Benefits Report, par. 11).

What is a successful park?

The success of a park "emerges from its relationship to surrounding developments and from the special features that attract users and make the park central to a city's images and personality" (Francis 208). The development and maintenance of a park should be based on the advice and assistance of non-profit partners: academic institutions, urban planning groups, non-profit organisations, and the local community. The LBM's Unitary Development Plan (UDP) states that "the Council will take advice from relevant bodies…such as English Nature, the London Wildlife Trust and the Sports England" (UDP 186).

The developers of a park need to have a hand in the future plans of the city in which they are building (Girling 223; Francis 210). This will allow the developers to plan a park that is in tune with the direction of the city. For the LBM, these questions can be answered by studying the UDP. Most towns and cities have a documented plan for their future. Developers should research these plans and take them into account. This will allow the park to be useful for the oncoming generations.

Traditional parks generally fail because the planners failed to meet the needs of the users; the parks were over designed (Francis 11). During the planning of the park, the developers did not seek the involvement of the users, and instead relied on a personal vision. Francis argues that for a good park to exist, it must be designed with a community management strategy, recognise the presence of nature, and take into consideration the open spaces surrounding the park.

2.2.4 The Economic Value of Open Space

Governments and environmental organisations have long recognised the need to preserve certain open space lands because of their importance in producing public goods and services such as food, fibre, recreation and natural hazard mitigation or because they possess important geological or biological features (Fausold, par. 1). Accumulating evidence indicates that open space conservation is not an expense but an investment that produces important economic benefits (Fausold, par. 5). Some of this evidence comes from academic studies and economic analysis. Other evidence is from the firsthand experience of community leaders and government officials who have found that open space protection does not "cost" but "pays" (Fausold, par. 5).

Open space preservation results from the desire to counteract the effects of declining urban areas and suburban sprawl (Cranz 45). The growing use of habitat conservation plans for reconciling environmental and economic objectives also draws attention to the values of open space, especially in comparison to alternative land uses. Some communities work to conserve economically important landscapes, such as watersheds and farmland, or they preserve open space as a way to attract tourists and new business. Many communities are learning that conserved open space contributes to the quality of life and community character that supports economic well being (Garvin 23).

It is likely that most decisions about open space preservation will be made at the local level, due in part to the general trend of devolution of governmental responsibilities, as well as an increase in the institutional capacity and activism of local land conservation trusts. This is evident in the London infrastructure. The Greater London Authority creates a plan for boroughs on which they can base their UDPs off of; further information available in Appendix B – Greater London

Authority. Conservationists are frequently called upon to demonstrate to local communities the economic value of preserving open space.

2.2.5 Concepts of Value

Like all natural ecosystems, open space provides a variety of functions that satisfy human needs. However, attempting to assign monetary values to these functions presents several challenges (Fausold, par. 5). First, open space typically provides several functions simultaneously. Second, different types of value are measured by different methodologies and expressed in different units. Converting to a standard monetary unit involves subjective judgements and is not always feasible. Finally, some would argue that it is morally wrong to try to value something that is by definition invaluable (Fausold, par. 6).

2.2.6 Use and Nonuse Values

Much of the economic value associated with open space activities, like recreation, can be examined as use value and non-use value (Fausold, par. 7). Use value results from current use of the resource, including consumptive uses (i.e., hunting and fishing), non-consumptive uses (i.e., hiking, camping, boating and nature photography), and indirect uses (i.e., reading books or watching televised programs about wildlife). Non-use value is simply areas designated off limits to humans that are essential to the preservation of nature.

Activities directly or indirectly associated with open space may provide an important source of revenue for businesses and state and local governments (Fausold, par. 8). For example, hunting and fishing license fees are a major source of funding for state wildlife agencies. Less direct, but perhaps more important from an overall economic perspective, are expenditures related to non-consumptive open space

activities that also have income and job multiplier effects and often occur in rural areas with limited commercial potential (Fausold, par. 8).

The economic implications of use and non-use values across society can be very large, and many economists agree that these values should be considered in open space decision-making (Fausold, par. 33). It will never be possible to calculate completely the economic value of open space, nor should it be. Certain intangible values lose significance when attempts are made to quantify them (Fausold, par. 34).

2.2.7 Open Space Protection

Open space and recreation are vital elements in an urban environment. Open space is an extremely valuable commodity for communities for natural systems preservation, recreation, education, cultural heritage, and aesthetics. Only through proper planning and implementation can land be preserved, acquired, and developed for open space purposes. Open space protection is good for a community's health, stability, beauty, and quality of life (Francis 11).

2.3 Merton's Unitary Development Plan

After one has a good grasp on the current concepts in open space strategies, the Merton Unitary Development Plan (UDP) becomes very straightforward. The purpose of the UDP is "to provide guidance as to how changes to the Borough's physical environment should be directed and controlled, in the interests of meeting the needs of its residents" (UDP vi). Merton states that their emphasis for the next decade is now on "making our town centres more sustainable; maximising the re-use of brown field sites to increase provision of local facilities, such as housing; promoting sustainable transport; and minimising the threat to green spaces from development" (UDP vi).

The three priorities that Merton has set for open space are: "Urban areas should be the main focus for development; green field development should only take place after alternatives have been considered, and should have regard to the full social, environmental and transport costs of location; the environment should be protected and enhanced" (UDP 4).

2.3.1 The Natural Environment in Merton

The interaction of human beings with natural environments is important in terms of meeting their needs for a broad range of sensory experience (UDP 36). Open spaces represent a vital resource for reshaping cities and making them attractive places in which to live. "The ability to foster a desire for urban living is dependent upon being able to offer natural environments and open air leisure and recreational opportunities close to people's homes within urban areas" (UDP 37).

"The majority of the open space in the Borough is in suburban domestic gardens and in other small open spaces within the developed areas of the Borough" (UDP 125). These support much of the Borough's biodiversity. It is here, too, that most people enjoy nature. To ensure a safe, green and healthy Borough, Merton "will safeguard and enhance metropolitan open land, open spaces and sports pitches, areas of nature conservation importance, allotments, green chains and green corridors" (UDP 37). To improve the environment in the Borough, Merton "will seek improvements to the environmental quality of parks, open spaces and streets in the Borough by appropriate landscaping, habitat creation, tree planting and maintenance" (UDP 129).

Metropolitan Open Lands (MOL) are areas of predominately open land occurring within the built-up area that are significant to London as a whole and are protected against development. These areas make up a large percentage of the overall

open space within Merton. Merton "will ensure MOL is retained as green space and its open character is protected. In areas of MOL, [Merton] will encourage the restoration of damaged or derelict land, the enhancement of landscape character and quality, and the improvement of nature conservation value" (UDP 118).

Merton "recognises the importance of maintaining and enhancing a network of green corridors which are relatively continuous areas of green space leading through the built environment, and which link to each other and to larger green spaces or MOL" (UDP 123). These green corridors can assist in the movement of some plant and animal species through the Borough, which in turn ensures their survival in the Borough.

2.3.2 Leisure and Recreation

The focus of our research on open space is with parks and pitches. Pitches are recreational playing fields. In the coming years, Merton "will seek to improve the quality and range of leisure, recreation, sports, arts and culture facilities in appropriate locations and to protect existing facilities" (UDP 39). "Recent information on pitches suggests that there are variance in demand and supply across the Borough, and that there is in fact an overall shortage of quality facilities that meet the expectations of modern players and spectators" (UDP 188). Merton has a strategic role in providing playing fields for use by people from the wider Southwest London area. To overcome the lack of pitches in the Borough, Merton will promote and encourage informal recreation on areas of open land, provided there is no unacceptable conflict with nature conservation: "The Council will encourage the opening up of areas of private open land for public access and informal recreation" (UDP 181).

2.4 *Geographic Information Systems*

A simple definition of a Geographic Information System (GIS) is "an organised collection of computer hardware, software, and geographic data designed to efficiently capture, store, update, manipulate, analyse, and display all forms of geographically referenced information" (Johnson, Pettersson, and Fulton 11). A GIS combines layers of information about a place to give a better understanding of that place. What layers of information the user combines depends on his or her purpose.

Geographic information was first included in digitally processed computer files in the early 1960's (Johnson, Pettersson, and Fulton 11). The mid-1980s saw a massive growth in the field of GIS. Since that time, GIS has evolved into a valuable tool for visual analysis of a given system.

There are three major objectives of GIS: storage, analysis, and organisation. GIS has the ability to store vast amounts of referenced data in a computer database (Johnson, Pettersson, and Fulton 11). A GIS software program can then take these stored data and perform analysis that relates specifically to the geographic aspects of the data. Finally, the program can take the given data and organise and manage these large portions of information in a fashion that is accessible and useful to the user.

In order to make full use of a GIS certain requirements must be met: hardware, software, data, and user training (What Is GIS?). The hardware necessary for a GIS is a computer. GIS software provides the functions and tools needed to store, analyse, and display information about locations. A GIS can use data from a wide range of proprietary and standard map and graphics file formats, images, CAD files, spreadsheets, or relational databases. Due to the complexity of GIS, it is necessary for a person to be properly trained in order to perform analysis using GIS.

GIS can be applied to a variety of different tasks in a number of disciplines and fields of work (What Is GIS?). Common uses of GIS include: emergency services; environmental monitoring and modelling; business site location and delivery systems; healthcare; local, state, and federal governments; military purposes; or as a research and teaching tool.

2.4.1 Collecting Data for a GIS

To create maps using GIS, the user needs accurate and precise data (Martin 73). For example, if the user is trying to determine the locations of customers, the user will query the database of customer addresses to create that map. The user must ensure that the addresses are correct for the map to be useful.

The data capture process can be split into two different operations: primary data collection and secondary data collection (Maguire 239). Primary data collection is data collected by remote sensing or immediate sources. Secondary data collection relies heavily on previously collected data, such as old maps or census reports. Primary data collection is far more reliable than secondary data collection. Primary data is up-to-date and methods of collecting the data have evolved to become more dependable. However, secondary data collection is the largest source for GIS data collection because it is easier to acquire.

The user must decide which analysis method to use based on the original question and how the results of the analysis will be used (Longley 76). Data can come from a number of sources: databases within the organisation, contact managers, CAD files, the Internet, commercial data providers, or government organisations. What data is chosen and where it comes from depends on needs and budget.

2.4.2 Data Models for a GIS

Data for a GIS comes in three basic forms: spatial, tabular and image data (Data Types and Models). These data types can be further classified into data models. There are two types of widely used data models for a GIS, vector type and raster type. Vector and raster models conceptualise, store and represent the spatial locations of objects differently (GIS Guide to Good Practice).

The vector model defines the spatial locations of features using a co-ordinate system. Vector models use discrete line segments or points to identify locations. Connecting line segments for discrete objects such as boundaries, streets and cities. Attribute data about the individual spatial features is maintained in an external database.

Vector data are topologically based (GIS Guide to Good Practice). Rather than with actual linear dimensions, topology data is concerned with order, contiguity and relative position. One example of a topological map is the London Underground. This map is a precise representation of the stations (points) and the routes (lines) between them, but it does not provide a very accurate indication of their relative locations and there is no indication of distances between them.

Raster data models merge the spatial representation of an object and its related non-spatial attributes (GIS Guide to Good Practice). The area under study is divided into a grid of cells. For this type of model, spatial data is not continuous; instead it is divided into discrete units. Each individual cell is referenced according to its row and column position within the overall grid.

For the raster data model, unlike the vector model, there are no hidden topological relationships in the data, because raster models represent the behaviour of

attributes in space, while vector models record individual spatial features (GIS Guide to Good Practice).

2.4.3 GIS Socio-economic Effects

An important application of GIS is socio-economic or population-related data analysis (Martin 4). Population-related data are data originally relating to individual members of a population that are scattered across geographic space. For example, the results of censuses or surveys and the records gathered about individuals by health authorities and local governments deal with a variety of people from a variety of places. These data are contrasted with those that relate to physical objects with definite locations, such as forests, geological structures and road networks. Clearly, there are relationships between these types of phenomena, as they both exist in the same geographic space. However, in terms of the data models it is important to recognise the distinction between them.

A GIS geared towards the representation of the socio-economic world must adopt one of three approaches (Martin 163). The first is an individual-level approach, in which data are kept relating to every individual person in the population. Databases of this kind tend not to be strictly geographic, due to the difficulty of assigning unique spatial references to individual members of the population. The second approach includes conventional census mapping. The rationale for this method is that geographic spaces are divided into zones, with all change occurring across zone boundaries. Census-type data are available in this form. For some applications concerned with the built environment this may be the obvious division of geographic space. The third option begins with the assumption that some socio-economic issues are important to the geographer and are continuous over space.

These three approaches represent different ways of analysing population-related phenomena, and affect the form of all operations on the data (Martin 163).

Of the applications for population data, none provide an ideal single model of the socio-economic environment (Martin 166). Population-related data can only be indirectly geo-referenced. True geographic patterns in the data are obscured by the idiosyncrasies of the zoning scheme or postal system through which they have been assigned a geographic location. Some data concerning the broader socio-economic environment are not strictly population-based, but relate to properties of neighbourhoods, in which case it is important to recognise that different basic spatial objects are involved.

2.4.4 GIS Legal Issues

When implementing a GIS, one cannot overlook the legal implications of this powerful technology. This technology, like many other computer related technologies, is a double-edged sword. GIS provides instant access to vast amounts of information, but at the same time there is the opportunity for abuse, misuse, and the invasion of individuals' privacy (Cho 22). The legal issues of GIS can also be extended to the relations between people, information, and its use (Cho 22).

In George Cho's book *Geographic Information Systems and the Law*, it is estimated that as much as four fifths of government data are GIS data (22-23). This is substantial if you consider the size of a government such as the United States. With the government having so much data at its disposal, an issue of ownership arises. If the taxpayers pay for the collection of government GIS data, then in a sense the data belong to the public. This argument brings with it unresolved legal issues, such as: 1) who owns the information and 2) who has liability for errors in the information (Cho 23)? Cho suggests that a way to help this situation is to have "an educational process

in which public and government agencies are reminded about their respective rights and obligations in the sharing of geographic data" (23).

With the many uses of GIS technology and the availability of the data to the public, two issues to consider are the quality and the use of the data (Cho 23). Three questions relating to the quality and the use of the data that Cho (23) suggests need to be resolved are:

1. Who is going to be legally responsible for the consequences of the use or misuse of the data?
2. Who will monitor the onward transmission of the data to third parties?
3. Who will ensure their accuracy as more and more contributors add to the datasheet?

An example to illustrate these three questions is to consider a contractor who has a utilities map, which shows the locations of underground conduits. Relying on this map, the contractor sees no obstructions in the ground where a bore will be sunk. The contractor finds out quickly, however, that the bore he was sinking has hit an underground conduit. According to the map there was nothing there. Who is responsible for the accident? This type of legal question involving GIS technology is an example of how GIS could be the basis for a legal case (Cho 23).

GIS technology brings to the user of these systems a wealth of information about an individual's activities and property. This means that the personnel that use GIS have to be trusted to work with a high ethical standard. To illustrate this point, Cho uses an example of compiling a map of owners of property in an area (24). What if, however, the user takes this map and then uses a query to display the number of pieces of property that each owner owns. That type of information was not the original reason for collecting the data, but using GIS allowed the user to extract more information from the data. This is an example of a simple query, but the possibilities are not limited if the user has access to the data and has enough experience with GIS

technology. This example illustrates that not only are there legal issues with GIS, but there are also ethical issues (Cho 24).

There are many different types of legal cases concerning GIS technology. Examples of these different types include: issues relating to contract law, tort law, open records policies, intellectual property such as copyrights and patents, law of evidence, and in the United States antitrust competition laws (Cho 24-25). The advice that Cho suggests in dealing with GIS legal issues is that people should "arm themselves with an awareness of legal issues, and avoid dispute with the right questions to good legal advisors, and sound contractual procedure" (25). In general, this advice can be applied to other types of legal issues. It is common practice to make sure that a user of GIS is well equipped with knowledge of the legal issue relating to GIS.

2.4.5 GIS within the British Local Government

British local government is generally departmental in style (Worrall 41). Working practices and programmes reflect the aim of achieving departmental objectives rather than broader organisational goals. In contrast, the study of Information Technology (IT) has been noticeably organisation-wide. By virtue of its newness, lack of traditional proponents, and its relationship with centralised computer departments, "IT has become an accepted vehicle for interdepartmental co-operation" (Worrall 41). Most local authorities have developed an IT Strategy. Despite the non-controversial nature of such developments, departmental jealousies, organisation instability, and the attitude of senior management vary greatly from one local authority to another and the consequent success of IT implementation varies significantly (Worrall 41).

GIS has often been closely linked with IT (Worrall 52). The assessment of GIS has usually been devolved to an interdepartmental IT working party. Local authorities have carried out a number of studies to assist their assessment of GIS. The studies have found that potential benefits of GIS to resource planning and management are numerous (Worrall 52). Benefits recorded within one group are associated with benefits from another: the advantage of up-to-date maps also involves an improvement in data quality, together with time saving and increased productivity which leads to a better service for the public.

With all the uses of GIS in local government, many local authorities have taken an active interest in the application of GIS technology (Maguire 76). Local governments have seen significant benefits in maps, data, and operations. Distribution maps, or thematic maps, are particularly valuable in departments dealing with planning, environmental issues, and housing and leisure services. When local authorities begin to store multiple data sets within a GIS, the maps produced have an increased usefulness. Compared to a map set stored in a particular location, the data held within a GIS are far more accessible to staff in different offices of the local authority; this serves to improve operations. Better mapping and quicker access to data means better operation (Worrall 53).

Local planning is another function within local authorities that can benefit from the development of a GIS (Worrall 56). The formulation of planning policy requires the comprehensive analysis of environmental, social, demographic, and economic information against the physical geography of an area. The more useful the geographic information base, the easier it is to formulate policy and to facilitate the implementation of that policy. The local planning function can make extensive use of a GIS, making the GIS an integral part of the planning process (Worrall 56).

GIS can have a major role to play in the development of policies and in the monitoring and evaluation of those policies. The effectiveness, productivity, and efficiency of the local planning action can be considerably enhanced by the development of a GIS.

2.4.6 GIS Use with Open Spaces

The application of GIS to the natural environment represents the largest and longest established GIS function and the most common use of GIS technology (Martin 32). Many GIS installations have developed in order to integrate data for land management over large areas. GIS serves a multitude of purposes in the study of open spaces. GIS has the ability to categorise open spaces in almost any way that the user feels will be useful for his or her investigation. GIS allows the user to classify the type of open space in a number of ways. For example, the GIS can visually depict if an open space consists of pitches. A GIS can display characteristics of these pitches if the data is available, such as what type of pitches, how many pitches, the area of the pitches, or the quality of the pitches. GIS can display the location of open spaces in a given region, and can tell the user the accessibility of each open space in regard to another. GIS can catalogue the facilities with which an open space is equipped: toilets, water fountains, playgrounds, or handicapped access. GIS has the ability to plot any of the aforementioned qualities against another on a map. GIS capabilities allow users to analyse material specific to the user's purpose.

2.4.7 MapInfo

GIS can be used with a variety of different software packages. The LBM chose MapInfo as their GIS software package. MapInfo is a GIS based software specialising in location information (About MapInfo). Customer addresses, phone

numbers, store sites, service and sales territories, customer buying patterns, demographic and lifestyle information, nearby businesses, routing directions, and traffic patterns are just some of the uses of MapInfo. MapInfo can help improve decision-making in organisations by combining its software with the users' data, thus allowing customers to map, visualise, profile, compare, and act upon customer and market information.

We were first introduced to the MapInfo during our PQP work at WPI. We attended a series of training sessions taught by Professor Fabio Carrera. These weekly training sessions built upon one another to culminate into a fundamental understanding of MapInfo. We used this prior experience with MapInfo as a catalyst to explore some of the more advanced features of the software.

2.4.8 GLA *Open Space Strategy Guide*

In many areas of London the quality of open space is declining, mostly due to vandalism, crime, or lack of investment (GLA Guide). The need for safe, accessible and sustainable open spaces has increased. As a result, the GLA prepared the *Open Space Strategy Guide* to work with the London Boroughs in planning and securing sustainable improvements to the open space environment.

The primary goal of the Guide is to promote a more consistent approach to open space planning and to offer guidance to London Boroughs for the preparation of an Open Space Strategy.

The Guide provides a list of the correct methods for identifying areas of open space deficiency, gaps in types of provision (i.e. changing rooms, floodlighting, toilets), and spaces that need improvement.

2.4.9 Merton Open Space Study

In November of 2001 the LBM commissioned the WS Atkins planning consultants to carry out an open space study of the Borough. This study was the first stage of the MOSS, which will eventually lead to the development of Merton's Open Space Strategy. The analysis for our project was based on the data obtained by the *WS Atkins Study*. This study provided Merton with an evaluation of the quality of the open spaces, a list of the facilities available at the open spaces, a playing pitch assessment, and an initial analysis of this information.

One of the most important reasons for the study was the restructuring of the Merton school system (MOSS 1-1). Similar to other boroughs, Merton will be changing from a three-tiered school system to a two-tiered school system. With this restructuring, there will be a surplus of schools and a surplus of open space, thus more potential public open space within the Borough. Merton needed an accurate assessment of the open spaces throughout the Borough so that the Plans and Projects Section can best determine what to do with the open space at the excess school sites.

3 Methodology

This project relied on four primary methods. First, we analysed the contents of the Greater London Authority's (GLA) *Open Space Strategy Guide* and the *WS Atkins Study*, provided by the WS Atkins planning consultants, for the Merton Open Space Study (MOSS). Second, we conducted meetings and discussions with members of the London Borough of Merton (LBM) and the WS Atkins planning consultants. Third, we implemented Geographic Information Systems (GIS) in our sample analysis of the MOSS. Finally, we trained the members of the Plans and Projects Section of the LBM in the use of the GIS. These methods allowed us to complete the goals set for our project.

3.1 Content Analysis

We used content analysis of the Greater London Authority's (GLA) *Open Space Strategy Guide* and the *WS Atkins Study*. These two documents, which are described in more detail in the background section of our report, formed an important aspect of our project. The GLA Guide explains how an open space strategy should be developed, while the *WS Atkins Study* contains data collected on all open spaces and playing pitches within the Borough and an introductory analysis of their findings. We analysed these two documents to gain an understanding of how to proceed with our analysis for the project.

3.1.1 GLA *Open Space Strategy Guide*

We studied the GLA Guide in order to determine the best means of analysing the open space data and conveying our results. Through the GLA Guide, we discovered methods for identifying areas of open space deficiency, gaps in types of provision (i.e. changing rooms, floodlighting, toilets), and spaces that need

improvement. We also found in the Guide information regarding the process for creating new open space and advice on assessing the quantity and quality of open spaces. This Guide includes examples of case studies of other boroughs and provides a framework for producing an open space strategy. We referenced the GLA Guide when we produced sample maps for the planners of the Borough, who will use them to generate the open space strategy.

3.1.2 WS Atkins Study

The purpose of the *WS Atkins Study* was "to assess and analyse the quantity and quality of existing open spaces, the varied functions of open spaces, and the needs of local people" (MOSS 1-1). The first section of the *WS Atkins Study* was the surveying of 176 open spaces within the Borough, and the creation of a database to store the results of the surveys.

The survey data from the *WS Atkins Study* was the foundation for our GIS sample analysis for the Borough. We utilised the *WS Atkins Study* data for our work with MapInfo. The maps that we created with MapInfo were based on the *WS Atkins Study* data.

3.2 Meetings and Discussions

In order to get a firm grasp on our role in the MOSS, we met with personnel in the London Borough of Merton's Projects and Plans Section. As well as speaking to member of the Plans and Project Section, we met with Mick Bird of the IT department to discus several technical ramifications of the project. We also contacted the WS Atkins planning consultants in order to get clarification on issues we encountered throughout our work on the project.

3.2.1 London Borough of Merton

We held meetings in the LBM to get more information about what Merton wanted to get out of the MOSS and to gain a better focus for our project tasks. The two primary people that we met with were our liaison, Richard Ainsley, and Steve Cardis, the Plans and Projects UDP leader. These meetings helped us to develop new project goals and to understand our responsibilities.

We also met with other individuals in the Plans and Projects Section to gauge the amount of experience the staff had with GIS and with MapInfo. The results of these meetings helped us determine the type and level of training that we would conduct for the members of the Section.

Throughout our work in Merton, we encountered several technical issues. File naming conventions, file type information and information storage location were some of our concerns. Upon the recommendation of Richard Ainsley, we spoke with Mick Bird, business systems manager, to help clarify these issues.

3.2.2 WS Atkins

In addition to consulting members within the LBM, it was also important that we contact the WS Atkins planning consultants. We had several questions regarding WS Atkin's work in the MOSS, and their use of MapInfo. To answer these questions, Richard Ainsley put us in touch with Tom McDonough of WS Atkins. Refer to section 4.2 of this report for the correspondence with WS Atkins.

3.3 Applying GIS to the MOSS

During the course of our project work, we realised something important: we are not planners. Therefore, our work with GIS was more of an example analysis, showcasing the possible ways the Borough's planners may carry out the actual GIS

analysis of the data for generating their open space strategy. We used the mapping software package MapInfo to provide the Plans and Projects Section with sample maps and charts from the WS Atkins data. These maps and charts will be useful to the Section because they demonstrate different means of using MapInfo for the analysis of the MOSS. The maps and charts that we created were based on certain criteria, which we obtained from the GLA Guide, the suggestions within the MOSS, and the advice of our liaison.

An issue of interest to the LBM is the restructuring of its school system. Two schools located within the wards of Longthorton and Figge's Marsh are no longer needed by the Borough. The planners need to decide the best course of action for this region and the potential surplus open space. Consequently, this region is being further examined in an area profile. Our GIS work focused on creating maps for the planners, so that they can determine the best option for use of the open space made available by the closing of the schools. In order to advise on this topic, we utilised deficiency maps that allowed us to gain knowledge of the neighbourhood's needs.

Deficiency maps distinguish areas lacking in a particular type or characteristic of open space. Using MapInfo, we produced maps displaying the facilities of the open space within the designated area, keeping in mind the age of area residents. This information provided us with knowledge of the structure of the studied area and its open spaces.

3.4 Training

One of the important aspects of our project was the training of the Plans and Projects Section in the use of GIS and MapInfo. It was imperative that they have a clear understanding of GIS, and more specifically, MapInfo. This ensures their ability to further analyse the data from the *WS Atkins Study* with the help of these tools.

3.4.1 GIS Training

Because of the relative unfamiliarity of GIS within the Plans and Projects Section, our first training session was an introduction to GIS. We created a PowerPoint presentation that briefly explained GIS and described some of its general uses.

Richard Ainsley, Rob Naylor, and Steve Cardis first screened this presentation. Their constructive criticism helped us revise the pilot presentation, which allowed us to develop the most suitable GIS presentation for the Plans and Projects Section.

Our GIS presentation was divided into five sections: a definition and explanation of GIS, features of a GIS, obtaining GIS data, mapping GIS data, and a list of common GIS uses. The project team provided pictures throughout the presentation to help explain these topics. Refer to Appendix L – GIS Presentation for the GIS presentation.

3.4.2 MapInfo Training

MapInfo was a new tool in the Plans and Projects Section at the start of our work. Throughout the project, we worked closely with members of the Plans and Projects Section, training them in the skills of MapInfo. It was essential that they have a good understanding of the uses of MapInfo, so that after we left they could continue the analysis of the *WS Atkins Study* data.

We provided the Plans and Projects Section with training sessions, in order to sharpen their skills in the use of MapInfo. These sessions were based on the needs of the Plans and Projects Section and the progress of our work with MapInfo. We split the MapInfo training sessions into two phases: MapInfo I and MapInfo II.

We divided MapInfo I into two sub-sections, a MapInfo introductory presentation and a step-by-step tutorial. Like the GIS presentation, MapInfo I was first screened by our liaisons, allowing us to make the necessary revisions prior to the meeting with the Section.

With the help of the PowerPoint presentation, we introduced the members of the Plans and Projects Section to the GIS mapping software, MapInfo. We related the general GIS information covered in the GIS presentation with more specific MapInfo concepts. The presentation described the basic features and functions of MapInfo. A copy of the MapInfo presentation can be found in Appendix M – MapInfo I Presentation.

Immediately following the MapInfo I presentation, we guided the Section through the MapInfo I Tutorial. The tutorial was a step-by-step instruction on the basic features of MapInfo. We provided each member with a tutorial guide, which we wrote specifically for the group, so that they could follow along with us. A copy of the guide can be found in refer to Appendix N – MapInfo I Tutorial.

The second tutorial that we conducted, MapInfo II, delved into some of the more advanced features of MapInfo. This training session was a more specialised and personal session that was reserved to members of the Plans and Projects Section that will be frequently working with MapInfo. MapInfo II sessions were tailored to meet the specific needs of the trainee. For example, planners may be more concerned with graphing and basic output information of MapInfo, while a technician might be more concerned with plotting of objects and detailing maps. An outline of each session can be found in Appendix I – MapInfo II Session Outlines.

We documented these training sessions in such a way, that they could be used following our departure. The GIS and MapInfo PowerPoint presentations and the

step-by-step MapInfo I tutorial will be available for the Plans and Projects section to consult, following the completion of this project.

3.5 Feedback Questionnaire

We produced a feedback questionnaire relating to the GIS and MapInfo I training sessions. This feedback questionnaire served several purposes. We utilised the questionnaire to judge the effectiveness of our GIS presentation and the MapInfo I training session. Having this information, we were able to make recommendations to the Plans and Projects Section on the most useful means for future training and education of GIS and MapInfo. In addition, we used the questionnaire to help us select the material that we covered in our MapInfo II training sessions and to reveal the most constructive ways of presenting this material. The responses to the questionnaire can be found in Appendix H – Questionnaire Responses.

4 Data and Results

The following chapter is a compilation of the data and results obtained during this project. This chapter is divided into three sections: MapInfo, training, and sample applications. Along with the data and results in each section, we discuss any problems that arose and the techniques we used to overcome them.

4.1 MapInfo

MapInfo was a new tool within the Plans and Projects Section of LBM at the time of our arrival in early March 2002. The Section will use MapInfo as an analysis and presentation tool. Within the first four weeks of the project, one of our tasks was to further our knowledge of MapInfo. Throughout our work with MapInfo, we encountered numerous obstacles, which we had to overcome, so that when the Section personnel used MapInfo, they would be able to utilise our solutions.

4.1.1 Data organisation

There are a few key concepts in the organisation of data within MapInfo. As shown in Figure 1, these include tables, maps, and workspaces. At this point in the project, the Section should be familiar with the concept of layers from GIS. In MapInfo, layers are called tables. For example, there is a ward boundaries table, a roads table, an open space table, and a buildings table. Maps are simply the visualisation of multiple tables stacked on top of one another. Thus, you can load the open space table and the roads table and view a map containing the open spaces in relation to the roads. Workspaces are used when saving maps; the current state of MapInfo is also saved into the workspace. If multiple maps are displayed on screen, these maps can be saved into one workspace. Later, when the workspace is loaded, MapInfo will restore itself and show those maps.

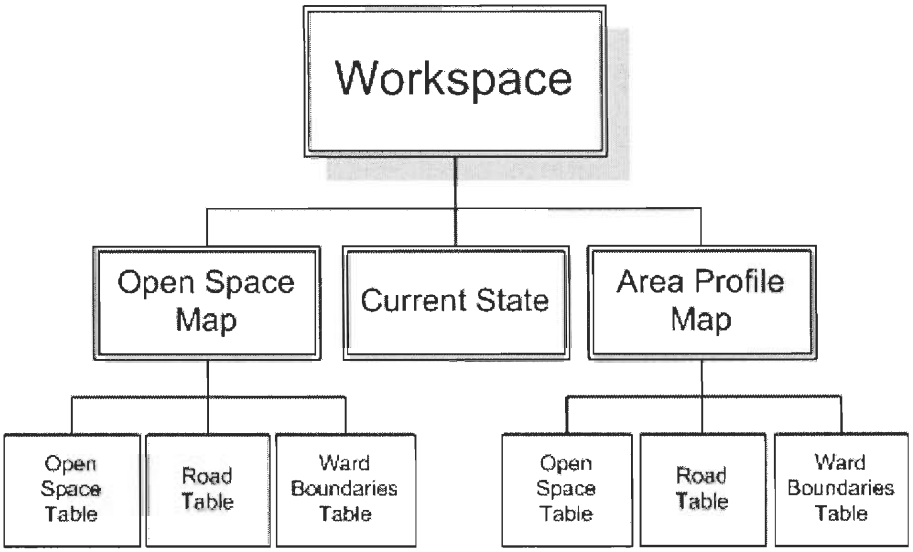


Figure 1: Organisation within MapInfo

We found it useful to have a base workspace that contained one map; within the map were four tables: ward boundaries, open spaces, and roads. This allowed us to use our time efficiently when we created a new map, since all the maps we created used all four of these tables. When we were done creating the map, we would save it into a new workspace using the naming convention that is discussed later in this section.

4.1.2 File formats

MapInfo has the ability to open Microsoft Access and Microsoft Excel files. This is useful when accessing data that is contained in an Access database or an Excel worksheet. This feature was used by WS Atkins to import the data collected from the open spaces into MapInfo from Microsoft Access. Our project team, when importing the deprivation statistics, also used this feature. MapInfo allows a user to select the file type when opening a table of data.

4.1.3 Tables

MapInfo stores data in tables. These tables store data that are mappable and data that are non-mappable. A table that is mappable has visual data for objects that

will appear in a map window. Non-mappable tables are tables that contain data and can be used in MapInfo along with a mappable table. An example of a mappable table is the open space table provided by WS Atkins. An example of a non-mappable table would be the four attribute tables supplied by WS Atkins.

A MapInfo table consists of rows and columns. The rows in the table each refer to objects. The columns in the table are different fields, such as an ID or address. A MapInfo table is similar to a Microsoft Access Table; because of this, it is possible to open a Microsoft Access table with MapInfo and use the data for analysis.

Updating tables

Updating a column is a way of adding data from one table to another table. This operation can either be temporary or permanent depending upon the method used for updating the column. Updating a column refers to adding information to each of the objects, or rows, in a table.

When using data from other databases or existing MapInfo tables, it is necessary to join the data in the tables together. This means that there must be a field or column in both tables that is the same. This can be visualised in Figure 2. In the ATTRIB1 table, SPACE_ID links with WSA_ID in the LBM_OpenSpaces table. The common column however does not have to be sorted in the same order. MapInfo has the ability to place data in the right place so that the user does not have to worry about the order of the columns. This is why it is necessary to join the two tables with a common field (column). An example of this is when accessing data that was supplied by WS Atkins, but was not loaded into the MapInfo table that the user was working with. An example of the procedure to follow in order to update a column in a table can be found in Appendix N – MapInfo I Tutorial.

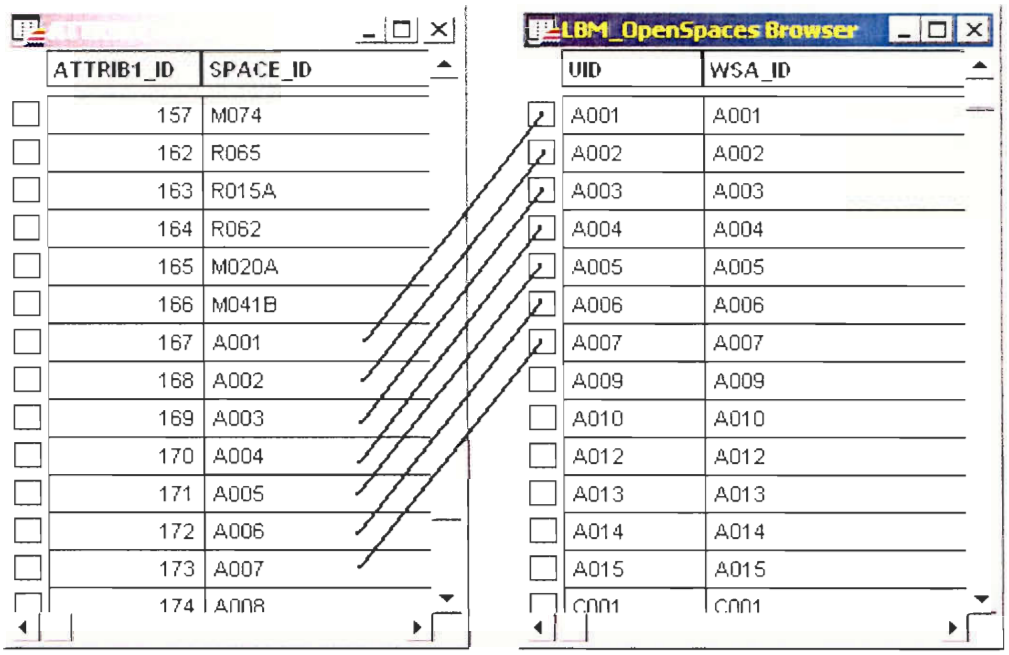


Figure 2: Joining tables

Maintenance of tables

In MapInfo, the maintenance utility allows the user to make changes to the structure of a table. The options that a user can do in the table maintenance is to add, delete, or edit the columns of the MapInfo table. These changes once confirmed are permanent.

4.1.4 MapInfo Tool Manager

The tool manager in MapInfo contains advanced tools. Many of the tools are not loaded by default, but can be added easily. Tools that we found useful in our project, as shown in Figure 3, were concentric ring buffers, thematic legend manager, map window manager, named views, and the universal translator.

Turning these tools on is computer specific; as a result, if a user moves to a different computer the tools may have to be turned on again. To activate more advanced tools, go to the *Tools* menu and click on *Tool Manager*; a list of tools will appear. Find the tool that you want to use, and check the two boxes on the right.

Figure 3: Tool manager menu

Useful tools to activate:

1. Concentric Ring Buffers
2. Thematic Legend Manager
3. Map Window Manager
4. Named Views
5. Universal Translator

4.1.5 Object Selection

Selecting objects is one of the most common actions. Basically, all operations within MapInfo are dependent on what objects are selected. For example, a thematic map can be created based on a certain layer, or on the current selection. There are two ways that MapInfo allows the user to select objects: visually with a mouse, or manually with a simple select form or a more complex structured query language (SQL) form. Selecting objects with a mouse is very quick if there are a few desired objects, but when objects need to be selected based on a certain characteristic, such as ownership or condition, a manual selection process is more efficient.

Using the toolbar

The selection toolbar, as shown in Figure 4, allows for five distinct methods of selecting objects. The first, and most commonly used, is the single select tool. The next three selection tools are based on three types of shapes: rectangle, circle, and polygon. The problem with these types of selection methods is that for an object to be selected, it must be completely within the square, circle, or polygon. Finally, the

boundary selection tool selects objects within a clicked region. For example, if a ward is clicked on, all the open spaces within that ward are selected. Once again, the open space must lie completely within the ward for it to be selected.

Once objects are selected, MapInfo supplies two methods for manipulating the current selection. The first is the unselect tool that simply unselects the current selection. The second tool is the invert selection tool. An example of the use of the invert tool is if all local parks are selected, and the invert button is clicked, then any open space that is not a local park would then be selected.

Figure 4: Selection toolbar

Queries

Querying tables is a manual process that relies on the user to know what table to use, and what field within the table to query. Querying a table is useful to select objects in a layer so they can be extracted and saved into another layer.

Expressions

Expressions are used when querying objects. Expressions are structured phrases that contain field names and operators. It is useful to note that expressions are not case sensitive. Therefore, "Local park" and "local park" will both query the same objects.

Table 2: Examples of expressions

Type = "Local park"	Selects any open space that is classified as a local park.
Type = "Local park" or Type = "District park"	Selects any open space that is classified as a local park or a district park.
Type = "Local park" and COND1 = "Good"	Selects any open space that is classified as a local park and is in good condition.
Area(obj, "hectare") > 25	Selects any open space that has an area greater than 25 hectares.
Perimeter(obj, "m") < 500	Selects any open space that has a perimeter shorter than 500m.

In the previous examples, Area and Perimeter are functions supplied by MapInfo. They are calculated based on the shape of the object and are not stored in any database. There are a few other functions similar to Area and Perimeter, each based on the co-ordinate system that is in use. Lastly, the units available, such as *m*, *km*, *mi* and *hectare* are all listed in the reference guide on the MapInfo CD-ROM.

Simple selection of objects

Select is the first option under the *Query* menu. The *Select* form allows for a quick and simple selection of objects. It requires very little knowledge of the structure of the table that the query is being performed on. The procedure for using *Select* is straightforward. A query of local parks will be used to guide the user through the procedure. The completed query is shown in Figure 5.

First, the user simply selects a previously opened table to be queried from the drop-down list. Second, the user enters in an expression that determines which objects will be selected. To select all the local parks within the *OpenSpaces* table, use *Type = "Local park"* as the expression. In this expression, *Type* is the field, or column, in the open space table, and "Local park" is an entry within this field. To reinforce this idea, *Type <> "Local park"* would select all open spaces that were not a local park. The Assist button can be pressed to bring up a form that allows for a quick construction of the expression if the user is not familiar with the table fields. MapInfo supplies a Verify button that lets the user know if the expression is valid, although this option not needed because the *Ok* button also provides this information. Third, the user chooses the location for the storage of the queried objects. By default, MapInfo puts the objects into a *Selection* table. This is not very useful though; the objects are still part of the parent layer and cannot be manipulated without changing

the parent layer. Therefore, placing the objects into a new layer, such as *Local_Parks* will allow the user to manipulate the queried objects. Finally, the user can sort the objects, which is useful if the selection will be used to make a chart.

If queries are done fairly often on the same table and field, such as searching for a street name, a template can be created. This will allow for a very quick query process where only the street name will need to be entered. It is useful to note that after clicking *Ok*, the resulting layer is not displayed by default. It needs to be added to the map by using the layer control.

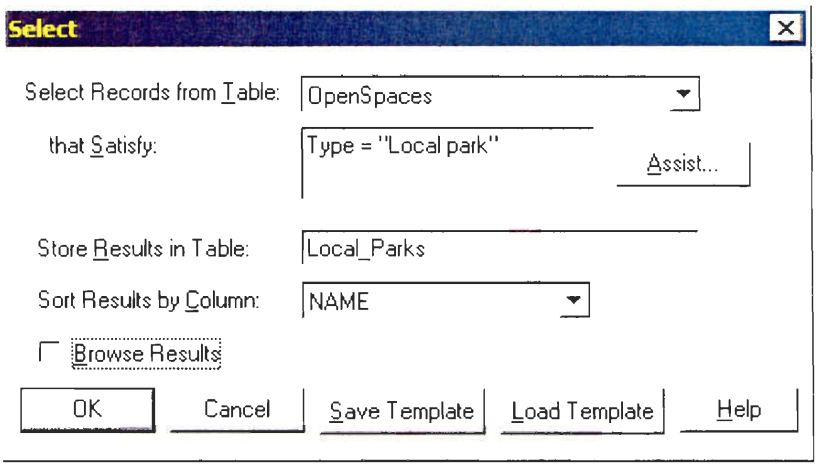


Figure 5: Selecting all local parks

SQL Selection

The objects' data are stored in databases. The common method for querying data within a database is by using a structured query language (SQL) statement. This is the case with Microsoft Access. MapInfo gives the user this ability and does so with a step-by-step form as shown in Figure 6. SQL selection is a very powerful tool, but we found that all the selection necessary for our maps could be done by using the Select method above. SQL selection allows users to tailor the resulting tables to their needs. For example, if the table being queried has 100 columns, and the resulting table only needs five of those columns, then the user can specify this in the Select Columns box.

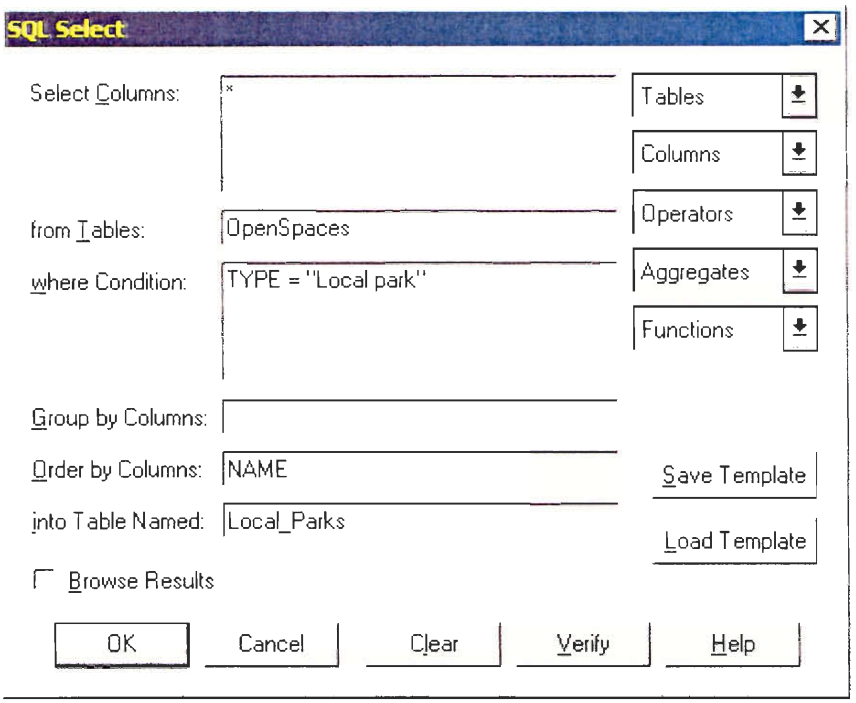


Figure 6: SQL Selection of all local parks

4.1.6 Maps

MapInfo provides the user with numerous ways to create a map, and thus numerous ways to analyse data on the map. For our project, we focused on thematic maps as a tool for displaying a theme within a map, such as types of open space and ownership of open space.

Thematic maps

The majority of the maps that will be used for analysis purposes in Merton's Plans and Projects Section will be thematic maps. There are nine styles of thematic maps. For our project, we relied on three: range, bar chart, and individual.

Range thematic maps

The range thematic map displays the data according to ranges set by the user. The ranges are shaded with colours or patterns. The user can choose from templates displayed as shaded lines, points or regions. Ranged thematic maps allow the user to illustrate data values across points, lines and regions. They are used to show a

relationship between the data values and geographical area, such as sales figures and household income, or to present ratio information such as population density (population divided by area). An example would be to shade the Borough based on each ward's population. Since there are twenty wards, the user could divide the Borough up equally into five ranges, and thus five shades of a certain colour. The result of such a map is shown in Figure 7.

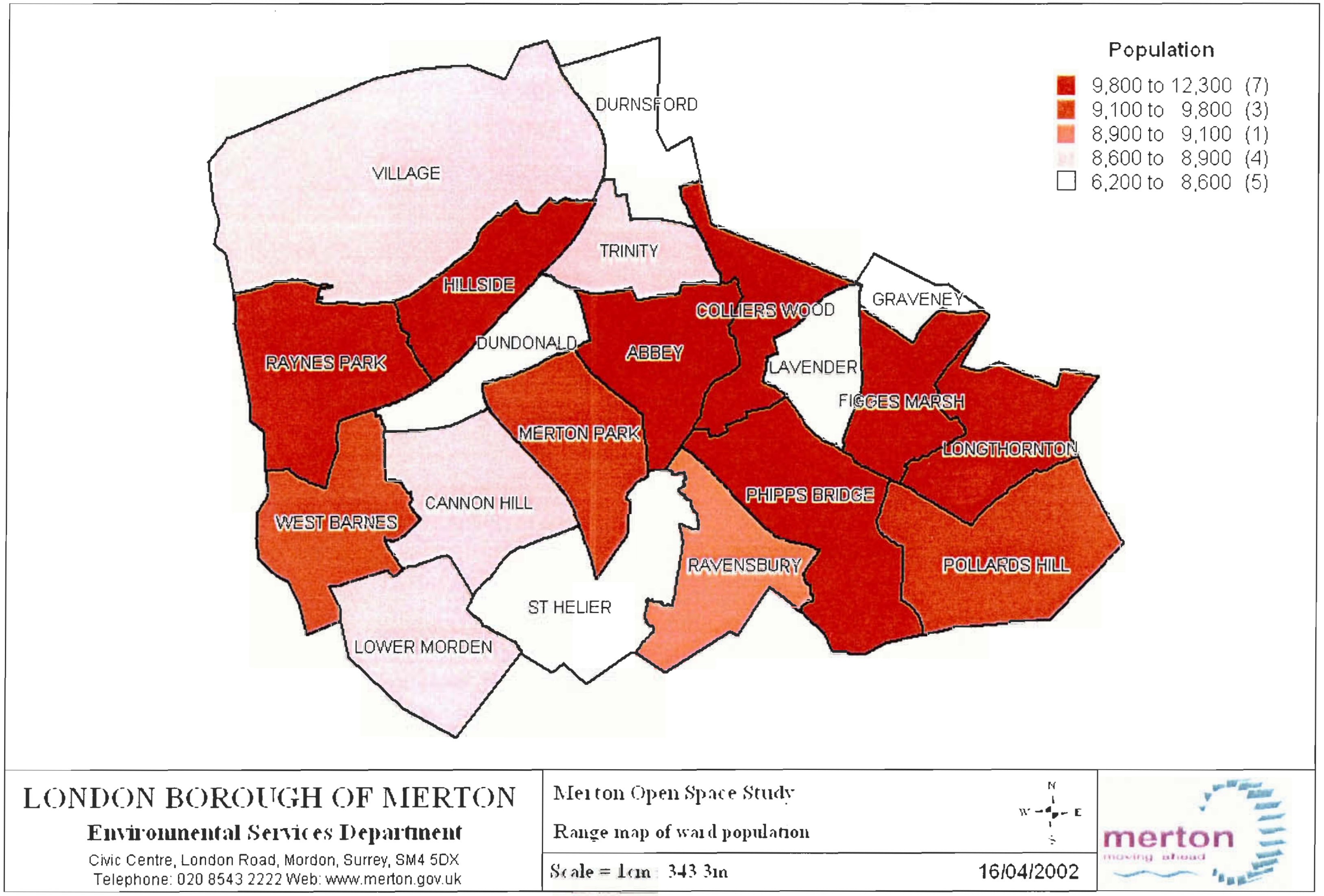


Figure 7: Map - Range thematic map showing population

Pie chart thematic maps

This type of map displays a pie chart of the thematic variables for each record in the table. Pie charts can be used to analyse multiple variables per record on the same map. An example use of a pie chart would be to display the amount of different sports contained within a pitch. This example can be see in Figure 8.

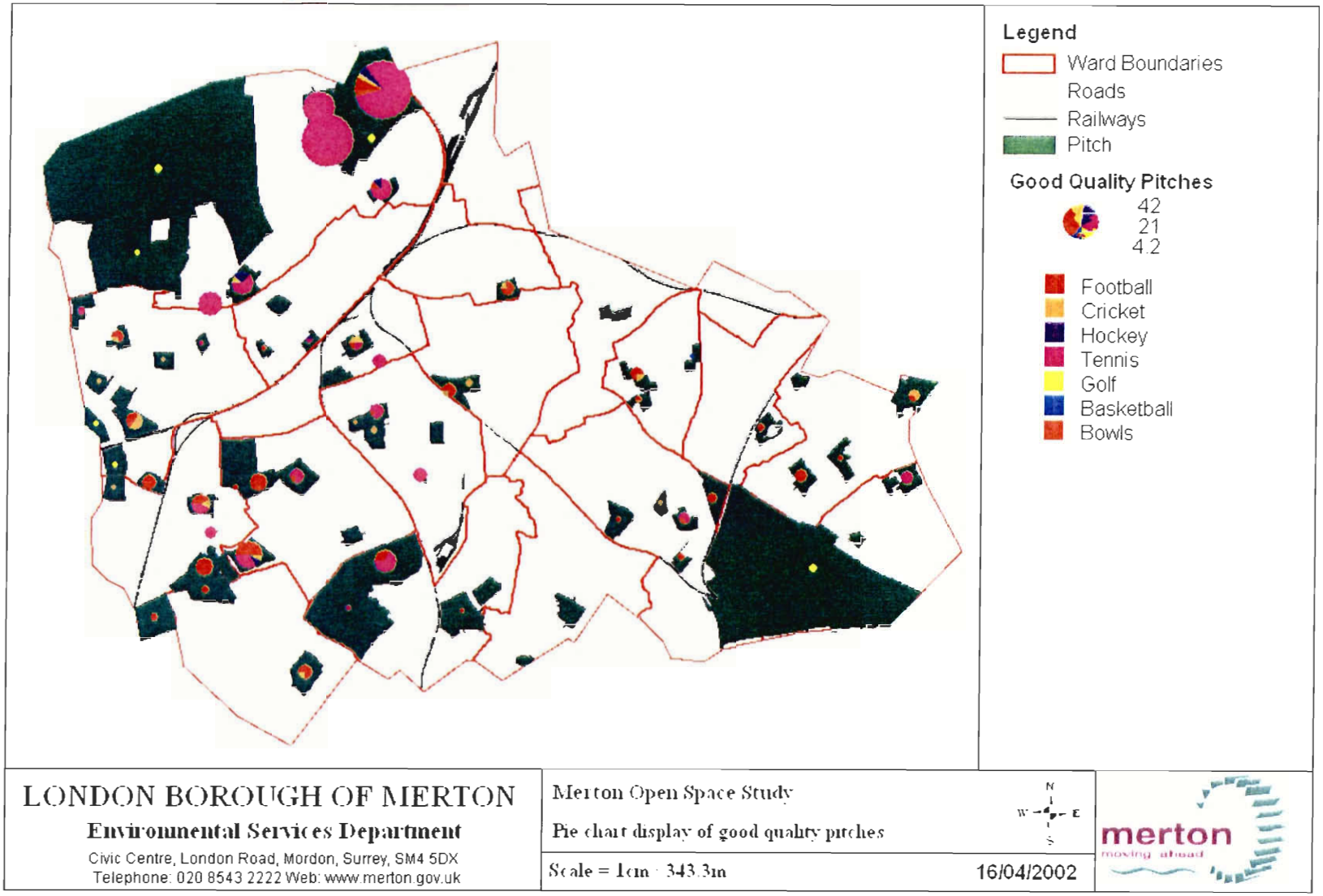
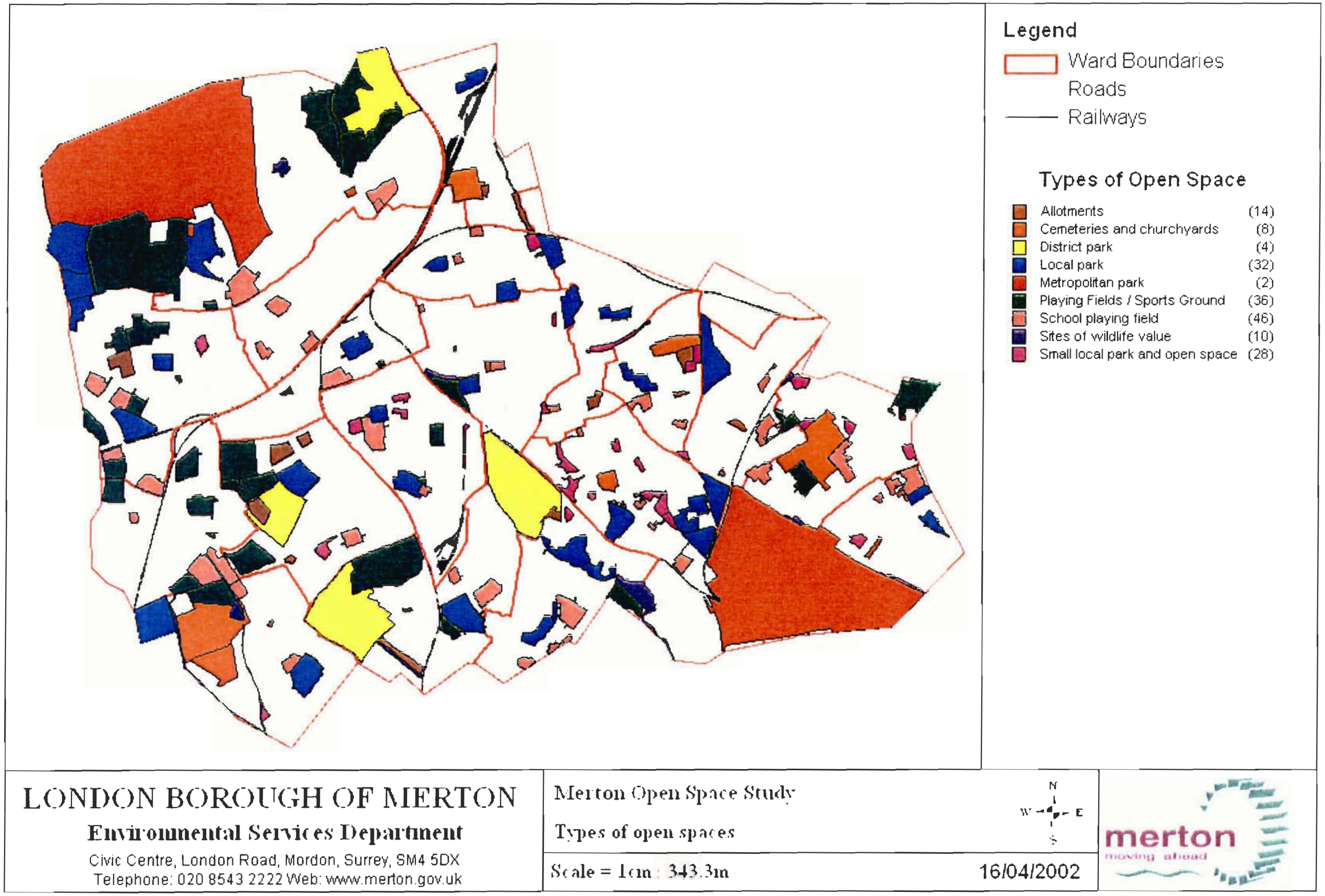


Figure 8: Map - Thematic pie chart map of pitches

Individual type thematic maps

An individual thematic map shades records according to individual data values. Individual value templates are multi-variable. The user can choose from shaded lines, points or regions. A thematic map that draws map objects according to individual values is useful when you want to emphasise categorical differences in the data rather than show quantitative information (e.g., types of stores in a given area or zoning classifications in a given area). An example, as seen in Figure 9, would be to display the types of open space within the Borough.

Figure 9: Map - Individual thematic map of open space types



Buffer zones and concentric circles

MapInfo allows for the creation of buffer zones, which are commonly referred to as catchment areas. There are two tools supplied, each of which has its own strengths. Both have the same basic options, such as creating a buffer zone with a 400m radius. The buffer radius is based off of the GLA recommendations from the GLA Guide as shown in Table 3. The first method, *Buffer* under the *Objects* menu, simply creates a new shape on the currently editable layer, usually the *Cosmetic Layer*. The downside to using this buffer method is that the resulting buffer is not separate and therefore cannot be moved within the *Layer Control*. The *Cosmetic Layer* must be saved to a file and then loaded to manipulate the buffer. Also, points and symbols cannot be buffered, only lines and regions. To resolve this problem, one can use the *Concentric Ring* tool under the *Tools* menu. Once again, with this tool the user must select which objects to buffer. The resulting buffer is then saved into its own table and can be manipulated with the *Layer Control*. Multiple buffers can be used at the same time, but should be created one after another, so that their display properties can be changed separately.

Table 3: GLA recommendation table

Type	Approximate Size	Indicative Catchment Area	Indicative Catchment Area (refined to take into account barriers to access)
Regional	Over 400 hectares	8 km	
Metropolitan	60 - 400 ha	3.2 km	
District	20 - 60 ha	1.2 km	
Local Parks	2 - 20 ha	400 m	280 m
Small Local Parks	0.4 - 2 ha	400 m	280 m
Pocket Parks	Less than 0.4 ha	400 m	280m
Linear Open Space	Variable	Where feasible	

There is a slight fault with both methods. When buffering some complex shapes, the resulting buffer can have missing areas, as shown in Figure 10. The yellow objects are open space and the light violet is the 400m buffer zone. The arrow points to the area of error in the buffer zone. MapInfo will most likely resolve this issue in the future. Until then, careful inspection during analysis is needed.

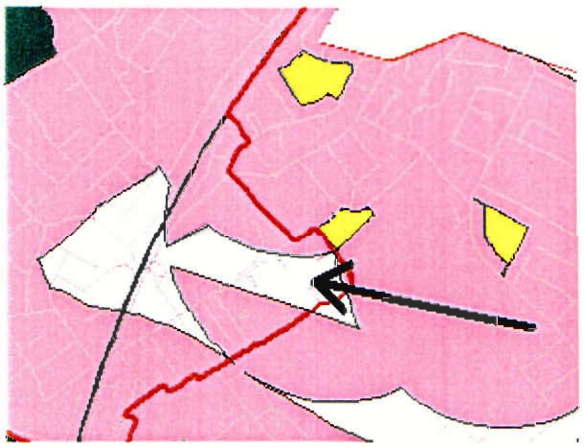


Figure 10: Buffer error

Coordinate systems and projections

The LBM uses British National Grid for all of its maps. It is important that all maps use the same coordinate system, otherwise objects in different layers will not line up correctly. This problem could arise if Merton uses surrounding boroughs' GIS data, which do not use British National Grid.

Clipping the view of maps

Clipping restricts the display of the map to a certain shape. If a polygon was drawn in the shape of Merton, and the polygon's shape was set as the clipping region, then anything outside the polygon, such as roads or railways, would not be displayed. This can be seen in Figure 11: Clipping off and Figure 12: Clipping on. MapInfo allows the user to easily turn clipping on and off.

One problem with MapInfo is that it does not allow the user to save multiple clipping regions. Instead, the user must save each shape into its own table, and load it as a layer. To change the clipping region, simply select the desired table and set the clipping region, and then turn off the visibility of the table. This turned out to be an easy solution, though it did introduce more tables to deal with.

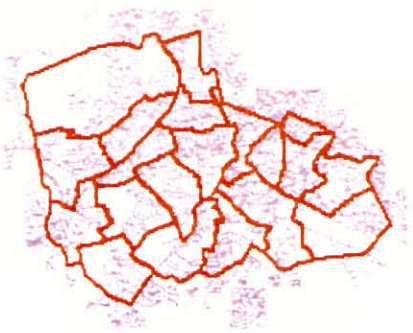


Figure 11: Clipping off

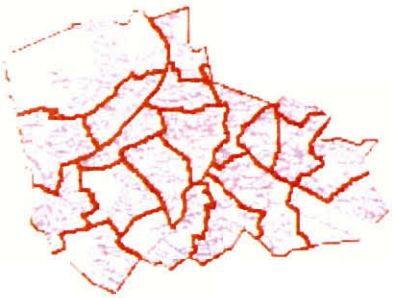


Figure 12: Clipping on

To create the Merton clipping region, first make the *Cosmetic Layer* editable. Next, select all the wards in the *Wards* table. Buffer the wards with a range of zero meters. Select the resulting buffer zone. Under the *Map* menu, choose *Set Clip Region*. The view will now be clipped. One downside to this is that everything gets clipped. Any custom text that was outside the region is hidden. To fix this, there are three clipping options within the *Options* menu under *Map*. Choose the second option, Windows Device Clipping (no points, text), to display text outside the region.

Inserting symbols onto a map

Symbols are useful to designate sites of interest on a map, such as a tube stop or bus stop. Often times it is useful to place a symbol on certain areas, such as a toilet symbol over any open space that contains a public toilet. Unfortunately, this is a fairly complicated task, but a good step by step guide is supplied on MapInfo's knowledge base under the title "Converting a table of text objects to labels," or search for "Symbols and Convert." It is important to stress that one should backup the tables

beforehand to a safe location, since it is very easy to lose data in this process. The gist of the process is that the objects that need symbols should be saved into their own table. This can be done with the Select method mentioned earlier. The new table should then be modified to have two new columns: latitude and longitude. These two new columns are updated with all the objects' centres. Finally, using the *Table>Create Points* menu, symbols are added based on the latitude and longitude stored. This process allows a map with symbols in the correct spot to be made. This table can then be inserted into any other maps where designation of toilets is desired.

A common problem with displaying symbols in MapInfo is that they do not change in size when the zoom level changes. There is fix for this on MapInfo's Knowledge Base website; simply search using the text "symbol AND increase."

4.1.7 Charts and Graphs

MapInfo has the ability not only to create highly detailed maps, but also to produce graphs and charts. These graphs and charts allow the user to display data that are located in the MapInfo tables. MapInfo also has the ability to graph information that is located in the visual data of the maps. For example, MapInfo can graph the area of regions in a map by graphing an expression instead of a column of data, such as the area or perimeter.

4.1.8 Plotting Objects

MapInfo allows the user to draw in custom objects. This is useful if any new open spaces are created in the Borough or more likely if any open spaces are modified. The objects in the MOSS are saved in vector form. This allows the objects to be modified easily since each object is made up of nodes. Nodes are simply points

that can be dragged around to new locations to change the shape of the object. Nodes can also be inserted and deleted from objects.

To create a new object, first choose which layer it will go on by making that layer editable. Next, choose a good zoom level to draw. Finally, choose a drawing tool such as the polygon tool and create the new shape.

Editing an object is similar to creating a new object. First, make the layer editable that contains the object to be modified. Next, with the single select tool, choose the object. If the object is a polygon, then nodes will appear that can moved around or deleted.

More advanced operations can be performed on objects. These tools are located under the *Objects* menu. For example, if two objects are selected, they can be combined to form one object. Similarly, one object comprised of two distinct shapes can be disconnected to form two objects. Finally, objects can be subtracted from one another. This can be seen in WS Atkins maps of areas that are deficient of local parks. This technique is the opposite of a buffer zone, but obviously it takes longer to create.

4.1.9 Layouts

Layouts allow for a consistent display of a map when printing or saving as an image. Layouts consist of any number of maps, legends, text, and images. Useful data to display are a title, a scale, the date printed, any copyright information, and a logo.

Defining a standard layout

Any layouts used within the Plans and Projects Section should be saved within their own MapInfo workspace. The reasoning behind this method is that if anything

needs to be changed on the layout, such as the Merton logo, only one file will need to be edited. Otherwise, if each map workspace contained the layout, then possibly hundreds of files would need to be edited to reflect the small change.

We have created a standard layout for MapInfo that is similar to the layout used when printing from DataMap. The MapInfo layout is for A4 paper. If maps need to be printed on different size paper, then a layout will need to be created for that paper size. To use the A4 layout, the user must simply load its workspace from within MapInfo and make any changes necessary, such as changing the title and scale. Once the layout has been used to print or save an image, the user must either restart MapInfo or close the tables that were opened by the layout's workspace. Otherwise, if the user makes a change to the map and saves the workspace, the workspace will include the files from the layout and the files from the map. Also, the user risks accidentally overwriting his or her layout since MapInfo may use the layout's workspace name to save the map's workspace. It is therefore suggested that the Plans and Projects Section make a backup of the layout templates in a location where they cannot be overwritten accidentally.

PlotBuilder V2.5

PlotBuilder, created by GDC, is a third party software plug-in for MapInfo. It allows for consistent printouts of maps. Through our uses of PlotBuilder, we have determined that it is more of a hassle than useful. All of its options can be accomplished through features of MapInfo. Its four main features are the display of a grid, display of a scalebar, placement of a north symbol, and the display of license information. Each of those features can be shown if the user creates his or her own layout, which is recommended since it gives the user more control over the look and feel of the map.

To print an area of a map, PlotBuilder requires the user to draw a rectangle around the desired region. MapInfo has a similar, and more powerful, feature called *Named Views*. Named Views will be discussed later in this section. Finally, PlotBuilder allows for the rotation of the area that will be printed. This is also a tool built into MapInfo called Rotate Map Window. For this version of PlotBuilder, any feature that it contains can also be found within MapInfo.

PlotBuilder allows for the use of two types of layout files: PVT files, and MapInfo layouts saved in their own workspace. PVT files are text files that contain a script of the creation of the layout; an example is shown in Table 4.

Table 4: Example of a PVT file

NAME=demo a4 landscape RECTANGLE=1.62454,17.2843,28.0352,19.7185 TEXT=1.79917,1.19944,ask map title,Times New Roman,24,0,0

NAME refers to the name of the layout. *RECTANGLE* would draw a rectangle on that area of the page. *TEXT* draws text at the location specified. The main reason for using a PVT file is to prompt the user for input, such as a title or scale. We feel that the more efficient and robust option for creating a layout template is by using MapInfo's layout tools.

To create a MapInfo layout template, open a blank workspace and insert a new layout window. Draw the objects onto the layout, such as the maps, legends and text. Change each object's attributes by using the *Options* menu. Finally, save the workspace with a useful name such as *Layout_Template_A4.wor*. When it is time to print a map, simply load this layout workspace and modify the layout to use the correct maps and legends. As noted under Defining a standard layout, do not save any workspaces at this point; either close all windows or restart MapInfo.

GDC's NLUD Tool

GDC's NLUD Tools allow you to make use of MapInfo for capturing, saving and exporting polygons associated with the National Land Use Database (NLUD). The NLUD project seeks to provide a consistent, comprehensive and up to date record of vacant and derelict sites and other previously developed land and buildings that may be available for redevelopment in England. GDC's NLUD Tools comprise of two separate parts: the Date Entry Monitoring Tool (DEMT) database that has been adapted by GDC, and the NLUD tools that provide a new NLUD menu and toolbar in MapInfo. GDC's DEMT replaces the version supplied by the NLUD Partnership. The DEMT is a Microsoft Access 97 or 2000 database that contains data for each region of land. GDC extended upon the NLUD Partnership's DEMT by directly integrating MapInfo. It is now possible, if both the DEMT and MapInfo are open, to have the easting, northing and area of a polygon entered automatically by MapInfo into the DEMT.

Upon first use of the GDC's DEMT, the user will be asked if he or she wishes to import data from a prior DEMT. This is the only time when the user can import data. We were unable to perform this step since we did not have old data. Once the GDC's DEMT has been set up, it works very similarly to the prior DEMT used in the Plans and Projects Section. The major difference is that it is now possible to obtain the easting, northing and area of a region from MapInfo. This process is laid out in the GDC NLUD document. There was a slight bit of confusion created by the document that needs to be explained.

To use MapInfo successfully with GDC's DEMT, first open the DEMT and create a new record. Click on the arrow in the top right to have the DEMT load MapInfo with the NLUD tools and NLUD workspace. The NLUD workspace

contains a temporary layer and the NLUD table. The NLUD table contains all the regions that are stored in the DEMT. Next, open the table containing the region to use or trace. This table will not be opened in the NLUD map window, though. Therefore, this window should be closed, and the layer added to the NLUD map window. Next, go back to the DEMT and click the arrow again; this will bring you back to MapInfo. Select the region to use and click the save button in the NLUD toolbar in MapInfo. The region will now be saved in the NLUD table and in the DEMT. Finally, fill out any information needed in the DEMT about that region.

Creating legends

Legends allow the user to display information about a given map. There are two types of legends: cartographic and thematic. Cartographic legends, as seen in Figure 13, display information about the attributes of the objects within a map. If a map contained ward boundaries and open space, the cartographic legend associated with that map would display the attributes of the ward boundaries and open space layers so that anyone viewing the map could easily distinguish between the two. Thematic legends, as seen in Figure 14, accompany maps that contain thematic map layers. The thematic legend displays the visual attributes of the thematic map layer. Both legends can be embedded into a layout template, whereas only a thematic legend can be embedded onto a map.

Figure 13: Cartographic Legend

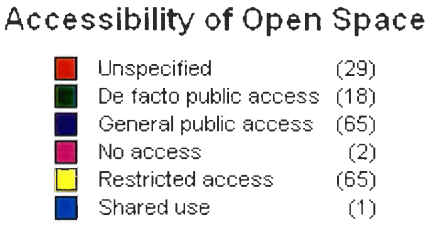


Figure 14: Thematic Legend

Named View Tool

Named views are one of the most useful tools within MapInfo. They allow the user to save and name multiple zoom levels and map centres. This is very convenient when printing maps. To print the same area of a map without worrying about finding the location and exact zoom level, simply choose from a stored view and MapInfo re-centres the map and restores the zoom level. This tool can be found within the *Tool Manager*, as it is usually turned off by default.

We used four views throughout the project: a view of Merton for manipulation, a view of Merton for printing, a view of the profile area for manipulation, and a view of the profile area for printing. It is strongly recommended that the Section uses the same views so that consistent maps can be printed. The named view settings are saved in *C:\winnt\nviews.txt*.

4.1.10 Exporting Maps

It is often necessary to use MapInfo with other programmes. This is generally the case when formulating a report or presentation that relies on maps or charts from MapInfo. There are a few methods to make the task of exporting easier: saving the current window as a picture, exporting a map to another format, and dragging the map window into another program.

The first method, saving the window as an image, is by far the simplest. One can easily save either the current map or layout as a bitmap, jpeg, metafile, or

Photoshop image. The only downside to this method is that some image quality is lost in the process, and the resulting picture may not be suitable for printing. However, if a map is saved as a Windows Metafile (WMF), then the picture will be saved in vector form and will be highly accurate. A WMF can be loaded with Corel Draw and Adobe Photoshop.

The next method, exporting data, can only be applied to tables. This is a problem if a legend or layout is needed. Also, only one table can be exported at a time, instead of an entire map. This method may be useful if the files will be used in DataMap or AutoCAD, but if they are going into a report, then this method will not work.

Finally, MapInfo allows the user to literally drag the map window into a program such as Microsoft Word. The map is inserted as an object; however, it is fairly large in size and therefore slows down Word.

4.1.11 Using Photographic Images within MapInfo

MapInfo allows for the underlay of images on a map; these are called raster images. Unlike standard raster images, the satellite images that the Borough will be receiving will not contain layers of information; they will only be images. We do not have any example images, therefore we can not explain the procedure for loading the images onto the map. But to emphasise a bit more, MapInfo does have the ability to load and display satellite images. Figure 15 shows MapInfo displaying a raster image along with a vector representation of the Northeast of the United States in red.

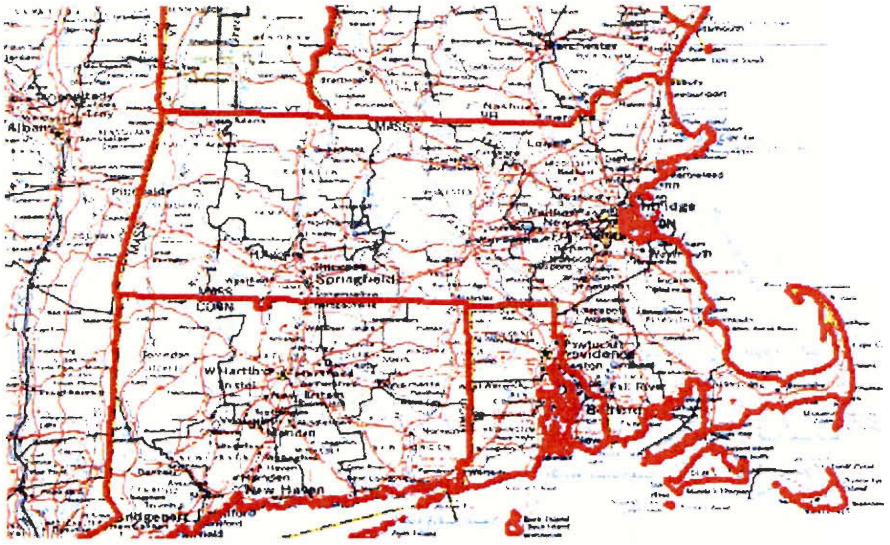


Figure 15: Raster and vector example

4.1.12 Printing

Printing in MapInfo, obviously, produces hard copy of the information that is displayed on the screen. MapInfo is able to print graphs, maps, and tables. In our project, it was necessary only to print maps and graphs.

There are two different ways to print maps. The first way is to print what is visible on the MapInfo screen. This is useful for producing a hard copy of a map, but it does not serve a purpose in a report because it does not provide information about the map, such as a legend or the current scale. The other method of printing for documentation purposes is printing a layout. The layout section of this report briefly explains layouts; these are useful for printing maps with a legend and descriptive information.

In our project, we ran into trouble printing because the MapInfo print jobs take a while to print. After clicking on *Print* in MapInfo, we found that it can take as long as a half an hour to print one map on the colour printer. This is time consuming, but the maps that are produced look very nice on the colour printer.

4.2 Results of IT discussions

Our liaison put us in contact with Tom McDonough of WS Atkins planning consultants. There were some MapInfo issues we encountered during our project work that needed clarification. We asked Tom about naming conventions for file names, scale bars, map projections, and relative file paths with regards to workspaces. Since MapInfo is new within Merton's Plans and Projects Section, Tom advised us to keep our own simple file and colour naming convention. Tom also confirmed to us that once the scale bar is added it will not auto adjust to different scales when the map is resized. Tom gave us detailed instruction with regard to altering map projections, however it was later discovered that these instructions were not valid. In a follow up phone call with Tom, we were able to conclude that it was not possible to change the projections of MapInfo tables correctly once they were formatted as MapInfo tables. This lead to WS Atkins sending a new set of data to the Plans and Projects Section with all the MapInfo tables saved in British National Grid Coordinates.

Within the Borough, file naming conventions, file type information and information storage location were technical concerns of ours. Upon the recommendation of Richard Ainsley, we spoke with Mick Bird, business systems manager, to help clarify these issues. On the subject of naming conventions, Mick Bird confessed that there were none, but plans were in progress to create one. He specified the location of important MapInfo Borough specific files on the network, and provided us with access to them. Additionally, he specified that the current technique of using a unique geocode for each object in the Borough should be used for the open space table and the linking of all spatial databases. A geocode is a unique identifier consisting of letters and numbers that is used to distinguish objects in the Borough from one another.

4.3 Training sessions given to Merton personnel

Training constituted a large portion of our IQP. Throughout the duration of our project, we trained the members of the Plans and Projects Section in GIS and its uses in the Borough. We divided the training into three sections: introduction to GIS, MapInfo I, and MapInfo II.

4.3.1 Feedback questionnaire

There were not many questions regarding our GIS presentation and only limited questions concerning the MapInfo I training session. As a result, we created a follow-up questionnaire, also screened by our liaison. We sent the follow-up questionnaire to all members of the Section who attended the presentations. The questionnaire gave us feedback with regard to the presentation, such as advice for corrections to the presentation, listing any confusing areas of the presentation, any questions members may have had, and if any follow-up information was wanted. Refer to Appendix H – Questionnaire Responses for responses to the questionnaire.

The feedback questionnaire allowed us to determine the members' concerns regarding our training sessions. Their responses to the training sessions make up a significant portion of the data and results section.

4.3.2 GIS training session

Our first training presentation was an introduction to GIS. The GIS presentation provided the Plans and Projects Section with a simple definition and explanation of GIS, and a list of common uses of GIS.

Before presenting to the Section, we conducted the presentation for our liaisons. Our liaisons offered constructive criticism that allowed us to revise the

presentation before we giving it to the Section. Examples of this were the inclusion of United Kingdom maps and an explanation of how MapInfo displays data.

Prior to our introduction to GIS presentation, the members of the Section had a very limited knowledge of GIS. The members felt that although GIS is an extremely broad topic, the GIS presentation provided an adequate introduction to GIS that was clear, informative, and helpful. The members also indicated that they would like to learn more about the areas of drawing, updating, and saving data; linking databases to the system; layer control; and more uses of GIS, such as possible uses by other boroughs. Most of these topics were covered in greater detail in MapInfo I training session; they include plotting new regions, updating and saving data; linking databases to the system; and the *Layer Control*.

4.3.3 MapInfo I training session

MapInfo I was divided into two sub-sections, a MapInfo introductory presentation and a step-by-step tutorial session. Like our GIS presentation, MapInfo I was first screened by our liaisons, allowing us to make the necessary revisions prior to the meeting with the Section.

The presentation introduced the members of the Plans and Projects Section to the GIS mapping software, MapInfo. We related the general GIS information covered in the earlier presentation to more specific MapInfo concepts. The presentation described the basic features and functions of MapInfo.

Immediately following the MapInfo I presentation, we guided the Section through the MapInfo I Tutorial that we wrote. The tutorial is a step-by-step instruction on the basic features of MapInfo. We provided each member with a written tutorial guide; a copy is located in Appendix N – MapInfo I Tutorial.

The responses to the questionnaires revealed that the members of Merton's Plans and Projects Section considered the presentation and guided tutorial to be an effective means of presenting MapInfo I. The members reported that the handout was helpful to them as they followed along with the tutorial. However, the members had questions regarding layering, updating and linking databases, drawing, templates, and printing specification. All of the members present said that they would be interested in attending another MapInfo session.

4.3.4 MapInfo II individual training sessions

MapInfo II expanded on the ideas presented in MapInfo I and focused on the more advanced features of MapInfo. This session was a more specialised and personal training session. MapInfo II was limited to the members of Merton's Plans and Projects Section who will be frequently working with MapInfo.

Three members of the section took part in MapInfo II. Richard Ainsley, Rob Naylor, and David Lumb were given individual training on MapInfo II. Each will use MapInfo differently; therefore, the individual sessions concentrated on the use that each will make of MapInfo. Upon conclusion of each tutorial, we looked back at what we had covered in the session and asked each trainee how they felt about the training session. Richard Ainsley, Rob Naylor, and David Lumb found that the training sessions were beneficial.

4.4 Example applications of MapInfo

Throughout the project, we created maps based on certain criteria. At times, there were multiple ways to display data. It was our responsibility to choose the type of map that best represented the criteria.

MapInfo allows for the creation of any number of maps limited only by the users' imagination. Thematic maps, for example, have seven main categories: ranges, bar charts, pie chart, graduated, dot density, individual and grid. Each one of these types has anywhere from two to twenty different styles. The user is not limited to thematic maps, though. Maps can be made that contain symbols to represent a location of importance, such as bus stops or toilets. It is up to the user to choose the best map for the job.

4.4.1 Map 1: Types of Open Spaces

The map in Figure 16 shows the ownership of open space in Merton. We created this map using an *Individual Region* Thematic Map. This style of map simply colours in objects based on a field; for this map, that field was the ownership of open space. WS Atkins used five types of ownership for open space, therefore there were five distinct colours that we used in the thematic map.

A map based on symbols for the ownership of open spaces was not possible. Many of the open spaces are adjacent to one another, and the symbols would have overlapped and blocked the shape of the open space. One option to solve this problem is to use both patterns and colours when displaying objects.

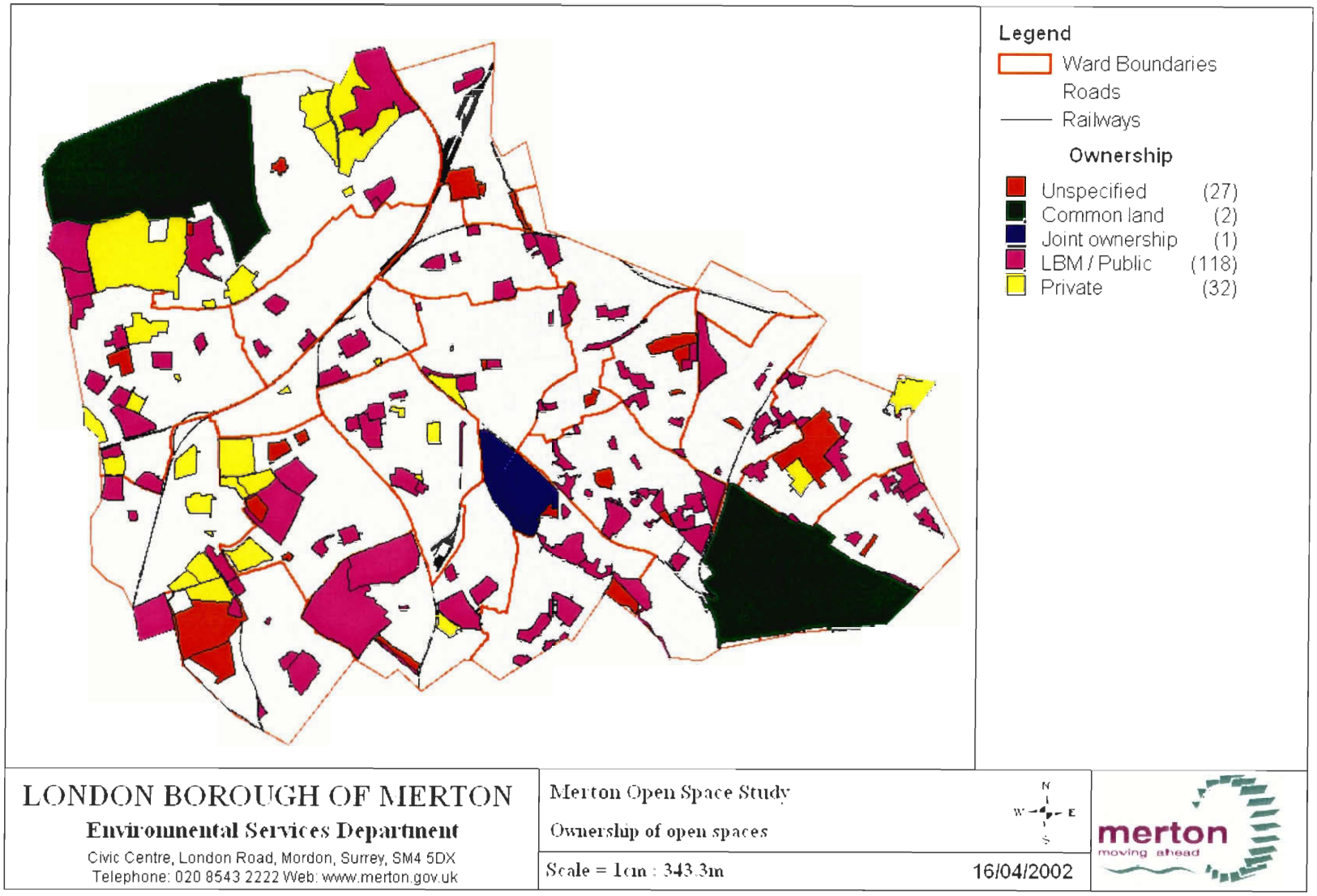


Figure 16: Map - Ownership of open space

4.4.2 Map 2: Location of Toilets

Another method of displaying data is using symbols. Symbols allow the user to easily represent a characteristic of an object, or to represent something contained within the object. For this example, the open spaces containing toilet facilities have been shown using both a colour and a symbol in Figure 17. The symbol makes the map more appealing because the symbol portrays more meaning than a colour in this case. The reason for the colour is that some of the open spaces with toilets are very small and almost hidden by the symbol. Also, some open spaces are very close to one another, and it is hard to tell which open space the symbol belongs to. The change in colour helps the viewer distinguish between the smaller open spaces.

To make the process of adding symbols to a map more straightforward, two columns have been added to the open space table: Center_X and Center_Y. These two columns represent the centres of each of the open spaces. Any table that is created from the open space table, such as a table containing only open spaces with a toilet, will also contain these two columns of data. To display the symbols, the user simply runs *Table > Create points.* A table will be created that contains the symbols. This table can then be layered on to any other map to show the location of the data represented, such as the location of toilets or as another possibility, bus stops.

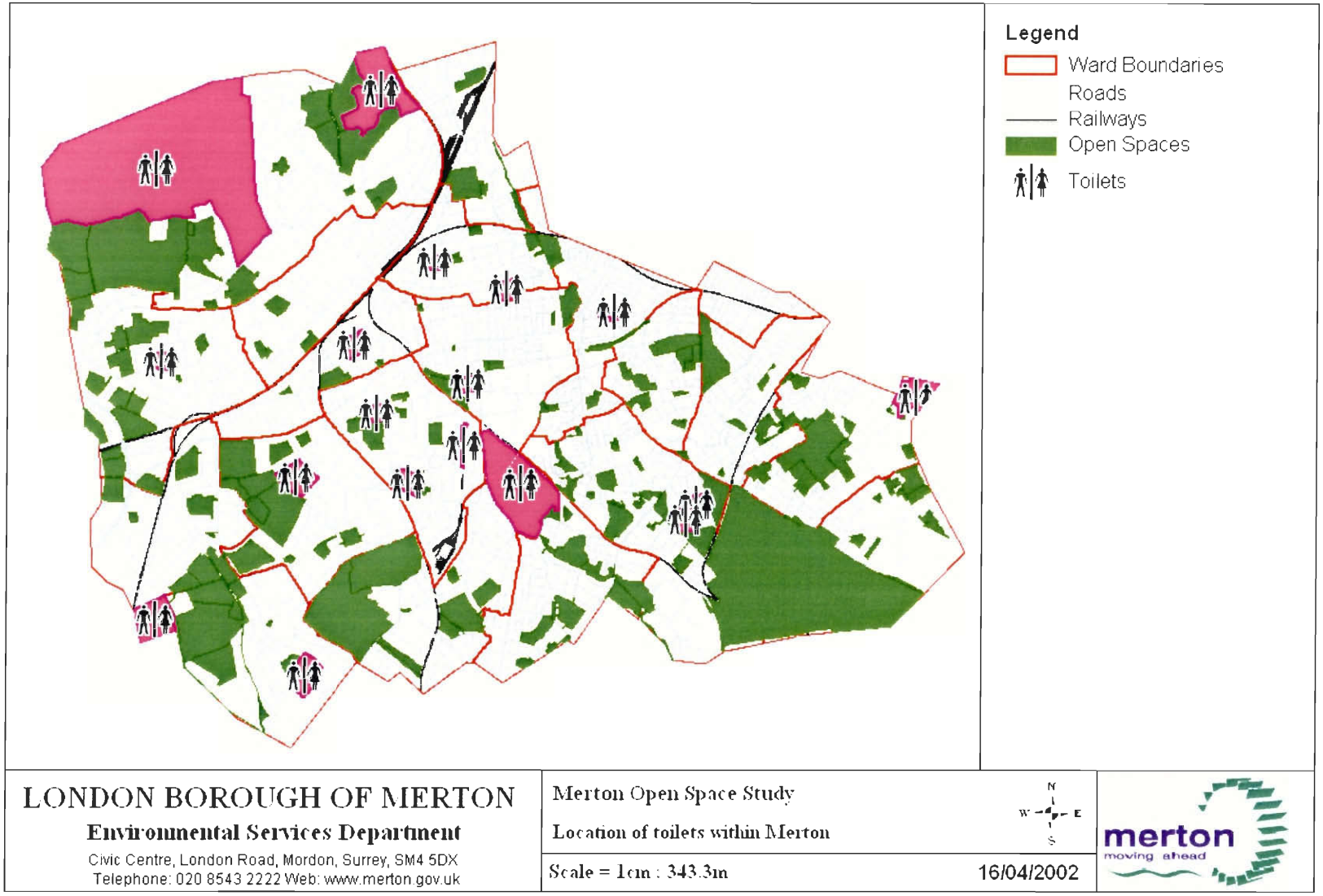


Figure 17: Map - Location of Toilets

4.4.3 Map 3: Local park accessibility by bus

The map in Figure 18 represents a culmination of all the methods discussed earlier in this report. First, a query was used to select all the open spaces that are classified as local parks. Those open spaces were then inserted into their own layer. This allowed us to display only local parks, which simplifies the map. Next, the *Bus Stop* table, which was previously created, was opened. After selecting all the bus stops with the circle select tool, two concentric ring buffers were created. The first was 400 metres, and the second was 280 metres. The reason for this order is that the 280 metre buffer lies on top of the 400 metre buffer so that it can be displayed. Lastly, the layers' display properties were manipulated to create an aesthetically pleasing map. The final result allows the planner to see whether a local park is within walking distance of a bus stop. It should be noted that we are unsure if the *Bus Stop* table is complete.

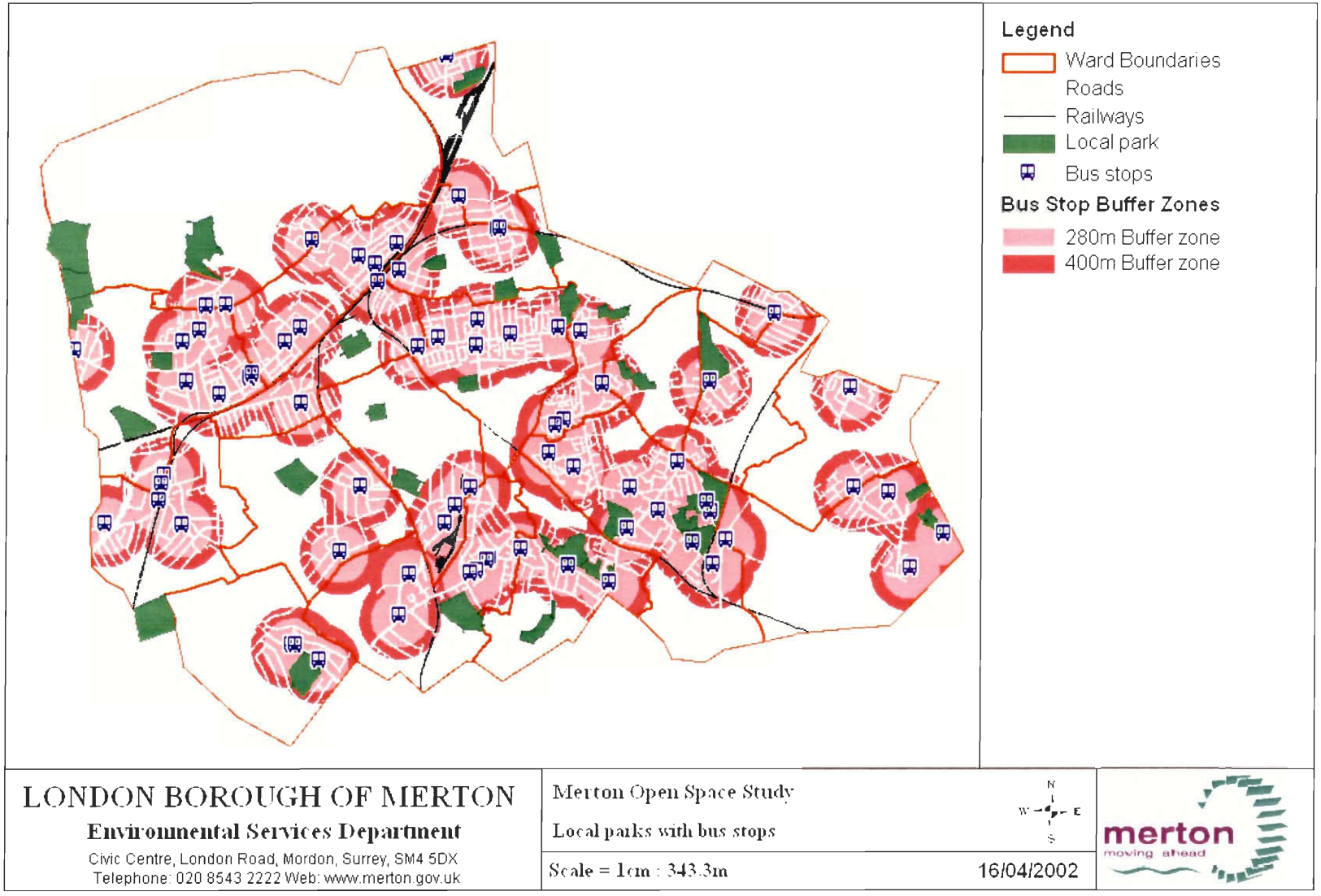


Figure 18: Map - Local Park Accessibility By Bus

4.4.4 Area profile

The area profile consisted of four different options for use with determining what to do with the Brenley Playing Fields and the Rowans School. The planners wanted to see the effect that changing both sites into local parks would have on the area. The first option, shown in Figure 19, was to just have Brenley Playing Field as a local park. Option 2, shown in Figure 20, was to turn Rowan School into a local park. Option 3, shown in Figure 21, was to have both sites as local parks. Finally, option 4 in Figure 22 was to turn only part of the Rowans School into a local park. All four maps were produced with a 400m buffer around all the existing local parks and around all the potential local parks.

For option 4, we had to manually edit the Rowans School object. It was first copied from the open space table into its own table so that the original would not be destroyed, also because the alteration is a potential solution, not a final one. Next, some nodes of the object were deleted and the object's shape was slightly changed. Finally, the table containing just the altered Rowans School object was saved for use within the area profile.

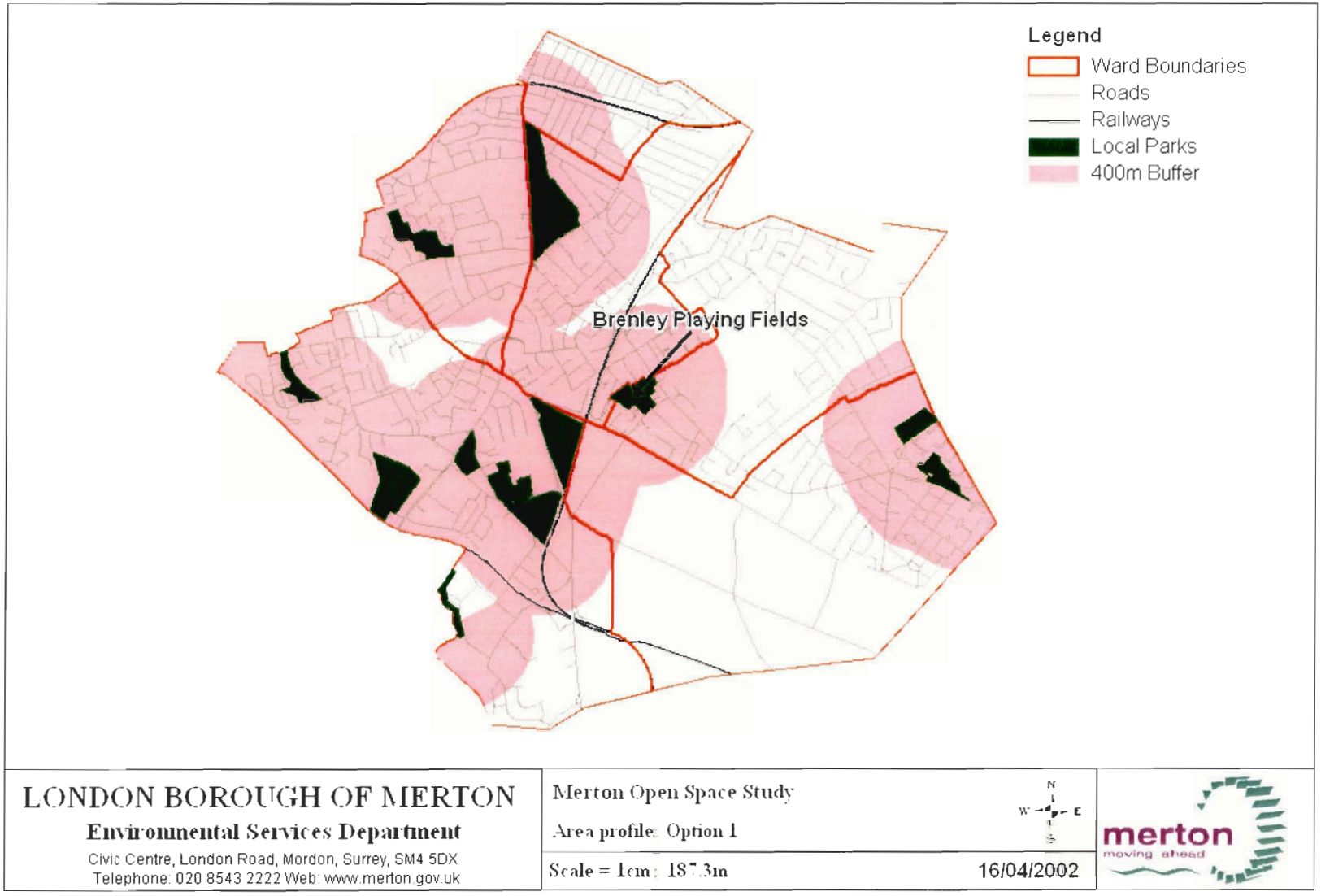
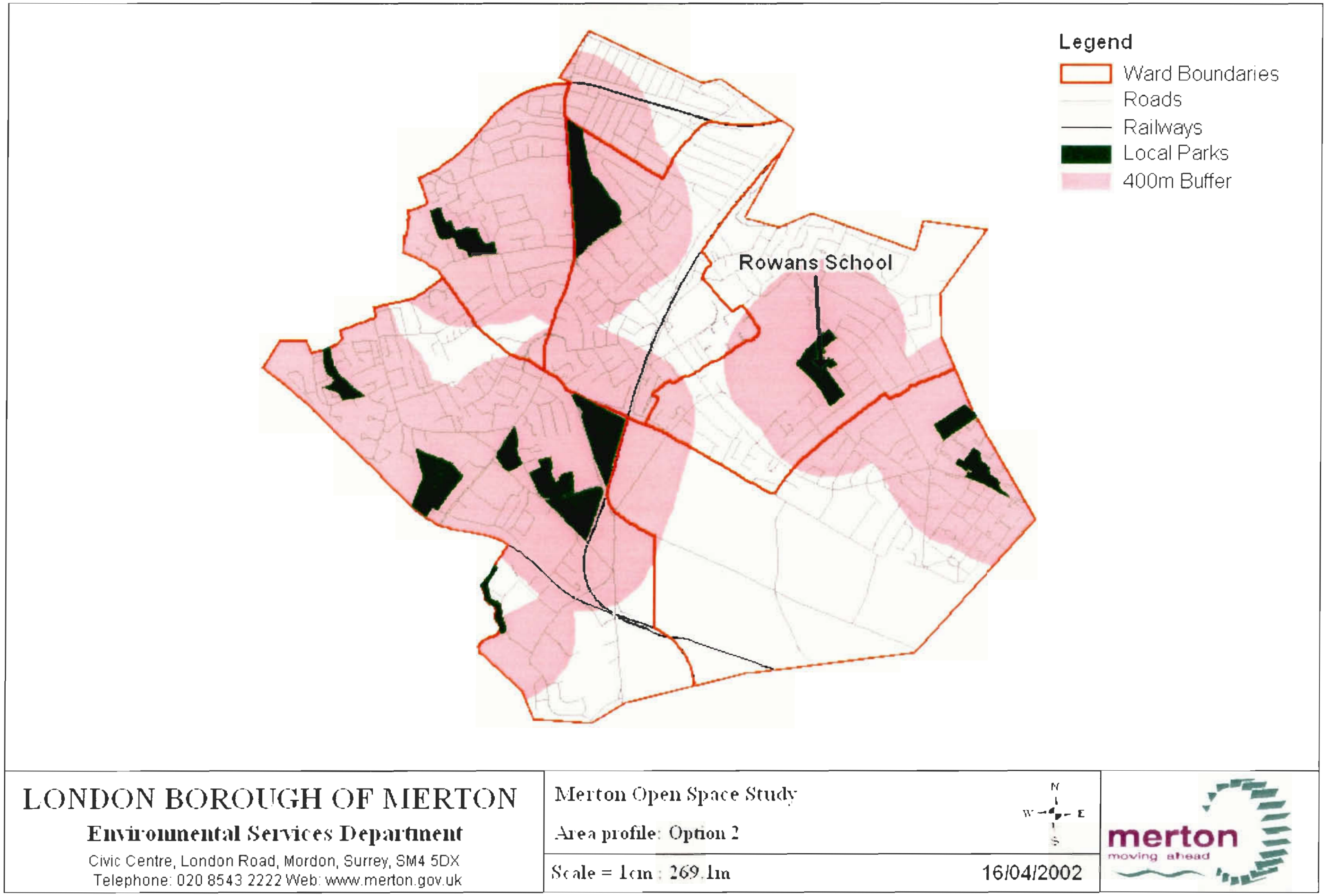


Figure 19: Map – Area Profile: Option 1

Figure 20: Map – Area Profile: Option 2



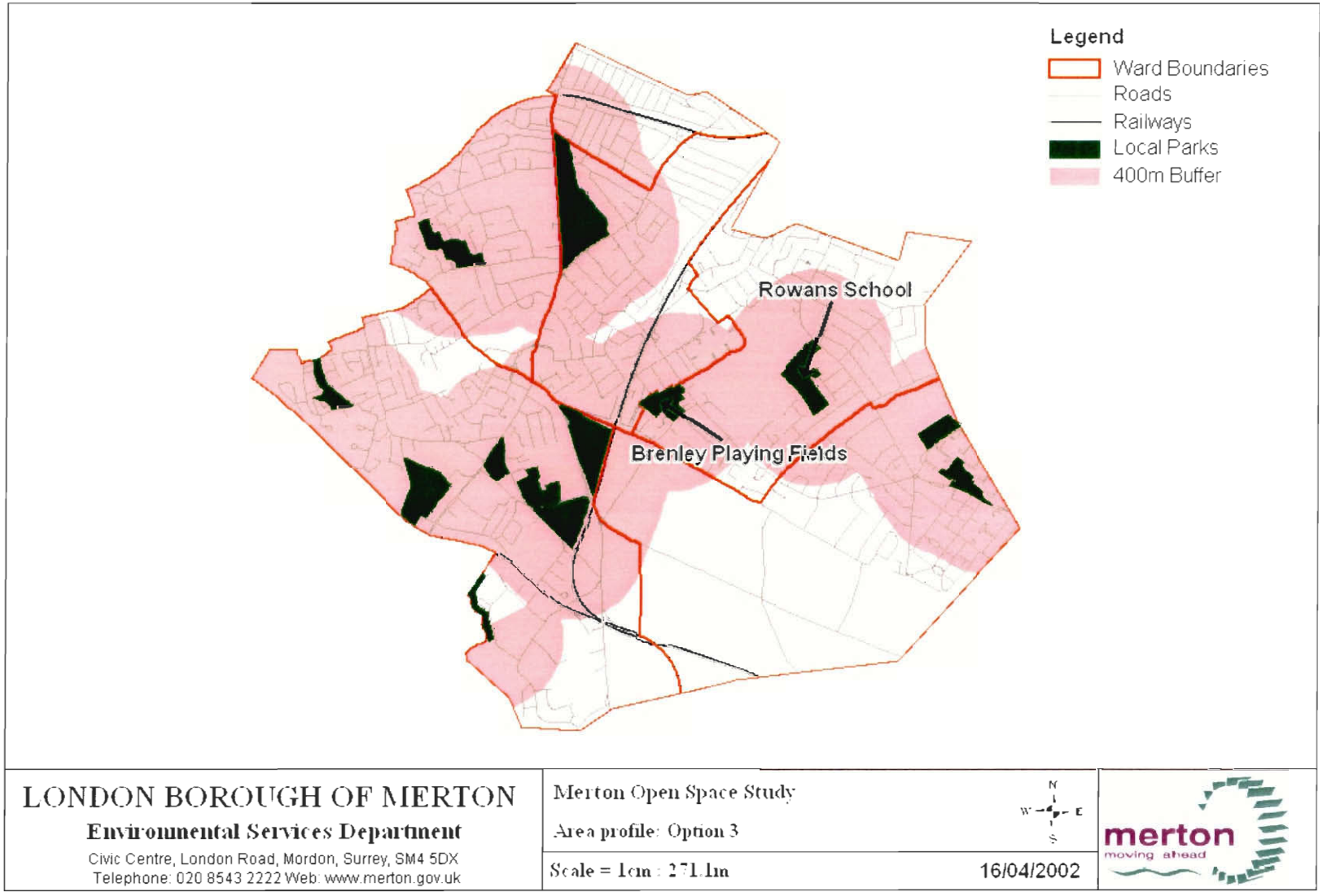
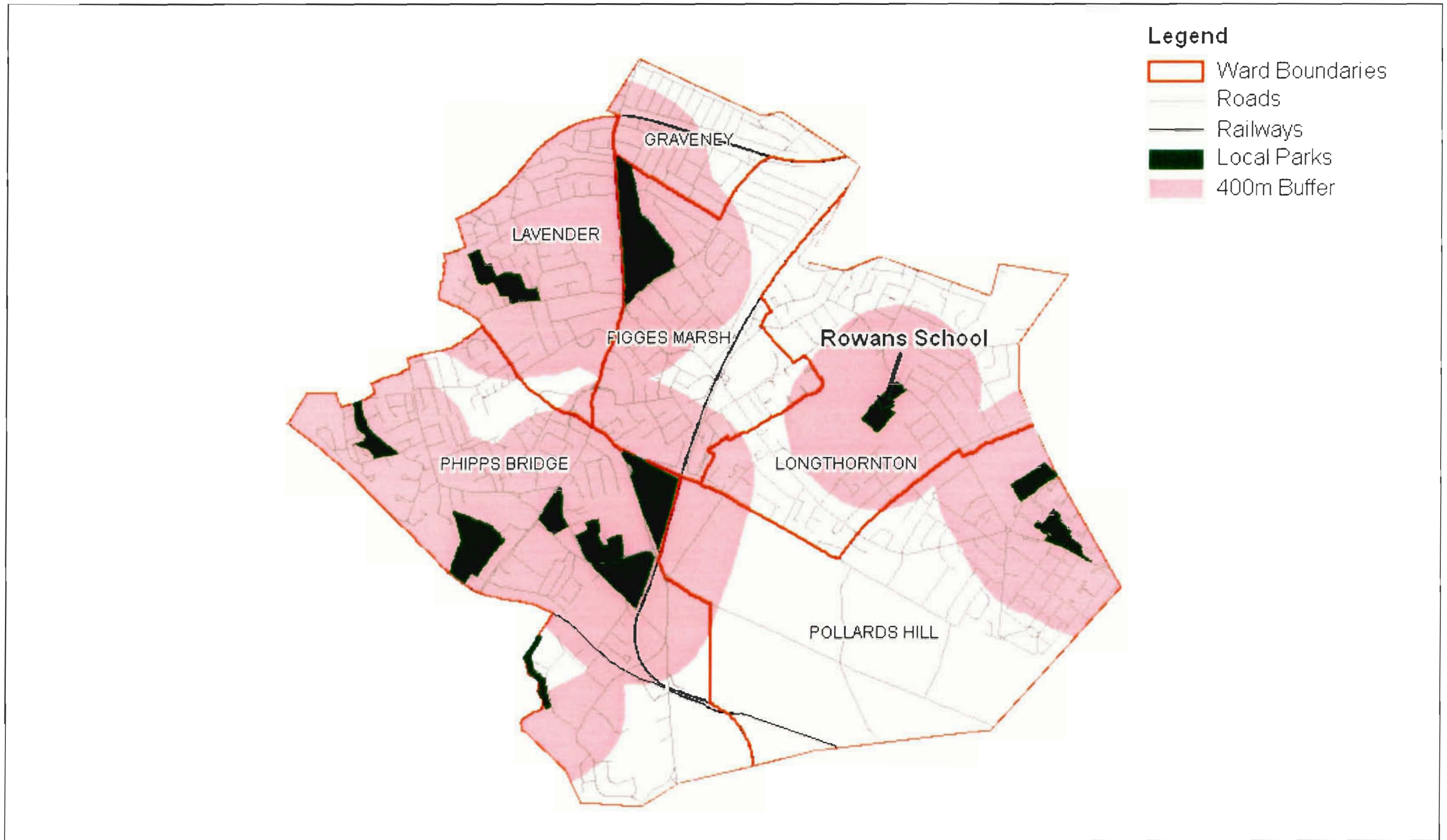


Figure 21: Map – Area Profile: Option 3

Figure 22: Map – Area Profile: Option 4



LONDON BOROUGH OF MERTON

Environmental Services Department

Civic Centre, London Road, Mordon, Surrey, SM4 5DX
Telephone: 020 8543 2222 Web: www.merton.gov.uk

Merton Open Space Study

Area profile: Option 4

Scale = 1cm : 272.8m

16/04/2002

4.4.5 Obtaining statistical data

MapInfo can be used not only to display object data on maps, but also to display statistical data. MapInfo has the ability to create highly detailed maps and charts that allow the user to reveal trends in data that are not possible to be seen by looking at the data in spreadsheet format. In this section of our report, there are examples of Deprivation Statistics of Merton from the year 2000 presented in both charts and maps. We created charts with MapInfo that are similar to those that can be created using a program such as Microsoft Excel. These data are shown in Appendix G – Deprivation Statistics 2000.

Our liaison provided us with deprivation statistics located in the first draft of the *Merton Neighbourhood Renewal Strategy*. This document contains a spreadsheet which we used for the charts in our report. These charts are an example of how MapInfo can produce charts similar to those in Microsoft Excel; the charts are also an illustration of the presentation aspect of MapInfo.

The Merton 2000 Deprivation Statistics can be obtained from the National Statistics Website (www.statistics.gov.uk). To obtain this data in a format useable by MapInfo, we first copied the information from the statistics website into Microsoft Excel. Next, we renamed the column names so that they did not contain any spaces. We then opened the Excel file in MapInfo as a table, using the first row as the column name. The table could then be saved in MapInfo's native format. To see the result of this example, refer to Appendix G – Deprivation Statistics 2000.

4.4.6 Presenting statistical data with charts

The charts in this section represent examples of MapInfo's ability to create highly detailed charts from statistical data. All of the data for these charts came from the Deprivation Statistics that were provided by our liaison. It was not necessary for

our team to know how the data was compiled; it was only necessary for us to interpret the data to determine which number meant most deprived and which meant least deprived. The presentation of the data was also changed in our charts when compared to the charts in the *Merton Neighbourhood Renewal Strategy*. In the maps below, the sorting is different. Figure 23 and Figure 24 show the same data, but are presented differently. In Figure 23, the order of the data presented is by the score of multiple deprivation, while in Figure 24, the data are sorted by the ward names. It is up to the user to decide which way to present the data. In our examples, we chose to sort the charts by the scores of deprivation so that it is easier to see which wards are the most deprived. The statistic charts, shown below in Figure 25, Figure 26, and Figure 27,are income deprivation, education deprivation, and child poverty deprivation.

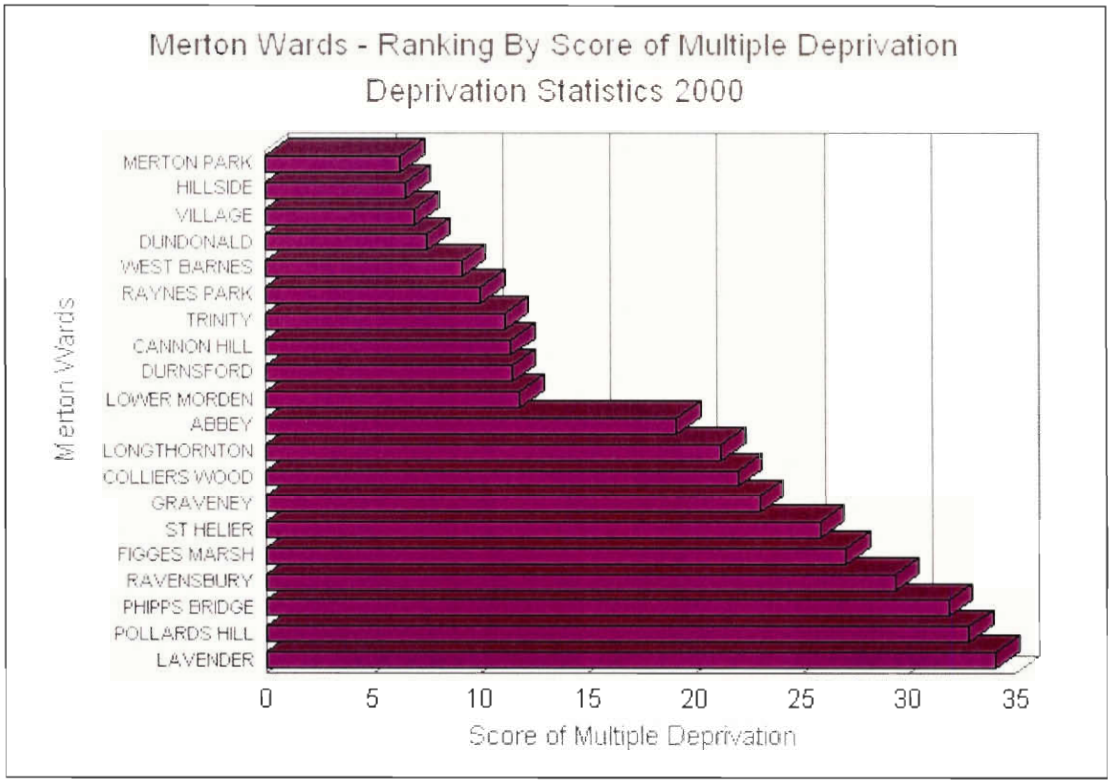


Figure 23: Chart - Multiple Deprivation (sorted by score of multiple Deprivation)

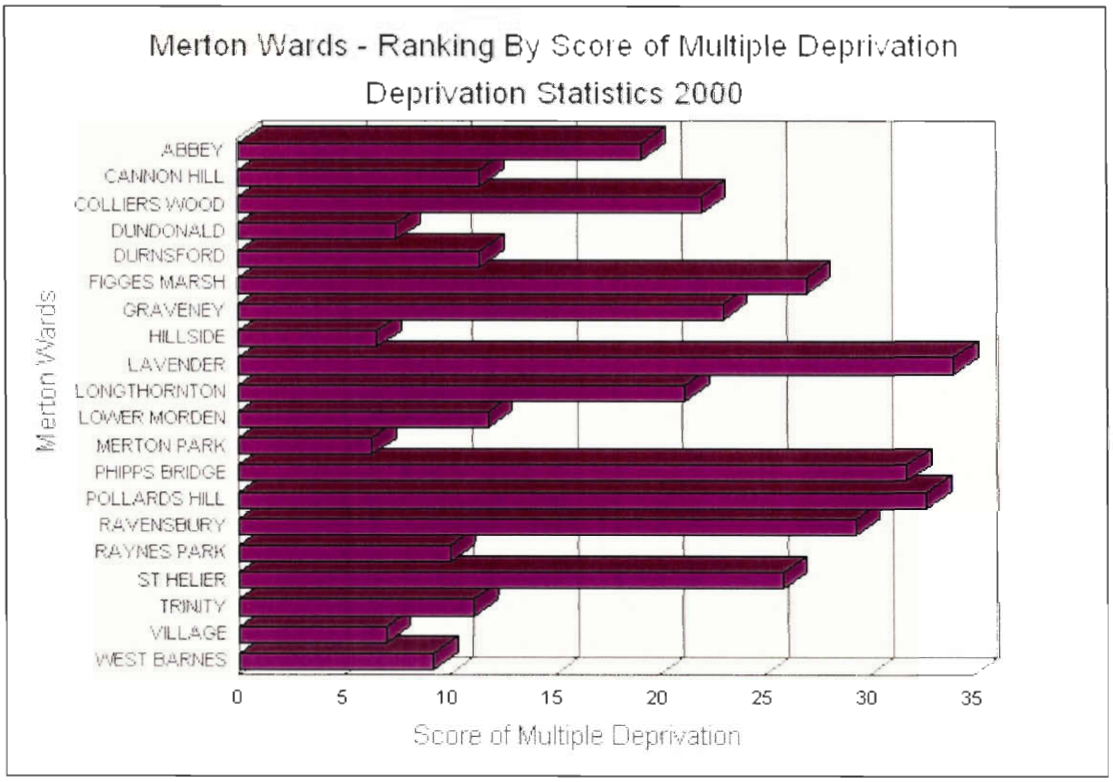


Figure 24: Chart - Multiple Deprivation (sorted by ward)

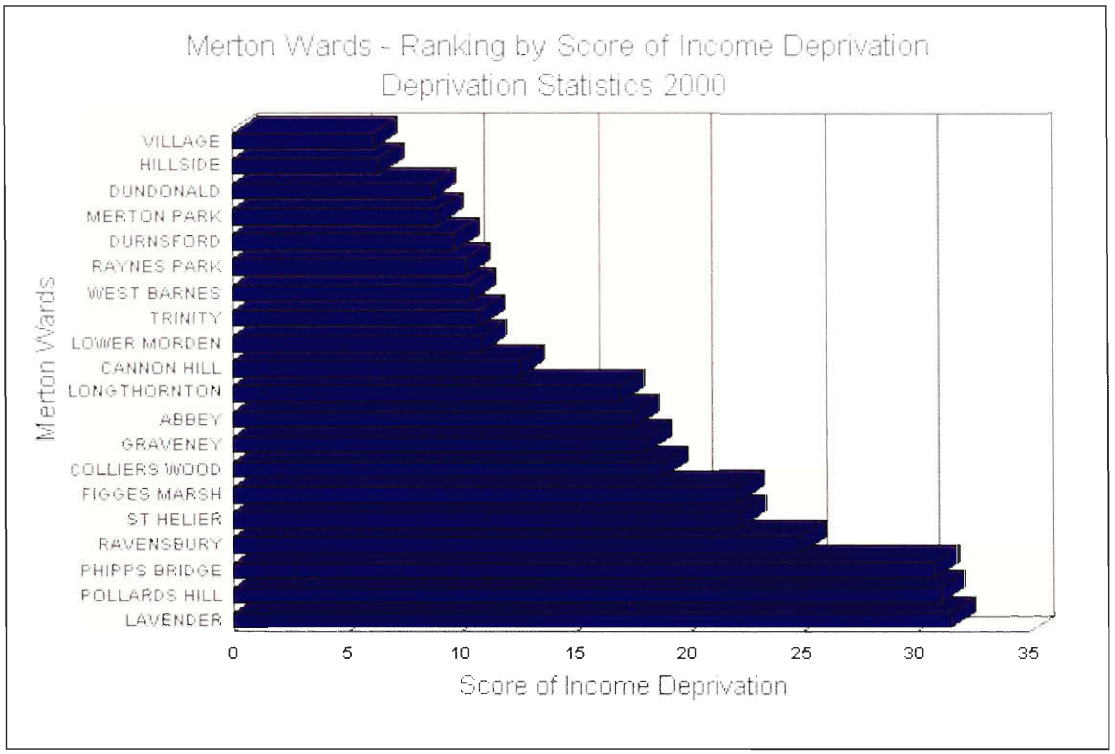


Figure 25: Chart - Income deprivation

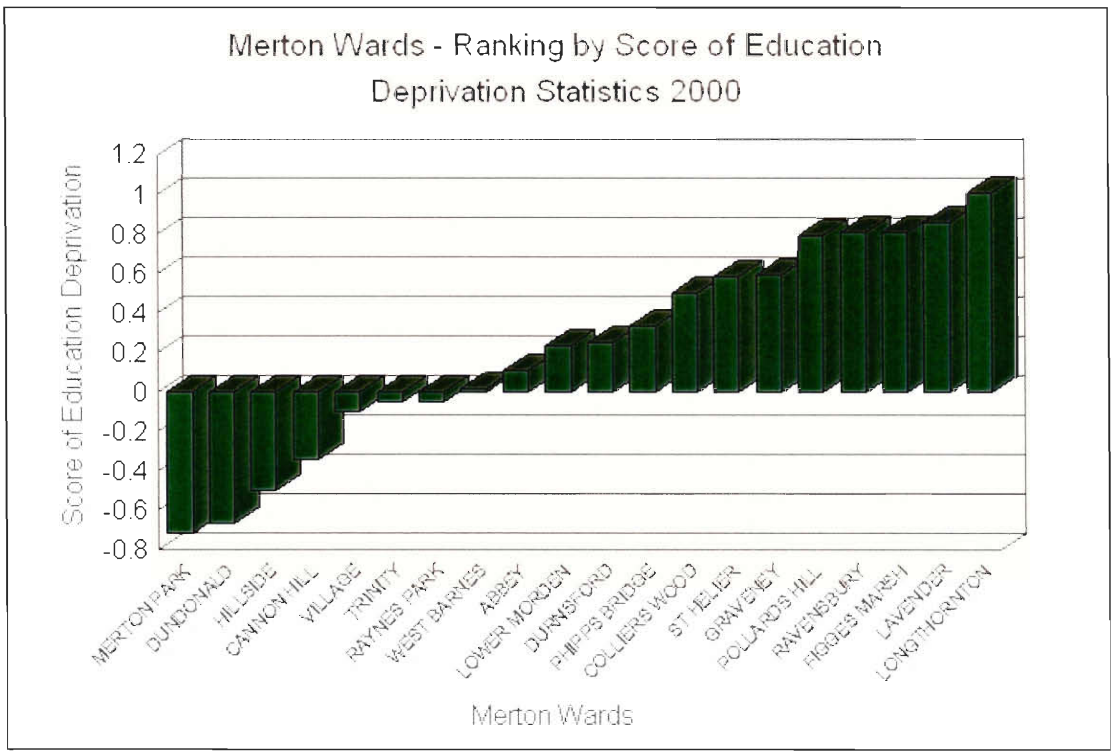


Figure 26: Chart - Education deprivation

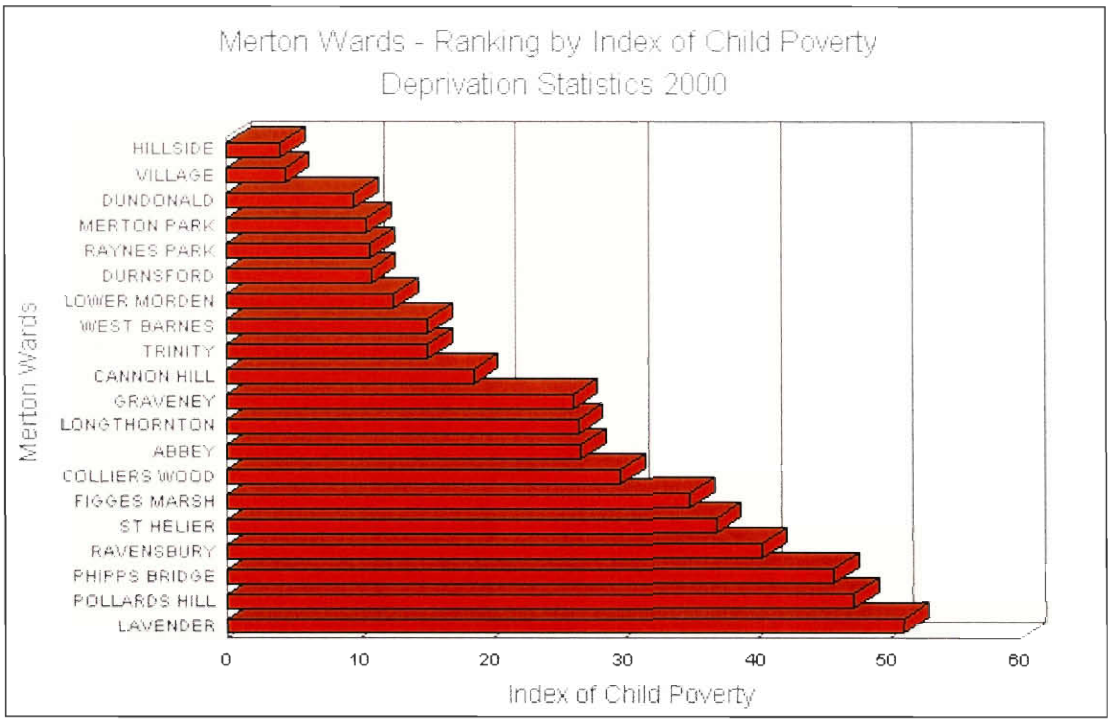


Figure 27: Chart - Child poverty deprivation

4.4.7 Presenting statistical data with maps

The maps to follow display the same data presented in the charts above. By taking these data and applying a thematic map to the wards, it is possible to see areas of Merton that are more deprived than others. When presenting the data in charts, it was only possible to compare the wards without any spatial reference. The maps below combine this spatial data and the deprivation statistics to give a view of deprivation for the entire Borough. These maps allow the planners to quickly see which areas of the Borough are deprived and thus, which areas to focus on.

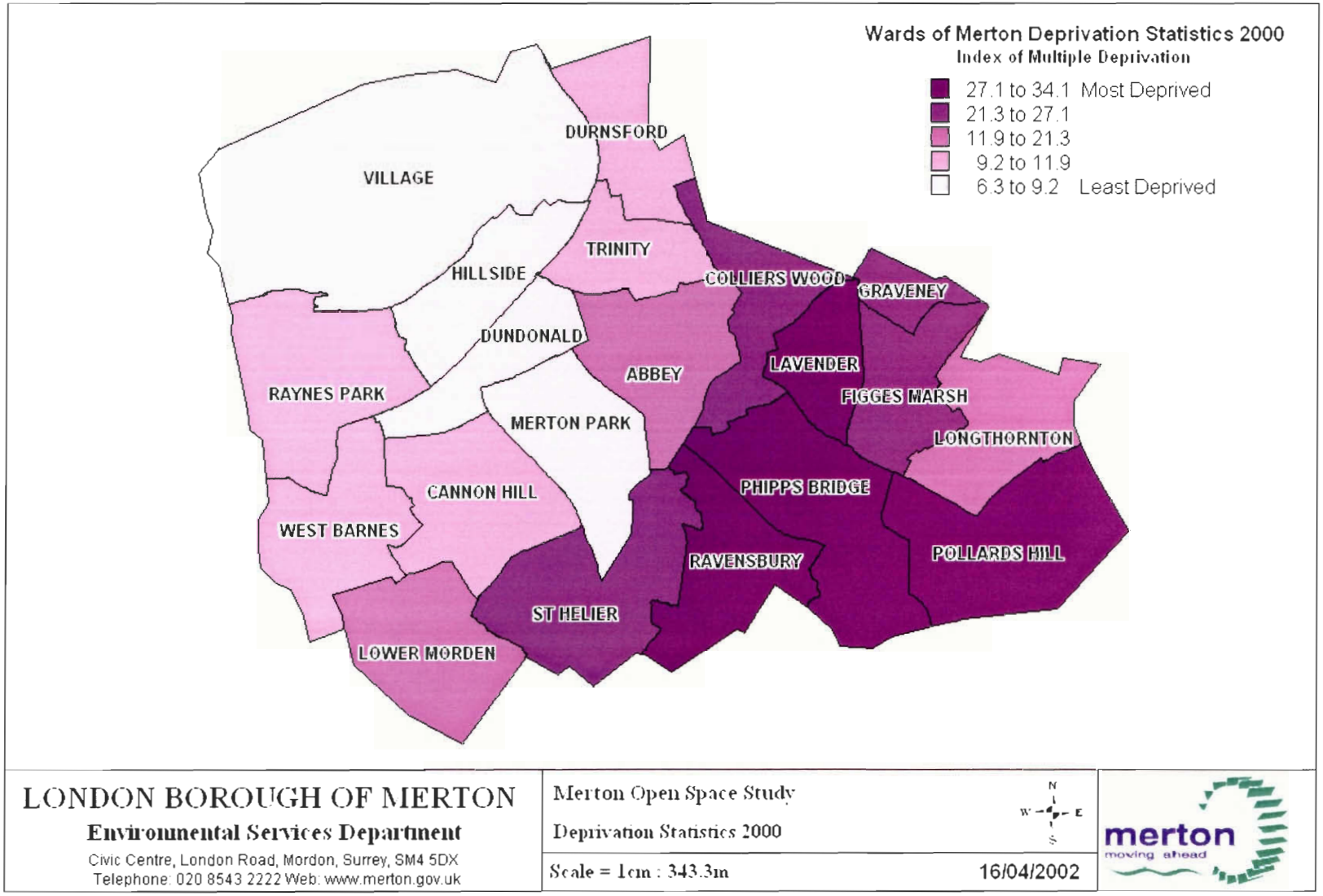


Figure 28: Map - Ranking By Score of Multiple Deprivation

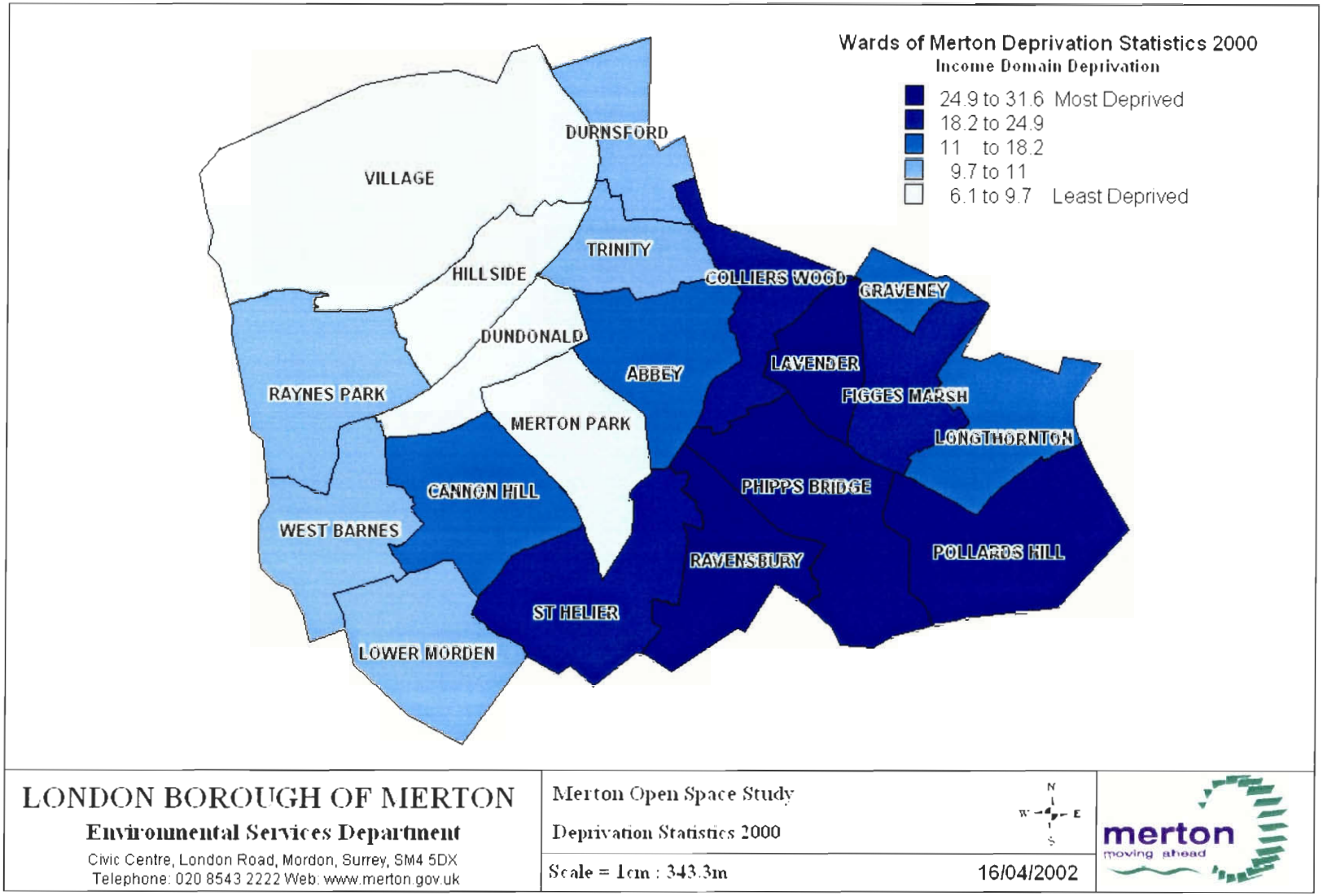


Figure 29: Map - Income deprivation

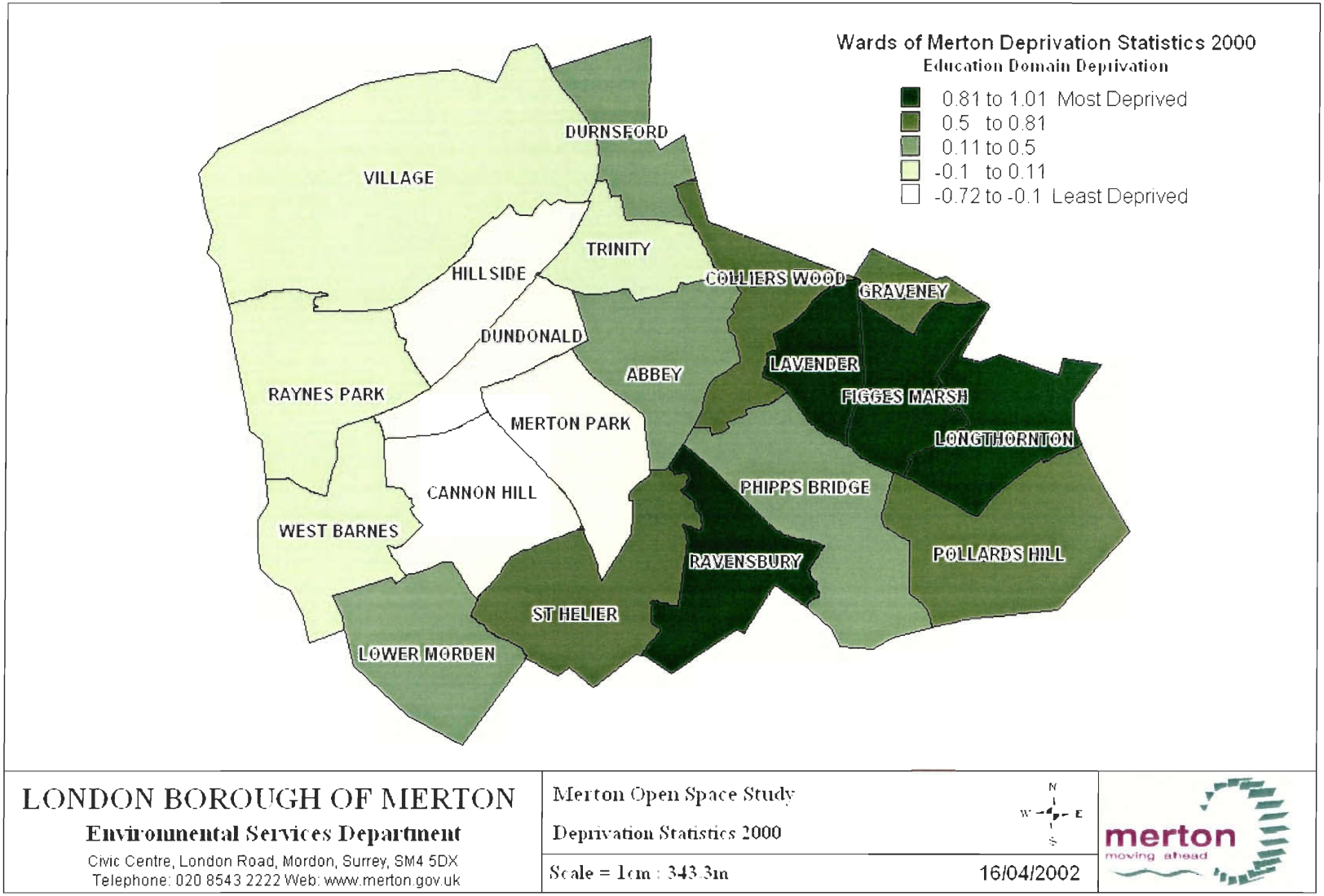


Figure 30: Map - Education deprivation

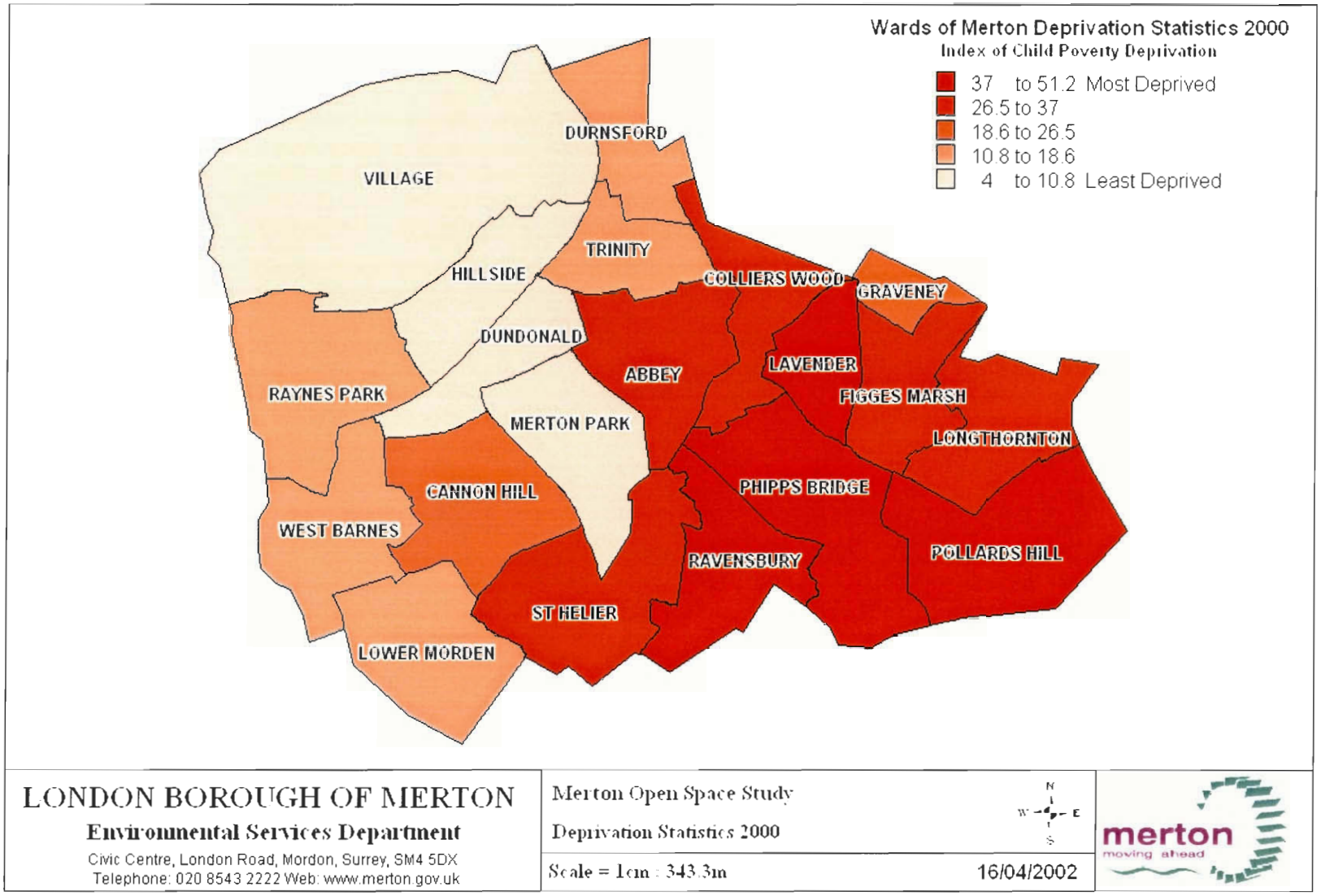


Figure 31: Map - Child poverty deprivation

5 Conclusions and Recommendations

5.1 Provide more training on MapInfo

Training remains an important subject for Merton's Plans and Project Section. The results of our feedback survey showed that every member of the Plans and Projects Section that attended MapInfo I wanted additional training sessions on MapInfo and its applications. As a result, we conducted MapInfo II training sessions. The MapInfo II training sessions gave a more concentrated and personal study because they were conducted one-on-one. However, we feel that additional in-depth and specialised training sessions would be in order, especially for the members of the Section who will be using MapInfo on a regular basis.

One part of the training that would greatly aid in learning MapInfo is hands-on use of the program. Due to the fact that MapInfo had been installed on only a few computers, this was not an option for us. The more use and practice the user has with the software, the more effective he or she will be with it.

We recommend a hands-on training course, run by a MapInfo expert. Members of Merton's Plans and Projects Section could reveal, prior to these sessions, the areas of MapInfo most important to them. This would result in the most productive training sessions, saving the Section time and money.

5.2 Provide common fields for maps and databases

MapInfo has the ability to be used with existing databases in the LBM. To use MapInfo with these databases successfully, it is necessary to have a common field in the database and in the appropriate MapInfo table. For example, if the user had a database with information on the buildings in Merton and a table that displayed all the buildings on a map, the user could associate and correlate the data. This can be very

useful in analysing trends in data and has many different applications. The only drawback is that there needs to be a common field. This is explained in section 4.1.3.

5.3 Improve availability and accessibility to MapInfo

Availability and accessibility of MapInfo are concerns within Merton's Plans and Projects Section. Currently, only three computers house MapInfo in the Section. As a result, there is limited exposure of MapInfo within the Section. In order for MapInfo to be a useful tool within the Section, access to the software must be improved.

Inquiries should be made into the feasibility of installing MapInfo on more of the computers in the Section, or if possible, all of them. Two factors may affect the availability and accessibility to MapInfo within the Plans and Projects Section: cost and computer hardware. Obtaining MapInfo for a large number of computers may be costly. In addition to cost, computer hardware is an issue. In order to run MapInfo effectively, the computers' hardware may need to be upgraded.

5.4 Develop common standards

We devised a standard for file naming, colours, and coordinate systems, so that the analysis carried out by different staff was consistent. Establishing these standards before analysis is done will save time in looking for files and interpreting someone's analysis.

5.4.1 Utilise a standard for file naming

When creating files that will be used and edited by different staff members, it is necessary to adopt a naming standard. When using information with MapInfo, all of the staff must use the same tables, and there should be an agreement among staff

members about this matter. It is necessary to develop a file naming standard that everyone can use and easily follow.

When analysing the data from MOSS, it was necessary for our team to develop and use one of these standards. When using MapInfo, we developed a convention for saving MapInfo tables and workspaces. The method that we came up with is to have the initials of the borough that is being studied and then a short description of the layer. Filenames used in our project are shown in Table 5.

Table 5: File naming samples

LBM_Roads.TAB	Road table of London Borough of Merton
LBM_WardBoundaries.TAB	Ward Boundaries of LBM
LBM_OpenSpace.TAB	Open Spaces of LBM
LBM_ClipBorough.TAB	Table used to clip Merton for easy viewing
LBM_OS_Types.WOR	Workspace containing a thematic map of the open space types in LBM

It is good practice to use abbreviations when possible to shorten the length of filenames. The filenames listed above are a good example because the use of common acronyms is apparent.

When looking through the *Layer Control* in MapInfo, a user wants it to be organised. The filename of a table is also the display name in the *Layer Control*. The *Layer Control* has a limited number of characters that it can display, so keeping the filenames under thirty characters is advised. Workspaces in MapInfo should follow the same convention that is used for tables. The reason for starting each layer with "LBM_" is that in the future, it may be necessary to open data from two different boroughs. If there is a borough distinction at the beginning of the layer, it will be much easier to tell which layer goes with each borough. Putting this information in the filename now will prevent it from being a problem in the future.

We recommend, therefore, that all the filenames should start with the borough abbreviation, and then a short description. This is the recommended method we arrived at after we consulted WS Atkins, and after we reflected upon our project team's own experience with MapInfo. It is our recommendation that this standard be adopted for the Plans and Projects Section.

5.4.2 Create a common colour scheme

Using MapInfo, it is necessary to be careful of the colours used in thematic maps. By default, MapInfo does not pick the best colours for maps that are produced. It is necessary to manually edit the colours and pick more appropriate colours. The question can then be asked what colours should be used? The scheme that was used in this project was based on the colours of a traffic light. A traffic light has the colours green, yellow, and red. These colours can be very easily applied to the categories of good, fair and poor, green being good, yellow fair and red poor. Before and after examples of a thematic map legend are shown in Figure 32: Before standard and Figure 33: After standard. Maps that are produced in the future should use the same colour scheme for all maps. A colour scheme should be adopted for the future to remain consistent in all maps produced.

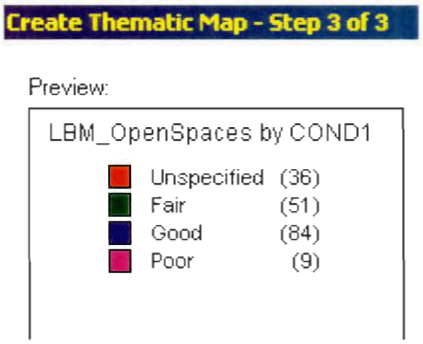


Figure 32: Before standard

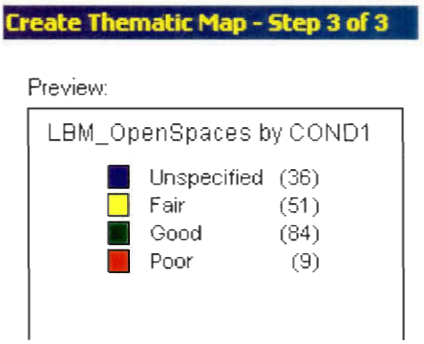


Figure 33: After standard

5.4.3 Adopt a common coordinate system

MapInfo has the ability to display map data in many different coordinate systems that are used in different parts of the world. It is necessary for all of the maps produced to be in the same coordinate system. If the maps are not in the same coordinate system, then different maps and layers that users produce will not be able to be layered on top of other layers correctly.

A problem with different coordinate systems was observed in this project. The maps that contained the open space data were in non-earth coordinates and the LBM's existing MapInfo data was in a British Coordinate System, specifically British National Grid.

We brought this to the attention of Merton's Plans and Projects Section, and they were able to contact WS Atkins regarding the open space data. WS Atkins was then able to reproduce the data in the British National Grid coordinate system. We recommend that all maps in the Borough have the same coordinate system, and that future consultants also use this standard.

5.5 Obtain permanent access to a colour printer

A recommendation for the Plans and Projects Section is to gain permanent access to a colour printer. When producing maps with MapInfo, it is necessary to

have a high resolution colour printer. Printing in greyscale does not give the user of MapInfo very useful detailed maps.

While conducting our project, we discovered that the Plans and Projects Section does not have a colour printer for all members to use. There is a colour printer in the Section; however, it is connected to a Macintosh and is not accessible via the network. The Section will not have access to a colour printer until they can buy their own printer or pay to use another section's printer. If in the future more staff will be using MapInfo, a colour printer will be more widely needed. It is our recommendation that the Plans and Projects Section resolve this issue before more staff use MapInfo on a routine basis.

5.6 Centralise location of data

Data are valuable assets at Merton. Data are used and shared by many different departments within Merton's Civic Centre. Currently, the scheme for storing data is flawed, but changes are being made. For example, the altering of data in one department may not be reflected in another department. This can cause problems if one department adds open space data to the centralised open space table; other departments that are not using these centralised data will not see these changes.

Most of the data are stored on the network in a centralised location. It is imperative that when members of the Section create maps, they use tables that are stored on the network. This practice of using centralised data will facilitate the creation of consistent and up-to-date maps. The members can then save the workspace on their local computer.

Few members of the Section should be given write access to the directories that contain the data; this will prevent data from accidentally being overwritten. Most members will simply be creating maps for analysis and will have no reason to alter

the table data. Building upon this issue, data should be backed up on a daily basis, and versions of tables should be saved in a separate, read-only directory. In this way, if a table becomes corrupt or overwritten, it can be restored rather effortlessly.

5.7 Acquire surrounding boroughs' data

The analysis of the MOSS will eventually reach the stage where GIS data from surrounding boroughs are needed. For the data to be useful, they need to be both in the correct format, and correct coordinate system. MapInfo can import data from numerous formats and programs, but is most useful if it is in MapInfo format. As seen with the WS Atkins data, if the tables supplied are not in the correct coordinate system, they can have considerable effect on the resulting maps. Therefore, it is a good idea to consult the boroughs on the coordinate system used prior to using their data.

5.8 Expand uses of MapInfo in the Borough

The areas that GIS can be further applied to within the Borough are endless. A few examples of possible geographical information systems are to monitor road maintenance, to map events within the Borough, to visualise census and statistical data, to plot locations of tourist sites, and to plan emergency routes for police, fire, and ambulance use. For an emergency route GIS, detailed road tables would be required, with information such as one-way roads and quality. One example of GIS use within the Borough would be to plot the locations of tourist sites, along with public transportation stops, to see if any sites are inaccessible. Other possible areas of GIS use within the Borough include:

- Housing: Mapping areas of deficient housing
- Leisure: Mapping the Borough's cycle routes
- Land use planning: Using GIS to determine future land use needs

5.9 Explore the possibility of a GIS specialist

As GIS becomes more prevalent within the Borough, it may be necessary to hire, or consult, a GIS specialist. As the Borough expands its use of GIS to other areas, a GIS specialist will be useful to guide the Borough in the best means of implementing the GIS. The GIS specialist should also be knowledgeable in MapInfo to be truly effective since the Borough will be using MapInfo as its primary GIS software package.

5.10 Supply GIS information on Merton's website

A well designed website is one that supplies content that is useful to its viewers. Using MapInfo, Merton could produce maps that help residents of the Borough. One part of the MOSS was an assessment of the borough's playing pitches. The data and conclusions obtained could be very useful to members of associations that run the sports played on the pitches. Also, maps displaying the locations of playgrounds would help parents find a safe place for their children to play. Maps displaying the quality of sites can be utilised by "Friends of" groups to further their work on the sites. MapInfo also contains a tool to export maps as HTML image maps for inclusion into websites. This provides a clickable interface to the maps.

5.11 Consider sponsoring a future IQP

During the course of our work on our project, we came upon several subjects that could form the foundation of a future IQP for WPI students. One of our supplementary goals that we did not actually have time to complete, was to provide information regarding the MOSS on the Borough's website. This subject could very easily form the groundwork of an IQP. Another possible subject could be helping other sections implement MapInfo or another form of GIS into their daily operations.

This type of task would be very similar to our project. Data storage and resource location is an issue within the LBM. During our meeting with Mick Bird, the IT manager for Borough, this was an issue that was raised. The Borough would like to store its resources in a more efficient manner, allowing all sections of the Borough access to the necessary information. This potential project, however, is extremely technologically based and is somewhat lacking in social implications.

One area of further work that our project team feels could not be a future IQP is the additional training necessary for members of the Plans and Projects Section. While the project would include both a technical and social aspect, the knowledge of MapInfo necessary to conduct these advanced training sessions is substantial. It would be highly unlikely that a project team could acquire this knowledge in the seven weeks prior to the project.

5.12 Impact of GIS and MapInfo on the Section

Our training sessions and sample maps gave Merton's Plans and Projects Section a head start with their use of MapInfo. This was an important step, because MapInfo will impact the work of the Plans and Projects Section. Using this new technology, the Section will be able to perform analysis that was previously not possible. Planners will increase their productivity by producing maps that will allow them to uncover patterns and trends within the data more quickly. The ability to create electronic versions of maps will both reduce paper usage and allow the Section to save backups of the data. Overall, this will allow Merton's Plans and Projects Section to provide a better service to the Borough of Merton.

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7 Glossary of Terms

Acronyms:
DEMT – Data Entry Monitoring Tool
GIS – Geographic Information System
GLA – Greater London Authority
HTML – Hypertext Mark-up Language
IQP – Interactive Qualifying Project
IT – Information Technology
LBM – (The) London Borough of Merton
MOL – Metropolitan Open Lands
MOSS – Merton Open Space Study
NLUD – National Land Use Database
PQP – Preliminary Qualifying Project
SDS – Spatial Development Plan
SQL – Structured Query Language
UDP – Unitary Development Plan
WMF – Windows Meta File
WPI - Worcester Polytechnic Institute

Definitions:
Derelict Land – Land so damaged by industrial or other development that is incapable of beneficial use without treatment (UDP).

Green Space – Open spaces, regardless of size and ownership, which fulfil a local environmental, nature conservation and/or amenity function, constitute a welcome break in the built environment and contribute to the vital structure of open space throughout London (UDP).

MOL – Areas of predominately open land occurring within the built-up area which are significant to London as a whole and are protected against development (UDP).

Public Open Space – Public parks, commons, heaths and woodland and other open spaces established and unrestricted public access and capable of being classified according to an open space hierarchy, though not necessarily publicly owned (UDP).

Urban Green Space – Open space to which public access is restricted or not formally established but which meets or is capable of meeting recreational or non-recreational needs within the urban area (UDP).

Appendix A – Plans and Projects Section

Sponsor: The London Borough of Merton

The sponsor of this Interactive Qualifying Project (IQP) is The London Borough of Merton's Environmental Services Plans and Projects Section. This section is located on the 11th floor in the Merton Civic Centre, which is centrally located in the Borough of Merton and has thirteen staff members. The mission statement of the Environmental Services Department is: "The department will maintain and improve the local environment and economy of the Borough, through the delivery of quality services and through regeneration and partnership initiatives."

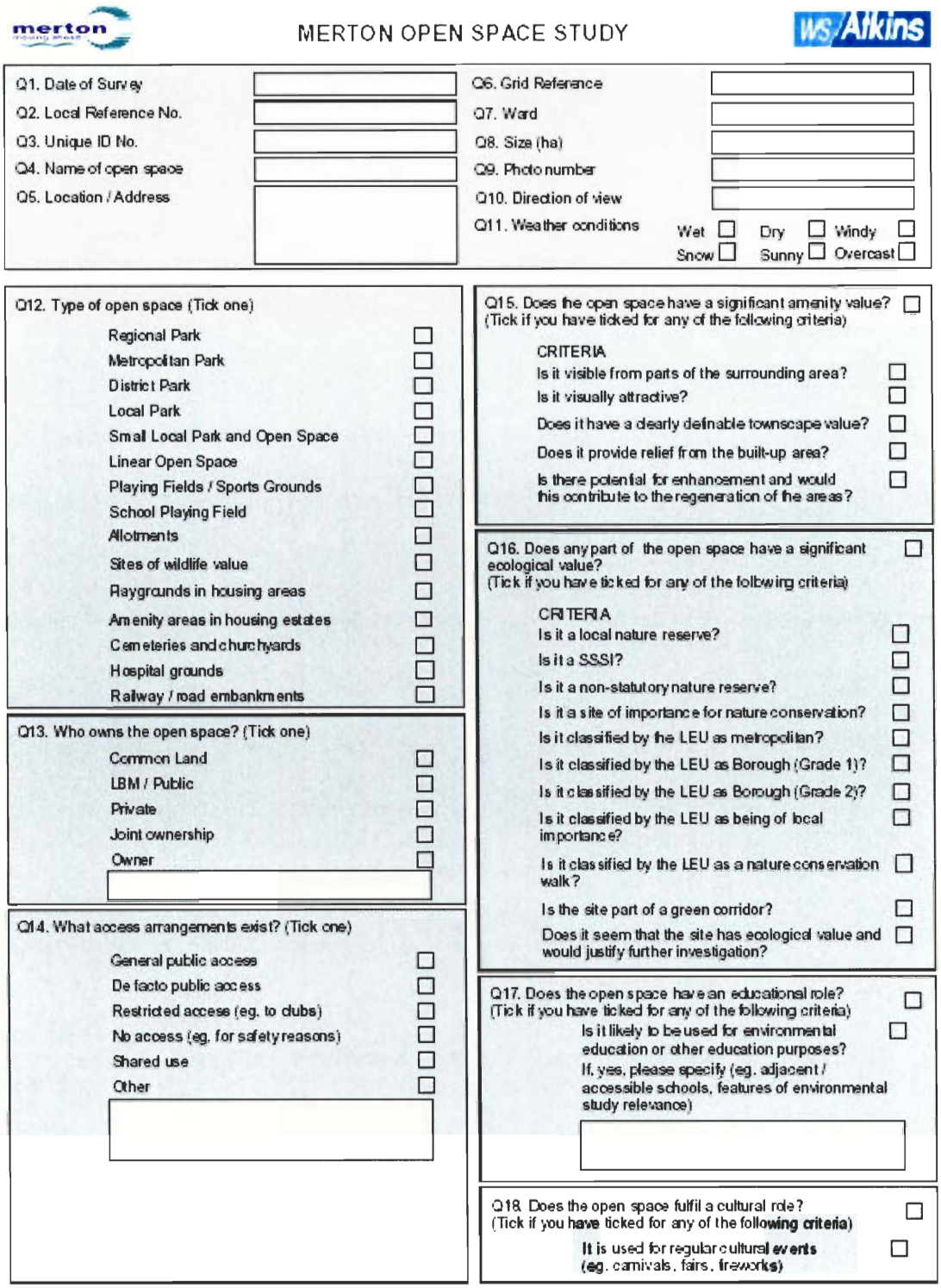
The primary responsibilities of the Plans and Projects Section include: strategic land use planning, Unitary Development Plan, strategic projects, census and population analysis, conservation areas, historic buildings, open spaces consultation, planning advice and guidance, design briefs, minerals and waste planning, and planning enforcement.

Appendix B – Greater London Authority

The Greater London Authority (GLA) is the strategic city wide government for London, which is made up of thirty-two boroughs and the Corporation of the City of London. It is comprised of a mayor, and The London Assembly. The GLA has three distinct purposes: to promote economic development, to ensure social development, and to improve the environment in Greater London. The Mayor's general policies about strategic planning for the development and use of land in Greater London are set out in the Spatial Development Strategy (SDS).

The SDS must deal only with matters of strategic importance to London. Boroughs remain responsible for producing Unitary Development Plans (UDP); the UDPs will be expected to conform to the SDS. Key issues that the SDS deals with are: sustainable development, the built environment, the natural and open environment, and housing. In conclusion, the SDS provides a framework for the boroughs' UDP, and the boroughs remain the designated planning authorities for their areas.

Appendix C – Merton Open Space Survey



MERTON OPEN SPACE STUDY

Q1. Date of Survey
Q2. Local Reference No.
Q3. Unique ID No.
Q4. Name of open space
Q5. Location / Address
Q6. Grid Reference
Q7. Ward
Q8. Size (ha)
Q9. Photo number
Q10. Direction of view
Q11. Weather conditions: Wet ☐ Dry ☐ Windy ☐ Snow ☐ Sunny ☐ Overcast ☐

Q12. Type of open space (Tick one)
- Regional Park ☐
- Metropolitan Park ☐
- District Park ☐
- Local Park ☐
- Small Local Park and Open Space ☐
- Linear Open Space ☐
- Playing Fields / Sports Grounds ☐
- School Playing Field ☐
- Allotments ☐
- Sites of wildlife value ☐
- Playgrounds in housing areas ☐
- Amenity areas in housing estates ☐
- Cemeteries and churchyards ☐
- Hospital grounds ☐
- Railway / road embankments ☐

Q13. Who owns the open space? (Tick one)
- Common Land ☐
- LBM / Public ☐
- Private ☐
- Joint ownership ☐
- Owner ☐

Q14. What access arrangements exist? (Tick one)
- General public access ☐
- De facto public access ☐
- Restricted access (eg. to clubs) ☐
- No access (eg. for safety reasons) ☐
- Shared use ☐
- Other ☐

Q15. Does the open space have a significant amenity value? ☐
(Tick if you have ticked for any of the following criteria)

CRITERIA
- Is it visible from parts of the surrounding area? ☐
- Is it visually attractive? ☐
- Does it have a clearly definable townscape value? ☐
- Does it provide relief from the built-up area? ☐
- Is there potential for enhancement and would this contribute to the regeneration of the areas? ☐

Q16. Does any part of the open space have a significant ecological value? ☐
(Tick if you have ticked for any of the folbwing criteria)

CRITERIA
- Is it a local nature reserve? ☐
- Is it a SSSI? ☐
- Is it a non-statutory nature reserve? ☐
- Is it a site of importance for nature conservation? ☐
- Is it classified by the LEU as metropolitan? ☐
- Is it classified by the LEU as Borough (Grade 1)? ☐
- Is it classified by the LEU as Borough (Grade 2)? ☐
- Is it classified by the LEU as being of local importance? ☐
- Is it classified by the LEU as a nature conservation walk? ☐
- Is the site part of a green corridor? ☐
- Does it seem that the site has ecological value and would justify further investigation? ☐

Q17. Does the open space have an educational role? ☐
(Tick if you have ticked for any of the following criteria)
- Is it likely to be used for environmental education or other education purposes? ☐
  If, yes, please specify (eg. adjacent / accessible schools, features of environmental study relevance)

Q18. Does the open space fulfil a cultural role? ☐
(Tick if you have ticked for any of the following criteria)
- It is used for regular cultural events (eg. carnivals, fairs, fireworks) ☐

Q19. What are the functions of the open space? (Please indentify how many of each facility are provided and their condition)

A. RELATED TO NATURE	Good	Fair	Poor
Nature trails	☐	☐	☐
Wildlife area / natural habitats	☐	☐	☐
Ponds	☐	☐	☐
Rivers and streams	☐	☐	☐
B. SPORTS PROVISIONS	**Good**	**Fair**	**Poor**
Football pitches	☐	☐	☐
Mini pitches	☐	☐	☐
Cricket pitches	☐	☐	☐
Hockey pitches	☐	☐	☐
Pitch drainage	☐	☐	☐
Tennis courts	☐	☐	☐
Multi use courts	☐	☐	☐
Athletics track	☐	☐	☐
All weather pitches	☐	☐	☐
Floodlighting	☐	☐	☐
Golf / putting green	☐	☐	☐
Basketball	☐	☐	☐
Horse riding	☐	☐	☐
Water sports	☐	☐	☐
Bowls	☐	☐	☐
Swimming	☐	☐	☐
Trim trails	☐	☐	☐
C. FACILITIES FOR CHILDREN	**Good**	**Fair**	**Poor**
Toddlers play area	☐	☐	☐
Children's play area	☐	☐	☐
Adventure play area	☐	☐	☐
Special play area (eg. BMX, skate)	☐	☐	☐
D. OTHER ATTRACTIONS	**Good**	**Fair**	**Poor**
Paths	☐	☐	☐
Formal sitting out areas	☐	☐	☐
Formal / oriental gardens	☐	☐	☐
Lake / boating lake	☐	☐	☐
Memorials / statues	☐	☐	☐
Paddling pools	☐	☐	☐

E. INDICATIONS OF INFORMAL USE

Desire lines ☐ Skateboarding ☐

Informal pitches ☐ BMX ☐

Dog walking ☐

F. OTHERS

Q20. Which is the predominant use of the open space?

Active Recreation ☐ Childrens Play ☐

Passive Recreation ☐ Other ☐

Q21. Which of the following facilities does the open space have? (Please indentify how many of each facility are provided and their condition)

	Good	Fair	Poor
Public toilets	☐	☐	☐
Cafe	☐	☐	☐
Lighting	☐	☐	☐
Changing rooms - Male	☐	☐	☐
Changing rooms - Female	☐	☐	☐
Changing rooms - Disabled	☐	☐	☐
Shelter	☐	☐	☐
Club / meeting room	☐	☐	☐
Bandstands / performance facility	☐	☐	☐
1-10 car parking spaces	☐	☐	☐
10-50 car parking spaces	☐	☐	☐
50+ car parking spaces	☐	☐	☐
Cycle parking	☐	☐	☐

Other

Q22. How well is the open space linked with neighbouring areas?

Isolated ☐

Few connections

- Pedestrians / footpaths ☐
- Cycleways ☐
- Roads / cars ☐

Well connected

- Pedestrians / footpaths ☐
- Cycleways ☐
- Roads / cars ☐

Q23. Assess the quality and quantity of the following?

		Footpaths	Cycleways	Bridleways
Quantity	None	☐	☐	☐
	Too few	☐	☐	☐
	Enough	☐	☐	☐
	Many	☐	☐	☐
Quality	Good	☐	☐	☐
	Fair	☐	☐	☐
	Poor	☐	☐	☐

Q24. Are there any physical barriers of access for pedestrians and cyclists? ☐

Q25. Is the open space accessible for people with mobility difficulties? ☐

Q26A. Is there signage to the open space? ☐

Q26B. Is there signage within the open space? ☐

Q27. What is the condition of the following? ☐
(Tick one box for each area)

	Good	Fair	Poor
Park overall	☐	☐	☐
Built structures	☐	☐	☐
Railings	☐	☐	☐
Drives and paths	☐	☐	☐
Bins	☐	☐	☐
Dog litter bins	☐	☐	☐
Seats	☐	☐	☐

Q28a. Is vandalism an obvious problem? ☐

Q28b. Is graffiti an obvious problem? ☐

Q29. Which of the following best describe the physical character of the open space? %

- Natural heathland / downland / common ☐
- Natural woodland ☐
- Formal planted park, with trees and shrubs ☐
- Informal Grassland ☐
- Recreational grassland ☐
- Agricultural land ☐
- Hard playing surface ☐
- Water area (lakes / marshes etc) ☐
- Derelict / wasteland ☐
- Other ☐

Q30. How would you describe the condition of the open space?
(percentage)

	None	Good	Fair	Poor
Trees	☐			
Shrubs	☐			
Flowers and bedding plants	☐			
Grass	☐			
Water features	☐			

Q31. How would you describe the topography and landform?

- Undulating ☐
- Gently sloping ☐
- Steep ☐
- Flat ☐
- Embankment ☐
- Other ☐

Q32a. Is it in a floodplain?

1:50 year ☐ 1:100 year ☐

Q32b. How would you describe the drainage?

- River ☐
- Stream ☐
- Pond ☐
- Lake ☐
- Reservoir ☐
- Water features ☐
- Man made drainage ☐

Q33. How would you describe the aesthetic factors / pattern?

Balance			
Harmonious	☐		
Discordant	☐	Chaotic	☐
Scale			
Intimate	☐	Small	☐
Medium	☐	Large	☐
Enclosure			
Confined	☐	Enclosed	☐
Open	☐	Exposed	☐
Colour			
Monochrome	☐	Muted	☐
Colourful	☐	Garish	☐
Diversity			
Uniform	☐	Simple	☐
Diverse	☐	Complex	☐
Movement			
Through	☐	Active	☐
Within:		Passive	☐
Unity			
Unified	☐	Interrupted	☐
Fragmented	☐	Chaotic	☐
Form			
Straight	☐	Angular	☐
Curved	☐	Sinuous	☐
Security			
Comfortable	☐	Safe	☐
Unsettling	☐	Threatening	☐
Stimulus			
Boring	☐	Bland	☐
Interesting	☐	Invigorating	☐
Pleasure			
Offensive	☐	Unpleasant	☐
Pleasant	☐	Beautiful	☐

Q34. How would you describe the other senses?

Sounds

Intrusive / Dominant	☐	Unpleasant	☐
Pleasant	☐	Quiet	☐

Smells

Unpleasant	☐	Pleasant	☐
None	☐		

Source

Q35. How would you describe the cover?

Woodland blocks
Semi-natural ☐ Ornamental species ☐
Evergreen ☐ Deciduous ☐

Tree groups
Semi-natural ☐ Ornamental species ☐
Evergreen ☐ Deciduous ☐

Avenues
Semi-natural ☐ Ornamental species ☐
Evergreen ☐ Deciduous ☐

Individual trees
Semi-natural ☐ Ornamental species ☐
Evergreen ☐ Deciduous ☐

Scrub
Dense blocks ☐ Individual groups ☐
Semi-natural ☐ Ornamental species ☐
Evergreen ☐ Deciduous ☐

Shrubs
Dense blocks ☐ Individual groups ☐
Semi-natural ☐ Ornamental species ☐
Evergreen ☐ Deciduous ☐

Grass
Close mown ☐ Short ☐
Long ☐ Close mown, with longer margins ☐
Medium length ☐

Hedges
Semi-natural ☐ Ornamental ☐
Evergreen ☐ Formal ☐
Informal ☐ Deciduous ☐

Q36. What is the age structure?

Trees
Over-mature ☐
Well established ☐ Young ☐

Shrubs
Over-mature ☐
Well established ☐ Young ☐

Q37. How would you describe the viewpoints within the open space?

High points, with distant views ☐
Breaks in vegetation, allowing views ☐
Open ☐
Enclosed by landform ☐
Enclosed by built form ☐

Q38a. Which is the most appropriate landscape management strategy?

Conservation ☐
Minor improvements ☐
Major improvements ☐

Q38b. How easily could the open space accommodate this change?

Easily able ☐
Able ☐
With difficulty ☐
Unable ☐

Q39. Landscape improvements

Landscaping ☐
Strategic structural tree planting ☐
Land modelling ☐
Create greater variety of spaces within park ☐
Grass planting ☐
Other ☐

Q40. Other comments

Appendix D – Sutton Open Space Study

The Borough of Sutton, located to the South of the Borough of Merton, conducted an open space study in 1997. This study was used as an example of what to expect from a completed open space study of a borough in London. Within the report, numerous maps were created using a GIS to plot the open spaces of the Borough.

There were four overall goals for the *Sutton Open Space Study* (Llewelyn-Davies and MVA Consultancy 1). The first goal was to identify shortfalls or over provision of open space and to indicate opportunities for reducing deficiencies. The second goal was to undertake a quantitative and qualitative assessment of the supply of public open space and demand for open space in the Borough. The third goal was to survey the provision of public open spaces against national standards. The final goal was to make appropriate recommendations that could be taken into account in the review of policies for the UDP.

The *Sutton Open Space Study* was conducted in three stages (Llewelyn-Davies and MVA Consultancy 1). Stage I was an assessment of the supply of open space in Sutton. It identified key issues in relation to the amount and quality of open space, and considered how provisions could be improved. Stage II addressed the demand issues and established local concerns in relation to open space by means of four focus group discussions involving representative organisations. Stage III brought together both of these elements and developed recommendations for the protection and enhancement of open space in Sutton.

A number of principles for open space studies can be derived from the Sutton study. First, improvements in terms of landscape and the range of facilities should be made to existing open space prior to the development of new spaces. Second,

deficiency areas should be prioritised for the creation of new spaces, and the potential private spaces in these areas should be further developed. Third, parks within wards with the lowest landscape quality scores should have highest priority for landscape improvements. Fourth, all space identified as having a non-recreational value should be given policy protection and designated as Urban Green Space. Fifth, the study suggests that no more private open space should be lost to development. Lastly, research should be performed into the long-term option of transferring open space management to an organisation (Llewelyn-Davies and MVA Consultancy 79).

Appendix E – WS Atkins

WS Atkins is one of the UK's leading providers of professional, technologically based consultancy and support services to industry, commerce and government world-wide. WS Atkins was established in 1938 and presently employs over 12,000 staff working in the UK and overseas. The company's corporate strategy is to provide a comprehensive service to its clients in the planning, development, management and operation of commercial, industrial and infrastructure facilities. The WS Atkins Planning Consultants of Epsom in Surrey carried out the first stage of the MOSS.

WS Atkins Planning Consultants is an integral part of WS Atkins, employing 200 professional staff and offering multidiscipline planning services throughout the UK and internationally. The consultancy provides a wide range of planning and related services to both public and private sector clients, including:

- Policy formulation and advice
- Feasibility studies
- Local plan and structure plan representation
- Site development and master planning
- Urban design
- Landscape planning
- Planning applications and appeals
- Planning inquiries
- Transport planning
- Development economics
- Environmental impact assessment
- Public consultation

About WS Atkins. 15 April 2002. WS Atkins Planning Consultants Main Office. 15 April 2002. <http://www.rtpiconsultants.co.uk/auto/main/133.html>

Appendix F – Survey of Streatham Park

03. WSA ID	XXX	04. Name of open space	Out of Borough
05. Address	Streatham Park, Borough of Lambeth		
07. Ward		08. SIZE	0
01. Survey date	13/03/2002		
09. Photo references		011 Weather	Overcast
012. Type of open space : current us	Small local park and open space	013. Who owns the open space?	LBM / Public
014. What access arrangements exist?	General public access		
015. Does the open space have significant amenity value	Yes		
016. Does the open space have an important ecological value?	No		
017. Does the open space have an educational role?	Don't Know		
018. Does the open space fulfill a cultural role?	Don't Know		
020. What is the Predominant use of the open space	Childrens Play		

022. How well is the open space linked with neibouring areas

Pedestrians : footpaths	Few connections
Cycleways	
Bridleways	

023. Assess the quality and quantity of the following

Footpaths	Enough	Fair
Cycleways	None	
Bridleways	None	

024. Are there any barriers for pedestrians and cyclists?	Yes	Four entrances to park. One of the entrances is obstructed.
025. Is the open space accessible for people with mobility difficulties?	Yes	Yes, on paths.
026A. Is there sinage to the open space?	No	
026B. Is there signage within the open space	Yes	Sign on gate.

027. What is the condition of each of the following?

Park Overall	Fair	Drives and Path	Fair	Seats	Fair
Built Structures	Fair	Bins	Fair		
Railings	Fair	Dog Litter Bins	Fair		

028A. Is vandalism an obvious problem?	Yes	028B. Is graffiti an obvious problem	Yes

029. Which of the following best describe the physical character of the open space

Natural Heathland : Downland : Common	0	Agricultural land	0
Natural Woodland	0	Hard Playing surface	20
Formal planted park, with trees and shrubs	45	Water area (lakes : marshes etc)	0
Informal Grassland	20	Derelict : wasteland	0
Recreational grassland	5	Other	0

Q30. How would you describe the condition of the open space? (percentage)

	Goo	Fair	Poor
Trees	90	10	0
Shrubs	90	10	0
Flowers and bedding plants	0	0	0
Grass	90	10	0
Water Features	0	0	0

Q31. How would you describe the topography and landform? Flat

Q32A. Is it in a floodplain?

Q32B How would you describe the drainage

Man made drainage

Q33. How would you describe the aesthetic factors - pattern?

Balance	Harmonious	Unity	Fragmented
Scale	Small	Form	Angular
Enclosure	Enclosed	Security	Unsettling
Colour	Colourful	Stimulus	Bland
Diversity	Simple	Pleasure	Pleasant
Movement Through	No		
Movement Within	Passive		

Q34A. How would you describe the sounds

Quiet

Q34B. How would you describe the smells

Pleasant

Q35. How would you describe the cover

Woodland blocks	☐ Semi-Natural	☑ Ornamental Species	Tree groups	☑ Semi-Natural	☐ Ornamental Species
	☐ Evergreen	☐ Deciduous		☐ Evergreen	☐ Deciduous
Avenues	☑ Semi-Natural	☐ Ornamental Species	Individual Trees	☑ Semi-Natural	☐ Ornamental Species
	☐ Evergreen	☐ Deciduous		☐ Evergreen	☐ Deciduous
Scrub	☐ Dense blocks	☐ Individual group	Shrubs	☐ Dense blocks	☐ Individual group
	☑ Semi-Natural	☐ Ornamental Species		☐ Semi-Natural	☑ Ornamental Species
	☐ Evergreen	☐ Deciduous		☐ Evergreen	☐ Deciduous
Grass	☐ Close mown	☐ Short	Hedges	☐ Semi-Natural	☐ Ornamental
	☐ Long	☐ Close mown with longer		☐ Evergreen	☑ Formal
	☑ Medium Length	margins		☐ Informal	☐ Deciduous

Q36. What is the age structure?

Trees	☐ Over Mature	Shrubs	☐ Over Mature
	☑ Well established		☑ Well established
	☐ Young		☐ Young

Q37. How would you describe the viewpoints within the open

- ☐ High points, with distant view
- ☐ Breaks in vegetation, allowing view
- ☐ Open
- ☐ Enclosed by landfor
- ☑ Enclosed by built for

Q38A. What is the most appropriate landscape management strategy? Minor improvements

Q38B. How easily could the open space accommodate this change Easily able

Q39. Landscape improvements

- ☐ Landscaping
- ☐ Strategic structural tree planting
- ☐ Land modellin
- ☐ Create greater variety of spaces within park
- ☑ Grass planting

Other: Upkeep, Graffiti

Other Comments: Good, besides graffiti and some upkeep

Appendix G – Deprivation Statistics 2000

Key for Deprivation Statistics

Field Name	Definition of Field
Name	Name of Ward
Code	Ward Code
Score1	Indices of Deprivation 2000, index of multiple deprivation score1
Score2	Indices of Deprivation 2000, rank of index of multiple deprivation rank (out of 8414 wards)2
Score3	Indices of Deprivation 2000, income domain score3
Score4	Indices of Deprivation 2000, rank of income domain (out of 8414 wards)4
Score5	Indices of Deprivation 2000, employment domain score5
Score6	Indices of Deprivation 2000, rank of employment domain (out of 8414 wards)6
Score7	Indices of Deprivation 2000, health domain score7
Score8	Indices of Deprivation 2000, rank of health domain (out of 8414 wards)8
Score9	Indices of Deprivation 2000, education domain score9
Score10	Indices of Deprivation 2000, rank of education domain (out of 8414 wards)10
Score11	Indices of Deprivation 2000, housing domain score11
Score12	Indices of Deprivation 2000, rank of housing domain (out of 8414 wards)12
Score13	Indices of Deprivation 2000, access domain score13
Score14	Indices of Deprivation 2000, rank of access domain (out of 8414 wards)14
Score15	Indices of Deprivation 2000, child poverty index score15
Score16	Indices of Deprivation 2000, rank of child poverty index (out of 8414 wards)16

National Statistics (www.statistics.gov.uk)

Name	Code	Score1	Score2	Score3	Score4	Score5	Score6	Score7	Score8	Score9	Score10	Score11	Score12	Score13	Score14	Score15	Score16
Abbey	00BAFA	19.22	3714	17.61	3620	8.22	4241	-0.25	5028	0.11	3711	1.42	534	-1.26	7915	26.71	3487
Cannon Hill	00BAFB	11.52	5856	12.6	5324	7.06	5018	-0.44	5688	-0.34	5398	0.18	3507	-0.27	4949	18.62	4991
Colliers Wood	00BAFC	22.08	3160	18.85	3303	8.99	3797	-0.37	5409	0.5	2405	1.52	463	-0.81	7031	29.68	3019
Dundonald	00BAFD	7.56	7256	8.76	7081	4.71	6960	-1.25	7696	-0.67	6469	0.79	1562	-0.66	6569	9.59	7261
Durnsford	00BAFE	11.53	5855	9.72	6621	5.5	6324	-0.85	6901	0.25	3200	0.85	1431	-0.58	6246	10.92	6908
Figge's Marsh	00BAFF	27.08	2335	22.24	2532	10.3	3133	-0.06	4362	0.81	1538	1.54	446	-0.63	6436	35.04	2371
Graveney	00BAFG	23.08	2994	18.17	3487	9.5	3540	-0.43	5636	0.59	2129	1.78	270	-1.39	8042	26.13	3600
Hillside	00BAFH	6.6	7601	6.45	7938	4.59	7080	-1.48	7998	-0.5	5946	0.63	2005	-0.54	6094	4.08	8293
Lavender	00BAFJ	34.07	1571	31.52	1210	12.98	2128	0.14	3631	0.86	1435	1.56	432	-0.65	6523	51.19	894
Longthornton	00BAFK	21.29	3310	16.99	3792	7.96	4401	-0.44	5672	1.01	1123	1.05	1025	-0.74	6806	26.52	3519
Lower Morden	00BAFL	11.91	5729	10.95	6059	6.75	5265	-0.44	5667	0.23	3285	0.42	2668	-0.95	7382	12.57	6478
Merton Park	00BAFM	6.38	7677	9.01	6967	5.63	6214	-1.08	7402	-0.72	6606	0.19	3459	-0.9	7279	10.53	7019
Phipps Bridge	00BAFN	31.87	1792	30.84	1274	13.13	2083	0.36	2864	0.33	2958	1.39	566	-0.63	6429	45.85	1311
Pollards Hill	00BAFP	32.8	1693	31.09	1248	12.48	2274	0.07	3903	0.79	1589	1.53	456	-0.72	6752	47.36	1176
Ravensbury	00BAFQ	29.38	2064	24.91	2064	12.05	2440	0.35	2904	0.81	1539	1.09	949	-0.69	6680	40.47	1797
Raynes Park	00BAFR	10.1	6350	10.26	6388	6.31	5631	-0.76	6642	-0.05	4316	0.38	2776	-0.56	6166	10.83	6930
St. Helier	00BAFS	25.89	2518	22.32	2510	10.43	3077	0.31	3040	0.58	2132	1.12	910	-0.7	6696	36.99	2152
Trinity	00BAFT	11.21	5961	10.85	6101	5.69	6158	-0.95	7156	-0.05	4313	1.06	1003	-1.32	7971	15.21	5808
Village	00BAFU	7	7465	6.16	8031	4.19	7384	-1.6	8100	-0.1	4479	0.36	2833	-0.23	4781	4.41	8262
West Barnes	00BAFW	9.21	6684	10.49	6278	4.3	7310	-1.26	7717	0.02	4059	0.77	1646	-0.86	7182	15.17	5815

Appendix H – Questionnaire Responses

Response 1
GIS Presentation

Before the presentation, did you have any prior knowledge of GIS?
Yes a little!

Did the presentation provide you with an adequate introduction to GIS?
Yes it was very informative and helpful.

Were there any confusing areas of the presentation?
If so, please explain.
No. It was a good basic introduction into GIS. Good level of detail to help understanding was covered.

Are there any topics of GIS that you would like to know more about?
Please describe:
Drawing, updating and saving of the data. Linking databases to the system.

MapInfo Presentation and Tutorial
Did this style of presentation aid in your understanding of MapInfo?
Yes the presentation was again pitched at the right level, and the mixture of the PowerPoint first, and then seeing the system in action was useful

Did you find the handout helpful?
Yes good levels of detail, and easy to understand

Were there any topics that could have used more detail?
Please describe:
Not really, most things were covered.

Are there any additional questions that you have thought of since the tutorial?
Concerns with the linking of data from databases. Assuming that all information relating to a specific site would need the exact same reference data in order to link them. Is there a standard referencing system e.g. Grid References?

Do you feel that you will use MapInfo for your job in the future? If so, would you like MapInfo on your PC?
Yes I would think so! (Already have it installed!)

Would you attend another MapInfo session?
Yes!

Response 2
GIS Presentation
I was only able to attend your GIS presentation.

Before the presentation, did you have any prior knowledge of GIS?
No, very little.

Did the presentation provide you with an adequate introduction to GIS?
Yes much so.

Were there any confusing areas of the presentation?
If so, please explain.
None

Are there any topics of GIS that you would like to know more about?
Please describe:
Yes, I would like to be given training, so that I can understand how we can reach the layers.

Response 3
GIS Presentation

Before the presentation, did you have any prior knowledge of GIS?
A little

Did the presentation provide you with an adequate introduction to GIS?
Yes

Were there any confusing areas of the presentation?
If so, please explain.
No

Are there any topics of GIS that you would like to know more about?
Please describe:
No

MapInfo Presentation and Tutorial

Did this style of presentation aid in your understanding of MapInfo?
I thought it was very useful to go through the exercise that you showed us, it gave a useful insight into some of the basics of MapInfo.

Did you find the handout helpful?
Very, it is good to see the tutorial on the screen, but its useful to have the handout to refer to if you get a bit lost, and also means that you can try the exercise at a later date.

Were there any topics that could have used more detail?
Please describe:
I think updating columns is a crucial part of using MapInfo this is not easy to explain and I think this was done well, but I felt that there could have been a bit more explanation.

Are there any additional questions that you have thought of since the tutorial?
No

Do you feel that you will use MapInfo for your job in the future? If so, would you like MapInfo on your PC?
Yes I will use MapInfo for analysing information. I would like to have MapInfo on my PC in future.

Would you attend another MapInfo session?
Yes MapInfo 2 tutorial.

Response 4
GIS Presentation

Before the presentation, did you have any prior knowledge of GIS?
Very limited, only general press coverage plus some use of datamap.

Did the presentation provide you with an adequate introduction to GIS?
Yes in general although it is a major subject.

Were there any confusing areas of the presentation?
If so, please explain.
There was a lot to cover so it will be useful to have some follow up

Are there any topics of GIS that you would like to know more about?
Please describe:
Variety of uses of GIS; examples from other Boroughs; how to digitise sites;

MapInfo Presentation and Tutorial

Did this style of presentation aid in your understanding of MapInfo?
Yes, but one to one with hands on needed next.

Did you find the handout helpful?
Yes but I need to test it.

Were there any topics that could have used more detail?
As I said there was a good intro but we need another chance to go over the tasks

Are there any additional questions that you have thought of since the tutorial?
Not yet!

Do you feel that you will use MapInfo for your job in the future? If so, would you like MapInfo on your PC?
Yes I will need to use it for research and analysis purposes but do not need to have detailed technical expertise. The ability to view data would be useful eventually.

Response 5
GIS Presentation

Before the presentation, did you have any prior knowledge of GIS?
Yes

Did the presentation provide you with an adequate introduction to GIS?
Yes, useful to clarify differences between vector and raster

Were there any confusing areas of the presentation?
If so, please explain.
No

Are there any topics of GIS that you would like to know more about?
Please describe:
Yes - linkages between photographic surveys (satellite) and GIS.

MapInfo Presentation and Tutorial

Did this style of presentation aid in your understanding of MapInfo?
Yes - very straightforward and easy to understand

Did you find the handout helpful?
Yes

Were there any topics that could have used more detail?
Please describe:
No - the balance of time spent on the different aspects - to fit within the one hour slot - was just about right

Are there any additional questions that you have thought of since the tutorial?
What about the issue of compatibility of GIS across borough boundaries - e.g. could we link in with different GIS used in adjoining boroughs to assess distribution/use of open space on borough boundaries.

Do you feel that you will use MapInfo for your job in the future? If so, would you like MapInfo on your PC?
As a Manager I don't feel I would necessarily require MapInfo to assist me in my role and responsibilities, and would more likely to request specific information / output which could probably be provided quickly and more effectively by other Officers. The time required to adequately learn to use the software to a useful level would be likely to be counter-productive.

Would you attend another MapInfo session?
Yes.

Response 6
MapInfo Presentation and Tutorial

Did this style of presentation aid in your understanding of MapInfo?
Yes to some extent

Did you find the handout helpful?
Yes I shall use it for reference.

Were there any topics that could have used more detail?
Please describe:
Yes working with layers and databases

Are there any additional questions that you have thought of since the tutorial?
Yes I would like more info on drawing, templates and printing specifications as well as on managing mapdata.

Do you feel that you will use MapInfo for your job in the future? If so, would you like MapInfo on your PC?
Yes I already have MapInfo on my computer.

Would you attend another MapInfo session?
Certainly.

Appendix I – MapInfo II Session Outlines

1) Rob Naylor
   a) Start with thematic map of open space types
   b) Table Maintenance
      i) Changing values in browser
      ii) Deleting a column permanently
      iii) Adding a new column
   c) Query
      i) Selecting to a new table
      ii) Expressions
      iii) Sorting tables
   d) Layout
      i) Adding frames
      ii) Adding text
      iii) Printing
   e) Using the Cosmetic Layer
   f) Plotting Regions
      i) GDC NLUD tool
      ii) Snap feature (hold down shift)
   g) Workspaces

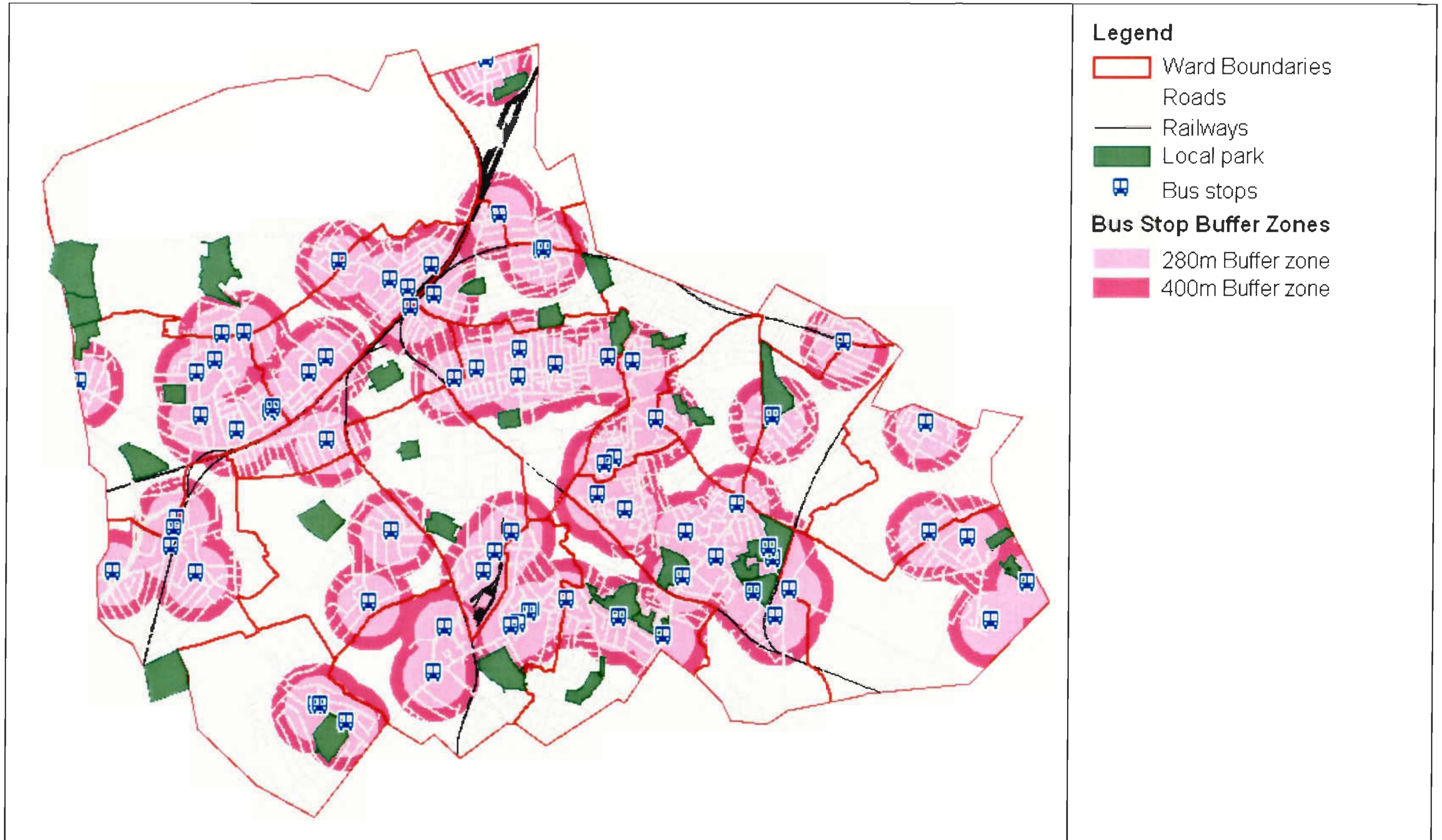
2) Dave Lumb
   a) Start with OS Template
   b) Layout
      i) Named views
      ii) Adding frames
      iii) Inserting legends (Cartographic and Thematic)
      iv) Adding text
      v) Adding logos
      vi) Adding compass
      vii) Printing (Laser printer and Plotter)
   c) Exporting Images
      i) Windows Metafiles (vectors)
   d) Using the Cosmetic Layer
   e) Plotting Regions
      i) Highlighting areas of interest
      ii) Snap feature (hold down shift)
   f) Data organisation within MapInfo

3) Richard Ainsley
   a) Start with OS Template
   b) Make a thematic map of Open Space Types
   c) Create buffer zones for map
   d) Create clipping regions (Merton and Area)
   e) Make a ranged thematic map of ward populations
   f) Make a chart of ward population
   g) Run through Profile options 1-4
   h) Open Layout workspace and print

Appendix J – Sample Maps

Sample Maps:

Figure 34: Map - Local parks with bus stop buffer zones



LONDON BOROUGH OF MERTON

Environmental Services Department

Civic Centre, London Road, Mordon, Surrey, SM4 5DX
Telephone: 020 8543 2222 Web: www.merton.gov.uk

Merton Open Space Study

Local parks with bus stops

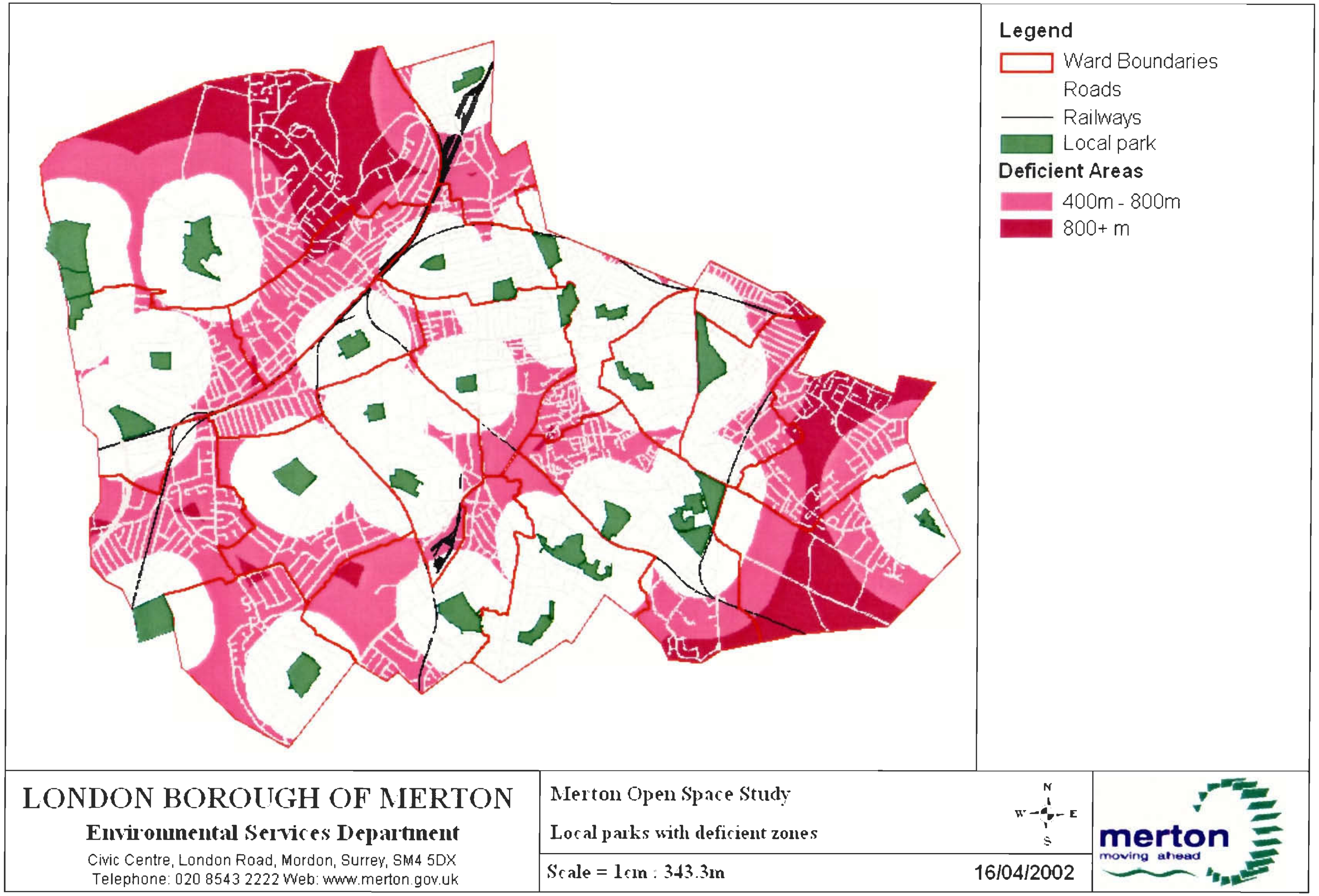
N W E S

Scale = 1cm : 343.3m

16/04/2002

merton moving ahead

Figure 35: Map - Local park deficient zones



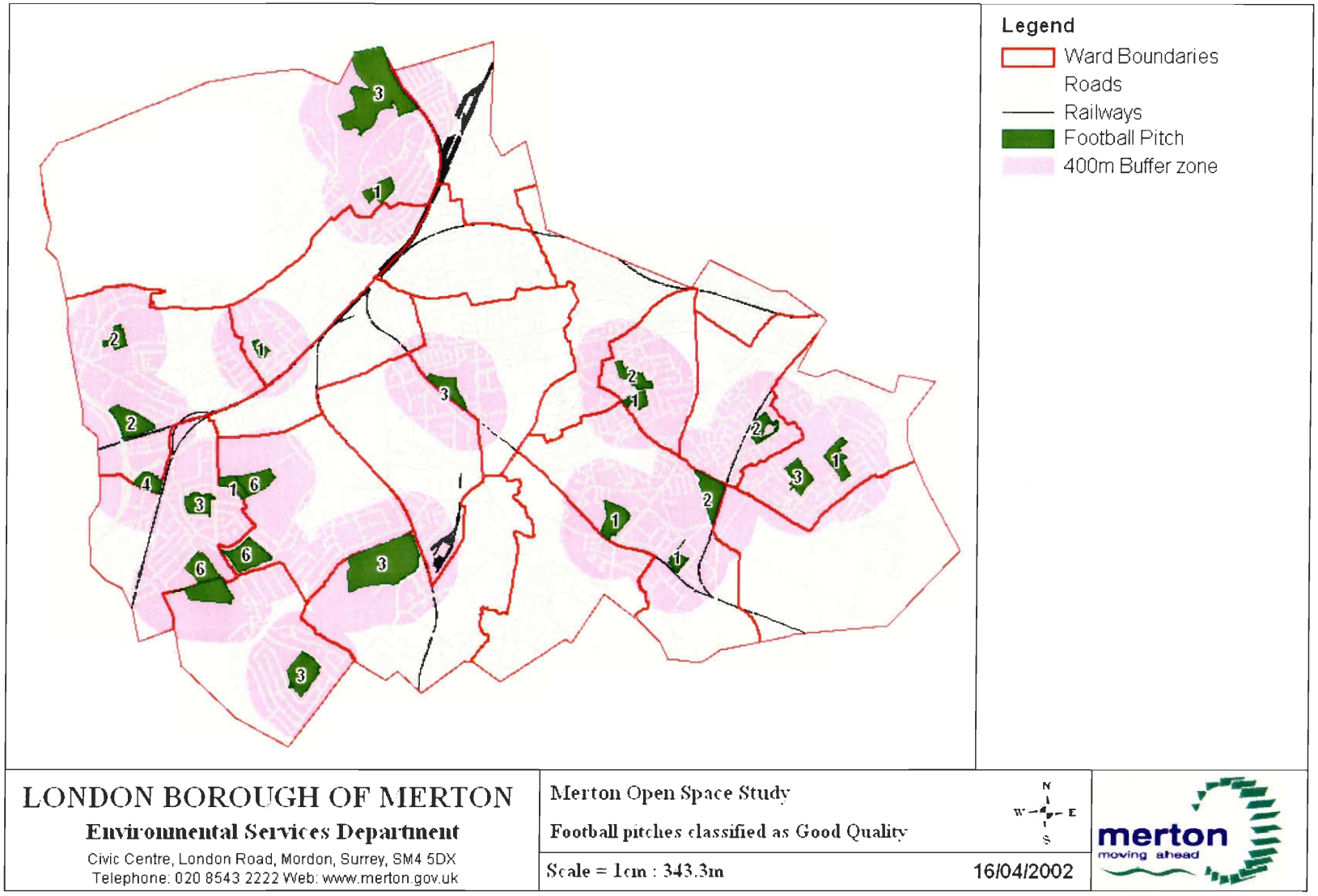


Figure 36: Map - Good quality football pitches

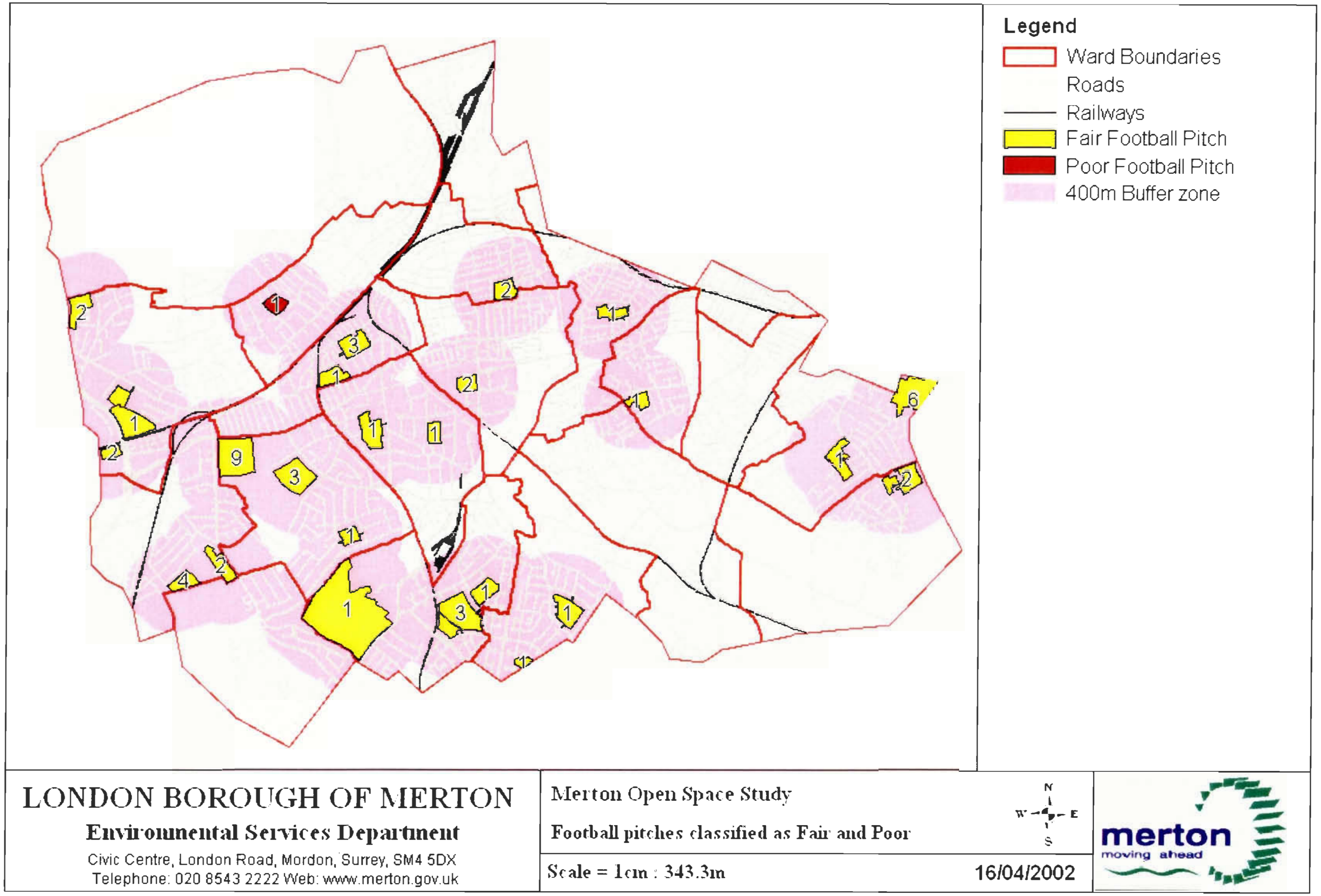


Figure 37: Map - Fair and poor football pitches

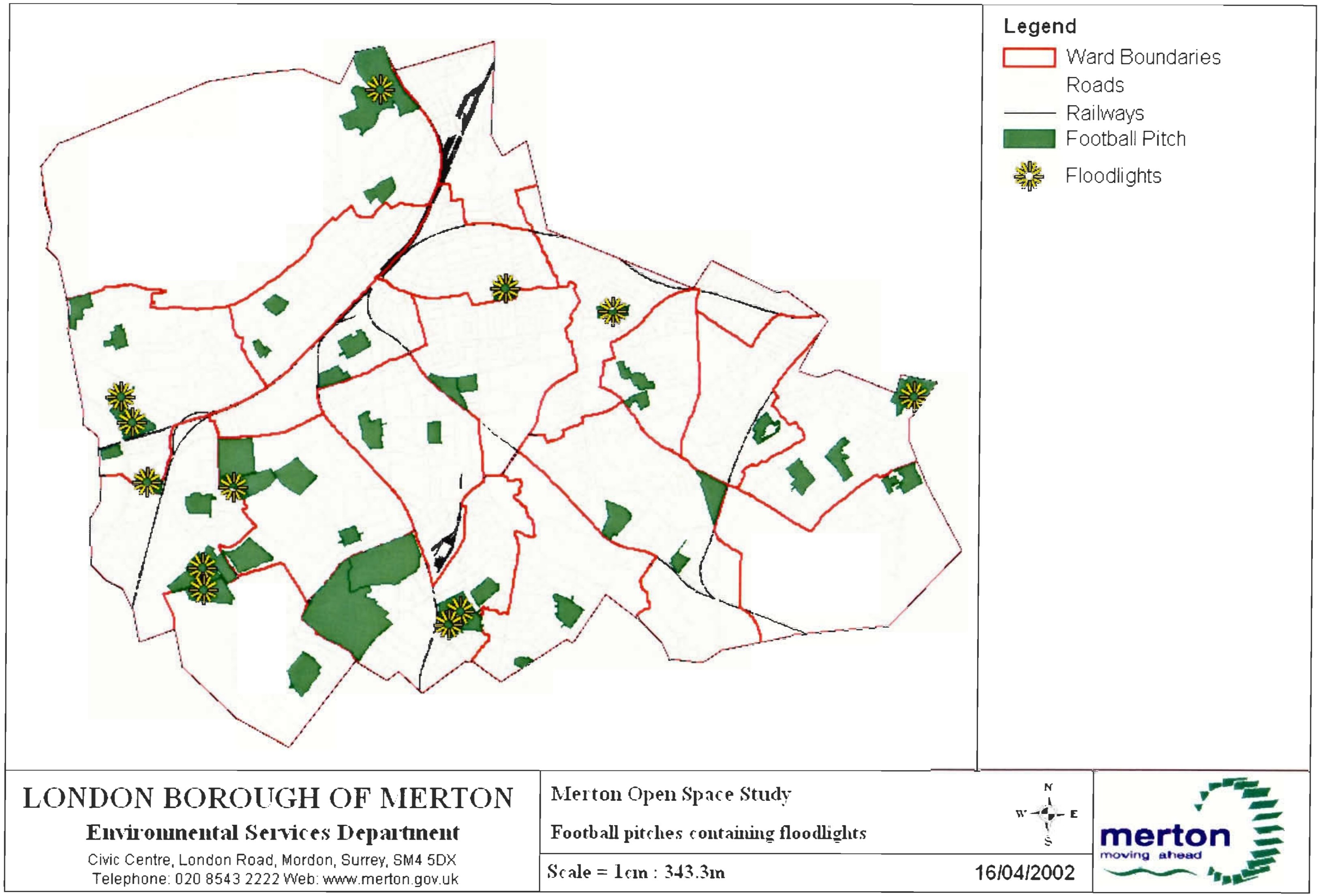


Figure 38: Map - Football pitches containing floodlights

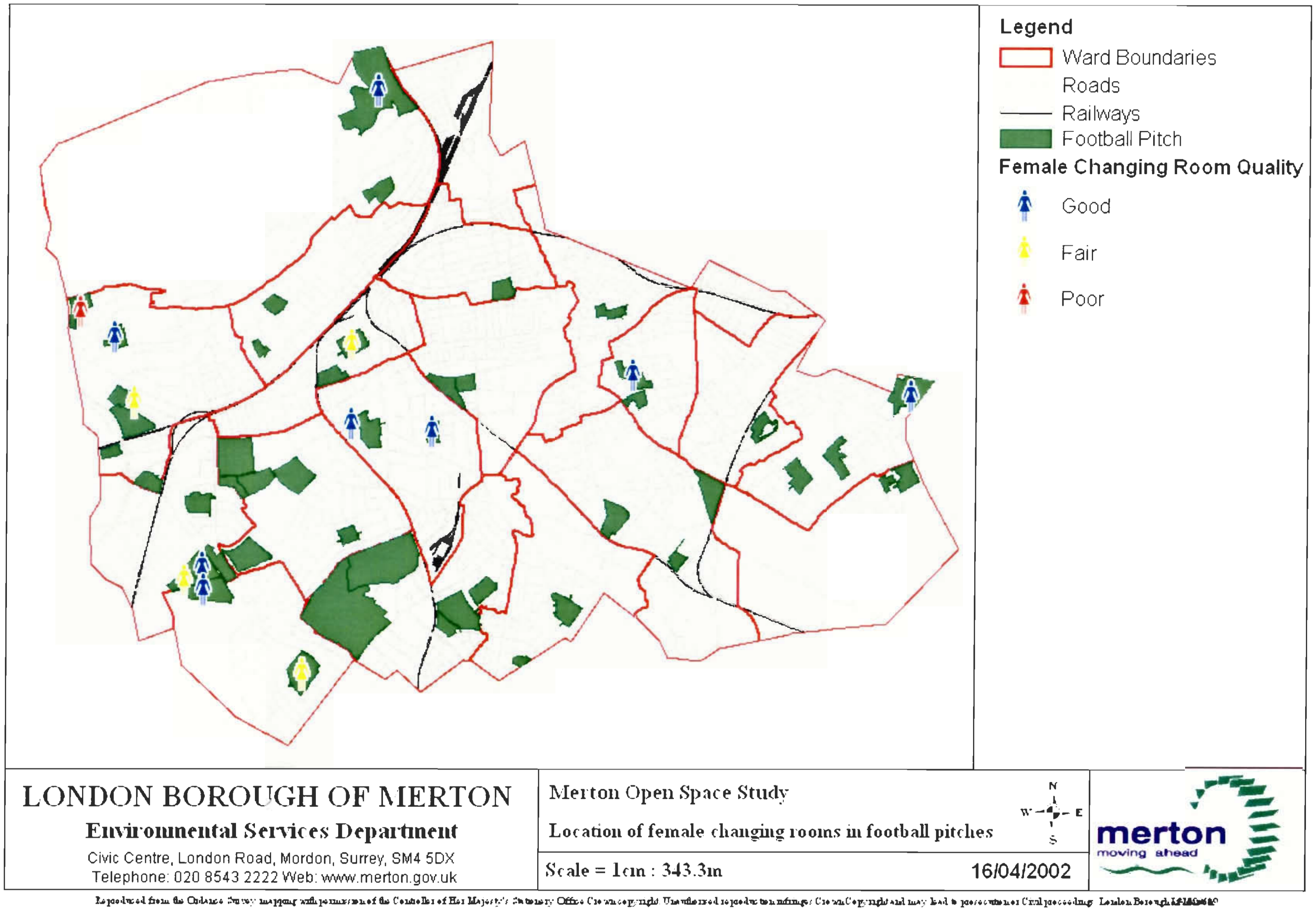


Figure 39: Map - Female changing areas in football pitches

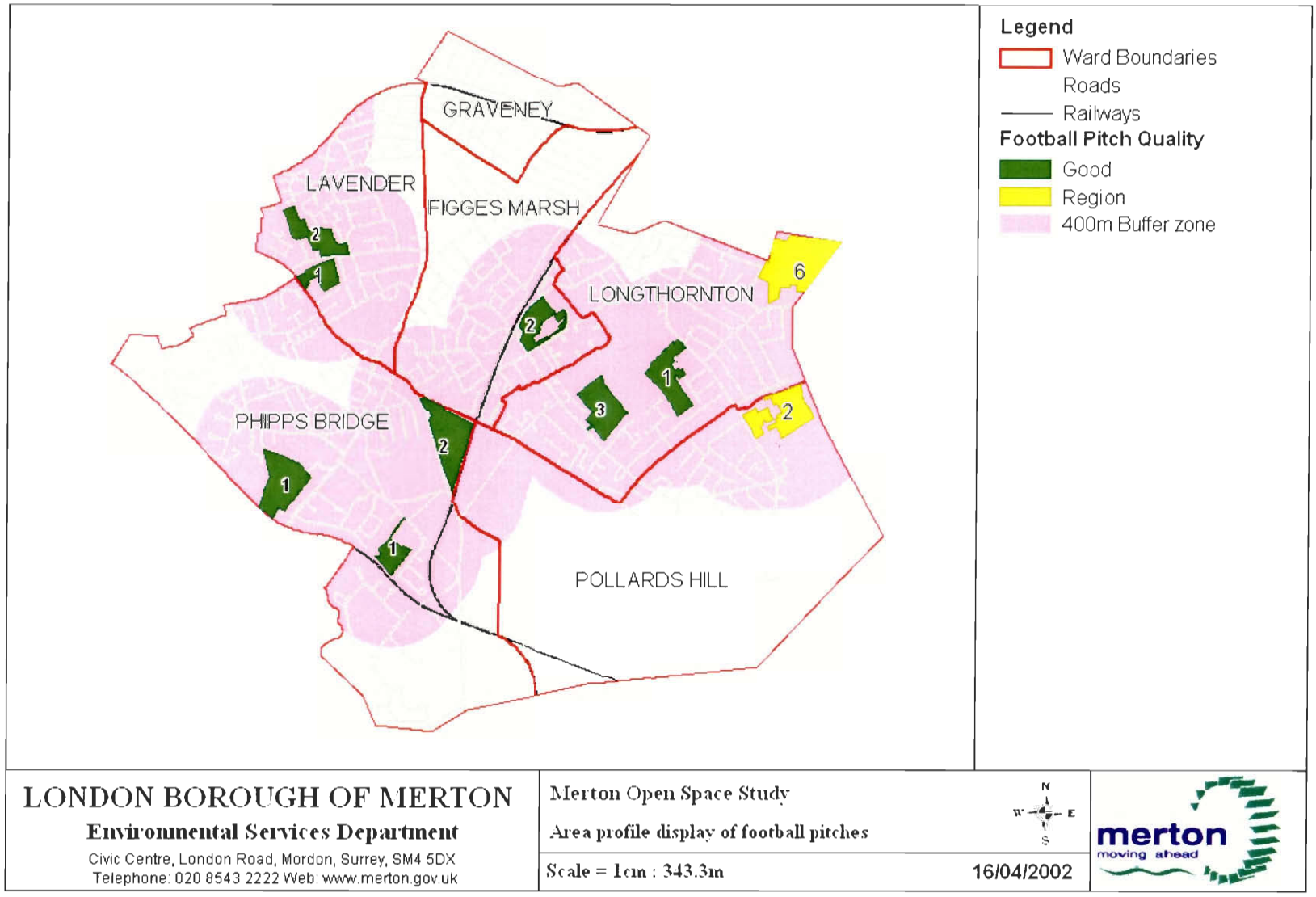
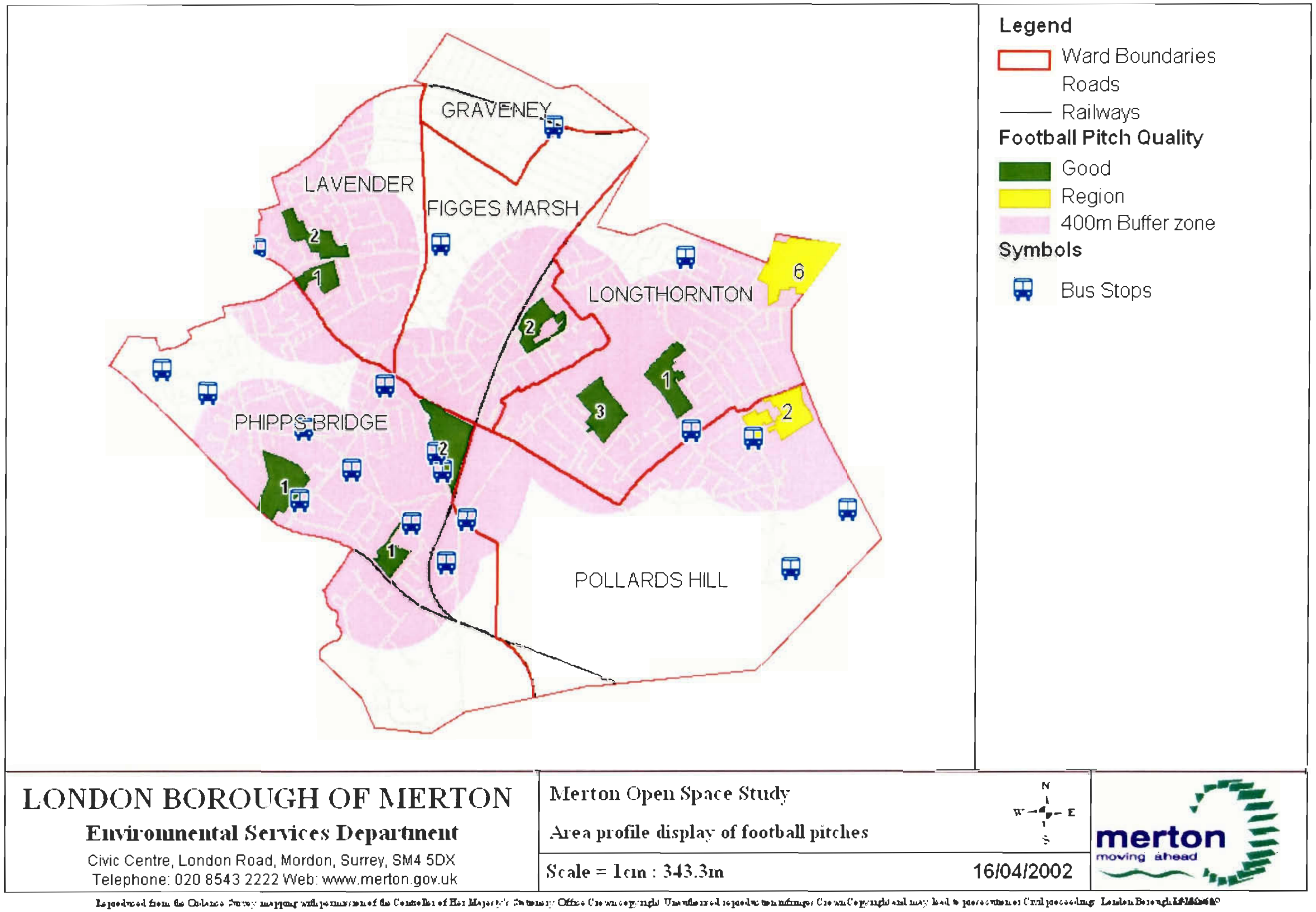


Figure 40: Map - Area profile of football pitches

Figure 41: Map - Accessibility by bus to football pitches within area profile



Appendix K – File List

Table 6: Workspaces

Filename	Description
Layout_Template_A4_0.WOR	Print template for A4 paper. No frame for a legend.
Layout_Template_A4_1.WOR	Print template for A4 paper. One frame for a legend.
Layout_Template_A4_2.WOR	Print template for A4 paper. Two frames legends.
LBM_Accessibility.WOR	Who can access the openspace.
LBM_Deprivation_ChildPoverty.WOR	Year 2000 Child poverty deprivation statistics for Merton.
LBM_Deprivation_Education.WOR	Year 2000 Education deprivation statistics for Merton.
LBM_Deprivation_Income.WOR	Year 2000 Income deprivation statistics for Merton.
LBM_Deprivation_Multiple.WOR	Year 2000 Multiple deprivation statistics for Merton.
LBM_Facilities_Toilets.WOR	Location of toilets in open spaces throughout Borough
LBM_LocalParks.WOR	Contains 400m and 800m buffer zones that can be used to show both deficiency and deficiency areas. Also contains bus stop layer with 280m and 400m buffer zones for the bus stops.
LBM_OS_Ownership.WOR	Ownership of each open space
LBM_OS_Types.WOR	Types of open space
LBM_Picthes_All.WOR	Football (1), Cricket (3), Hockey (4), Tennis (6), Golf (11), Basketball (12), Bowls (15), and Floodlights
LBM_Pitches_Football.WOR	Good, Fair and Poor football pitches with 400m buffers for each.
LBM_Population.WOR	Range thematic map of population for 20 wards. Year 2000 Statistics
LBM_Template.WOR	Template to be used for the creation of all maps.

Table 7: Databases

Filename	Description
ATTRIB1.DAT	Automatically updated to reflect changes within wsa_lbm_openspace_97.mdb
ATTRIB1.IND	
ATTRIB1.TAB	
ATTRIB2.aid	Automatically updated to reflect changes within wsa_lbm_openspace_97.mdb
ATTRIB2.IND	
ATTRIB2.TAB	
ATTRIB3.aid	Automatically updated to reflect changes within wsa_lbm_openspace_97.mdb
Attrib3.IND	
ATTRIB3.TAB	
ATTRIB4.aid	Automatically updated to reflect changes within wsa_lbm_openspace_97.mdb
Attrib4.IND	
ATTRIB4.TAB	
LBM_DeprivationStatistics2000.xls	Deprivation statistics 2000 from the National Statistics website.
LBM_DeprivationStatistics2000.DAT	Deprivation statistics from LBM_DeprivationStatistics2000.xls. Will not automatically update.
LBM_DeprivationStatistics2000.IND	
LBM_DeprivationStatistics2000.TAB	
wsa_lbm_openspace_97.mdb	WS Atkins data

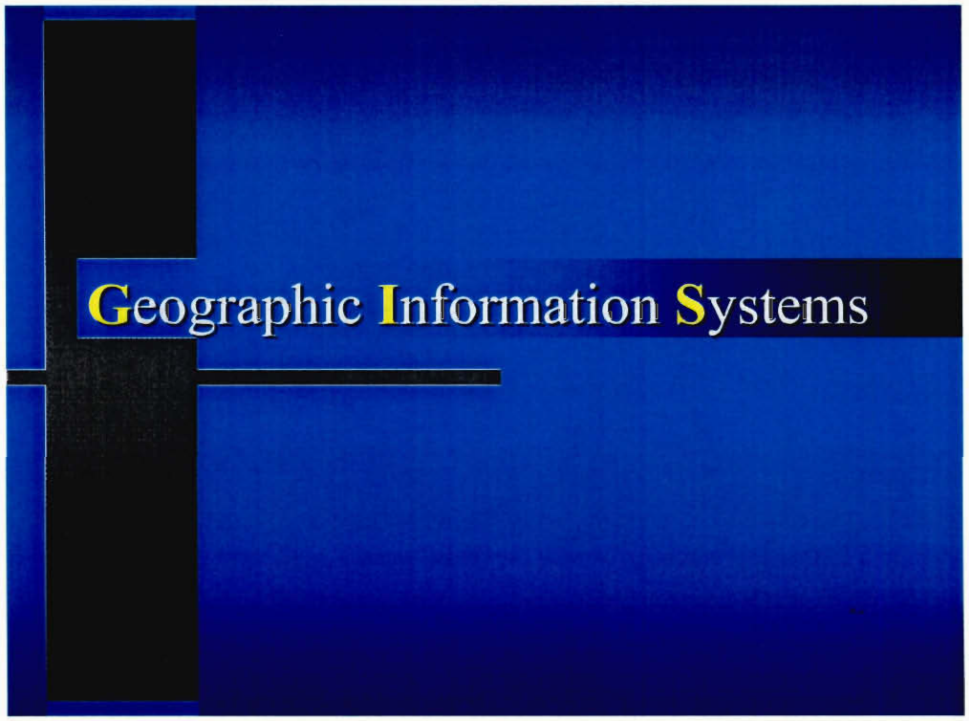
Table 8: Layers

Filename	Description
DateStamp.DAT	Used in the layouts to automatically fill in the data.
DateStamp.ID	
DateStamp.MAP	
DateStamp.TAB	
LBM_BusStops.DAT	Location of bus stops (possibly incomplete)
LBM_BusStops.ID	
LBM_BusStops.MAP	
LBM_BusStops.TAB	
LBM_ClipBorough.DAT	Clip region of Merton
LBM_ClipBorough.ID	
LBM_ClipBorough.MAP	
LBM_ClipBorough.TAB	
LBM_ClipEast.DAT	Clip region of eastern Merton (Area profile)
LBM_ClipEast.ID	
LBM_ClipEast.MAP	
LBM_ClipEast.TAB	
LBM_OpenSpaces.DAT	Open spaces layer, as supplied by WS Atkins
LBM_OpenSpaces.ID	
LBM_OpenSpaces.IND	
LBM_OpenSpaces.MAP	
LBM_OpenSpaces.TAB	
LBM_Pitch_Football.DAT	Football pitch layer (Good, fair and poor)
LBM_Pitch_Football.ID	
LBM_Pitch_Football.IND	
LBM_Pitch_Football.MAP	
LBM_Pitch_Football.TAB	
LBM_Railways.DAT	Railways of Merton
LBM_Railways.ID	
LBM_Railways.MAP	
LBM_Railways.TAB	
LBM_Roads.DAT	Roads of Merton
LBM_Roads.ID	
LBM_Roads.MAP	
LBM_Roads.TAB	
LBM_Symbol_Changing_Female.DAT	Location of pitches containing female chaning areas
LBM_Symbol_Changing_Female.ID	
LBM_Symbol_Changing_Female.MAP	
LBM_Symbol_Changing_Female.TAB	
LBM_Symbol_Cricket.DAT	Location of pitches containing cricket
LBM_Symbol_Cricket.ID	
LBM_Symbol_Cricket.IND	
LBM_Symbol_Cricket.MAP	
LBM_Symbol_Cricket.TAB	
LBM_Symbol_Floodlights.DAT	Location of pitches containing floodlights
LBM_Symbol_Floodlights.ID	
LBM_Symbol_Floodlights.IND	
LBM_Symbol_Floodlights.MAP	
LBM_Symbol_Floodlights.TAB	
LBM_Symbol_Football.DAT	Location of pitches containing football
LBM_Symbol_Football.ID	
LBM_Symbol_Football.IND	
LBM_Symbol_Football.MAP	
LBM_Symbol_Football.TAB	
LBM_Symbol_Toilets.DAT	Location of open space containing toilets
LBM_Symbol_Toilets.ID	
LBM_Symbol_Toilets.IND	
LBM_Symbol_Toilets.MAP	
LBM_Symbol_Toilets.TAB	
LBM_WardBoundaries.DAT	Ward boundaries (pre-May 2002)
LBM_WardBoundaries.ID	
LBM_WardBoundaries.IND	
LBM_WardBoundaries.MAP	
LBM_WardBoundaries.TAB	
MERTONLOGO.BMP	Displays the Merton logo in the layouts.
MERTONLOGO.TAB	

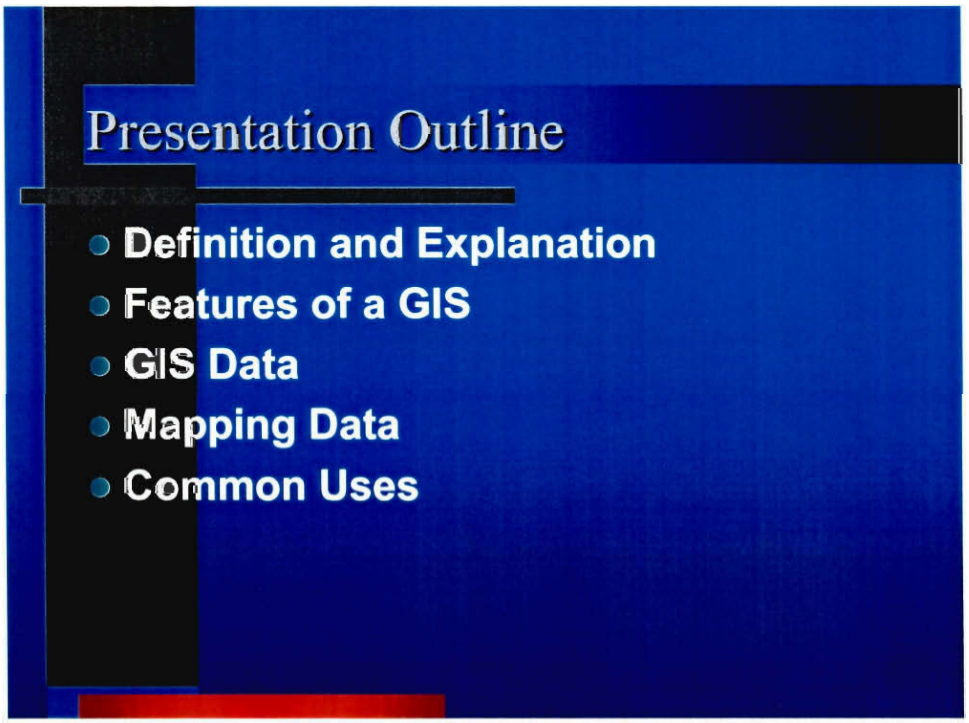
Table 9: Miscellaneous

Filename	Description
Buffer_0_LocalPark.DAT	Buffer layers created and used by multiple workspaces. Need to re-create if open space that applies to the buffer is added, deleted, or modified.
Buffer_0_LocalPark.ID	
Buffer_0_LocalPark.MAP	
Buffer_0_LocalPark.TAB	
Buffer_280_LocalPark_Bus.DAT	
Buffer_280_LocalPark_Bus.ID	
Buffer_280_LocalPark_Bus.MAP	
Buffer_280_LocalPark_Bus.TAB	
Buffer_400_LocalPark.DAT	
Buffer_400_LocalPark.ID	
Buffer_400_LocalPark.MAP	
Buffer_400_LocalPark.TAB	
Buffer_400_LocalPark_Bus.DAT	
Buffer_400_LocalPark_Bus.ID	
Buffer_400_LocalPark_Bus.MAP	
Buffer_400_LocalPark_Bus.TAB	
Buffer_400_Pitches_Football.DAT	
Buffer_400_Pitches_Football.ID	
Buffer_400_Pitches_Football.MAP	
Buffer_400_Pitches_Football.TAB	
Buffer_400_Pitches_Football_Fair.DAT	
Buffer_400_Pitches_Football_Fair.ID	
Buffer_400_Pitches_Football_Fair.MAP	
Buffer_400_Pitches_Football_Fair.TAB	
Buffer_400_Pitches_Football_Good.DAT	
Buffer_400_Pitches_Football_Good.ID	
Buffer_400_Pitches_Football_Good.MAP	
Buffer_400_Pitches_Football_Good.TAB	
Buffer_400_Pitches_Football_Poor.DAT	
Buffer_400_Pitches_Football_Poor.ID	
Buffer_400_Pitches_Football_Poor.MAP	
Buffer_400_Pitches_Football_Poor.TAB	
Buffer_4000_LocalPark_Bus.DAT	
Buffer_4000_LocalPark_Bus.ID	
Buffer_4000_LocalPark_Bus.MAP	
Buffer_4000_LocalPark_Bus.TAB	
Buffer_800_LocalPark.DAT	
Buffer_800_LocalPark.ID	
Buffer_800_LocalPark.MAP	
Buffer_800_LocalPark.TAB	
buffer_layer.DAT	
buffer_layer.ID	
buffer_layer.MAP	
buffer_layer.TAB	
key_to_field_names.xls	
LBM_Deprivation_ChildPoverty, Sort_by_ChildPoverty_Score15 Graph.3tf LBM_Deprivation_Education, Sort_by_Education_Score9 Graph.3tf LBM_Deprivation_Income, Sort_by_Income_Score3 Graph.3tf LBM_Deprivation_Multiple, LBM_WardBoundaries Graph.3tf LBM_Deprivation_Multiple, Sort1 Graph.3tf	Used by MapInfo when creating the Deprivation charts.

Appendix L – GIS Presentation



Slide 1



Slide 2

Geographic Information Systems

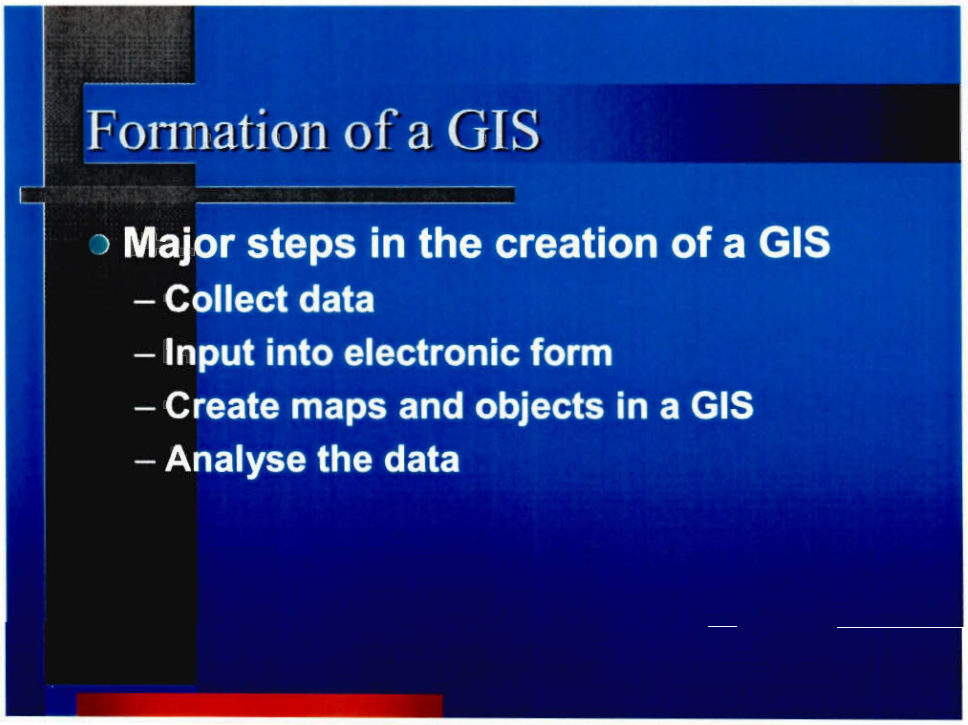
- GIS is a combination of computer software, hardware, data and personnel used to manipulate, analyse and present information that is tied to a spatial location

Slide 3

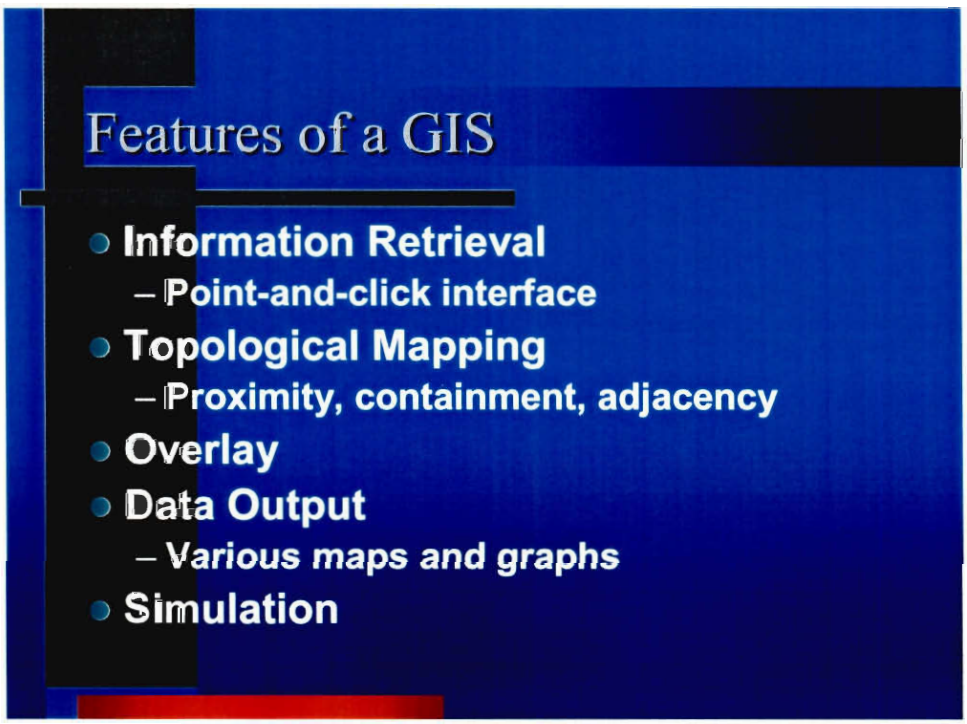
What is the purpose of a GIS?

- Three major goals of a GIS
  - Storage
  - Organisation
  - Analysis

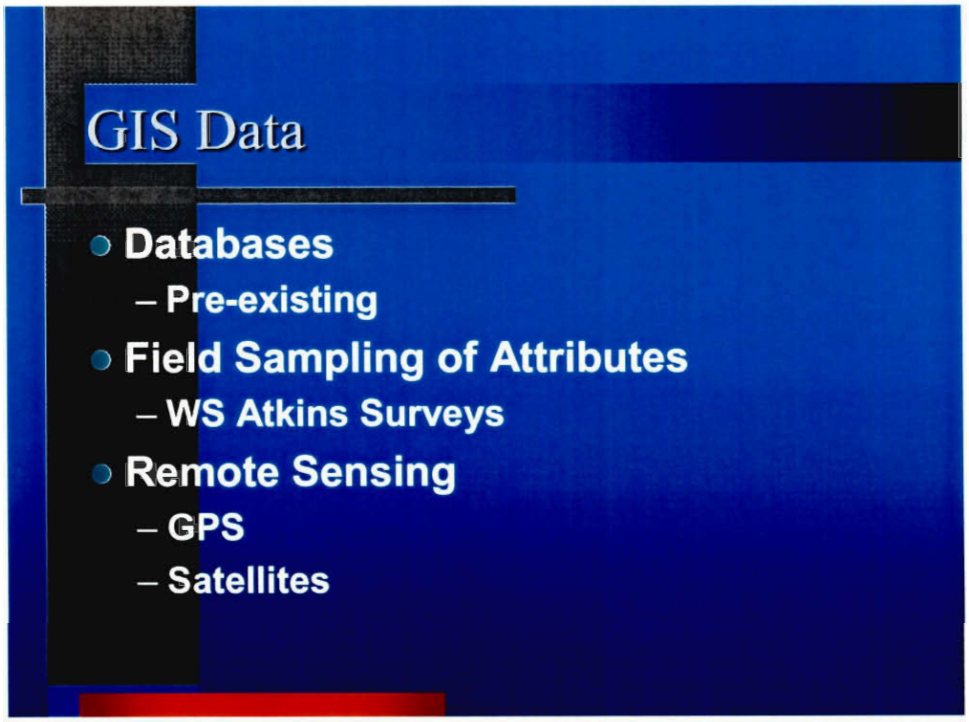
Slide 4



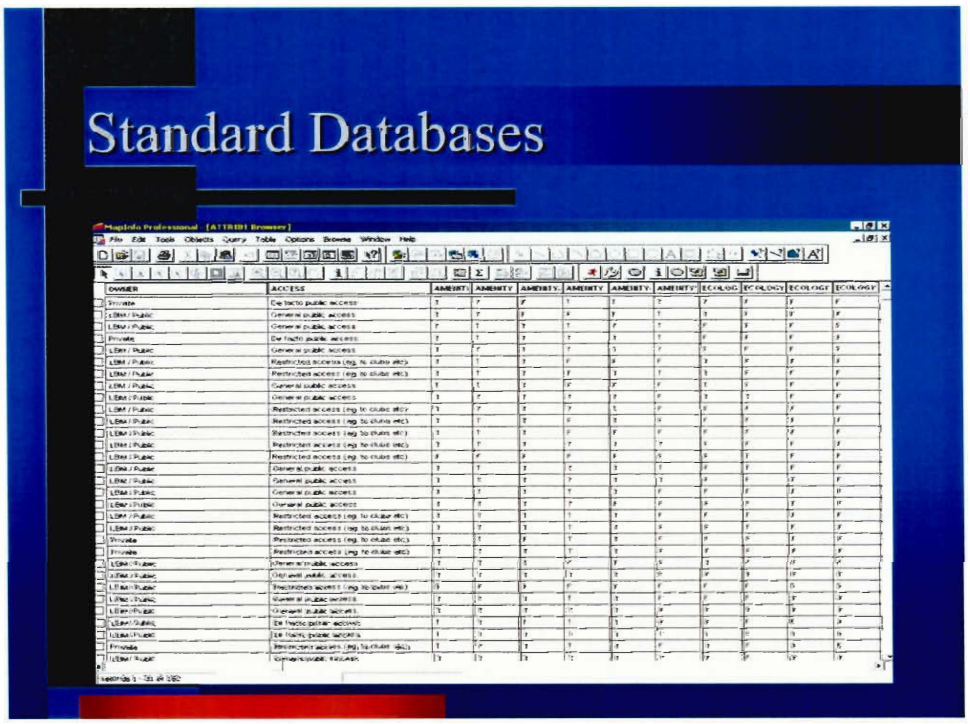
Slide 5



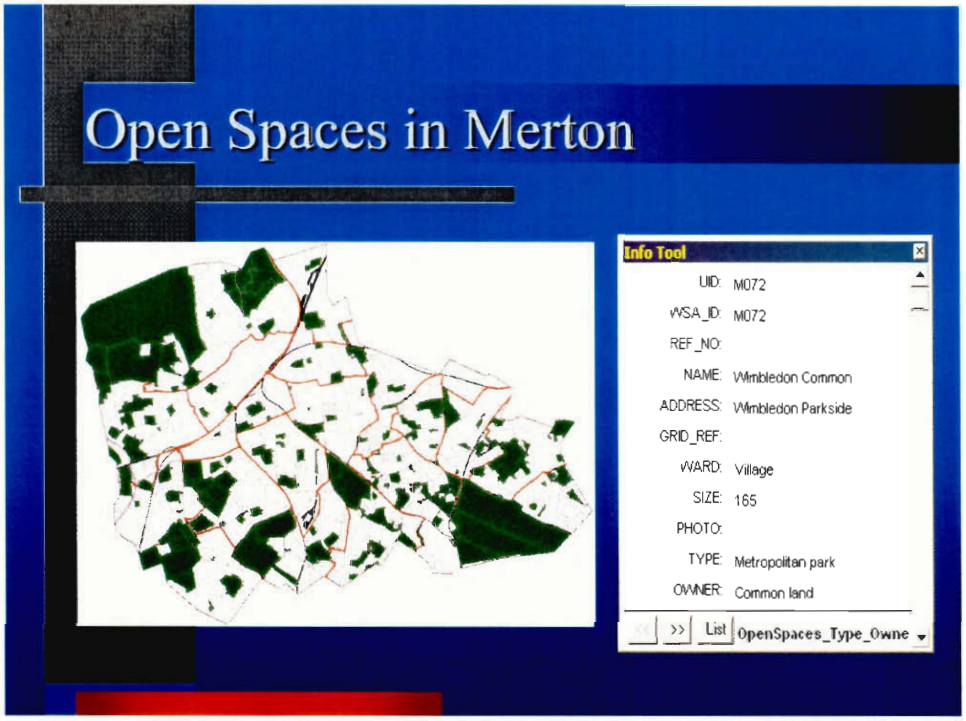
Slide 6



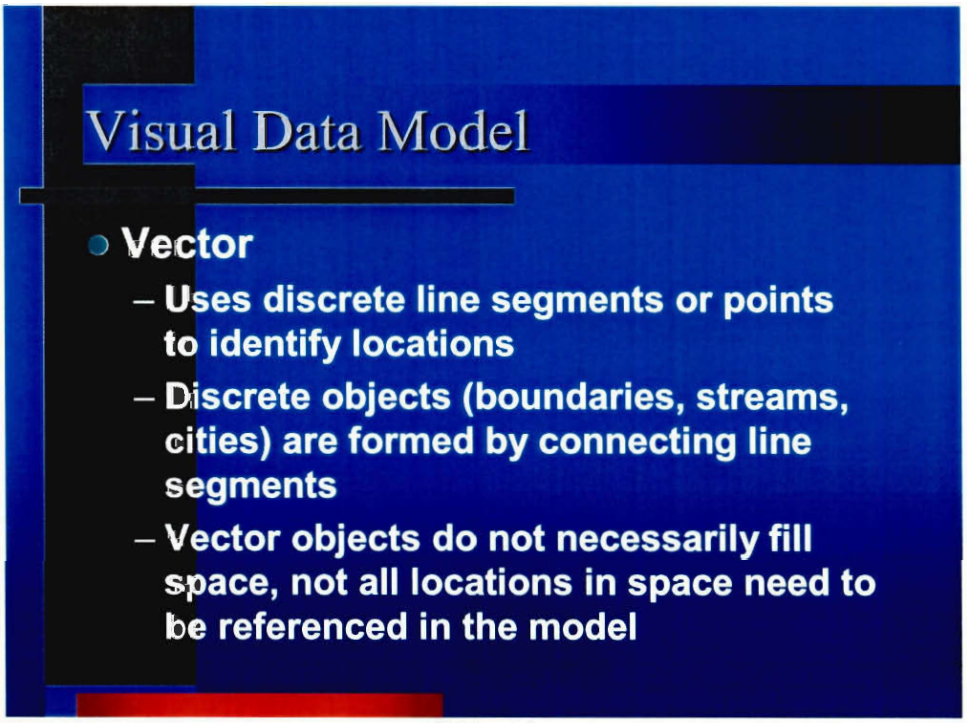
Slide 7



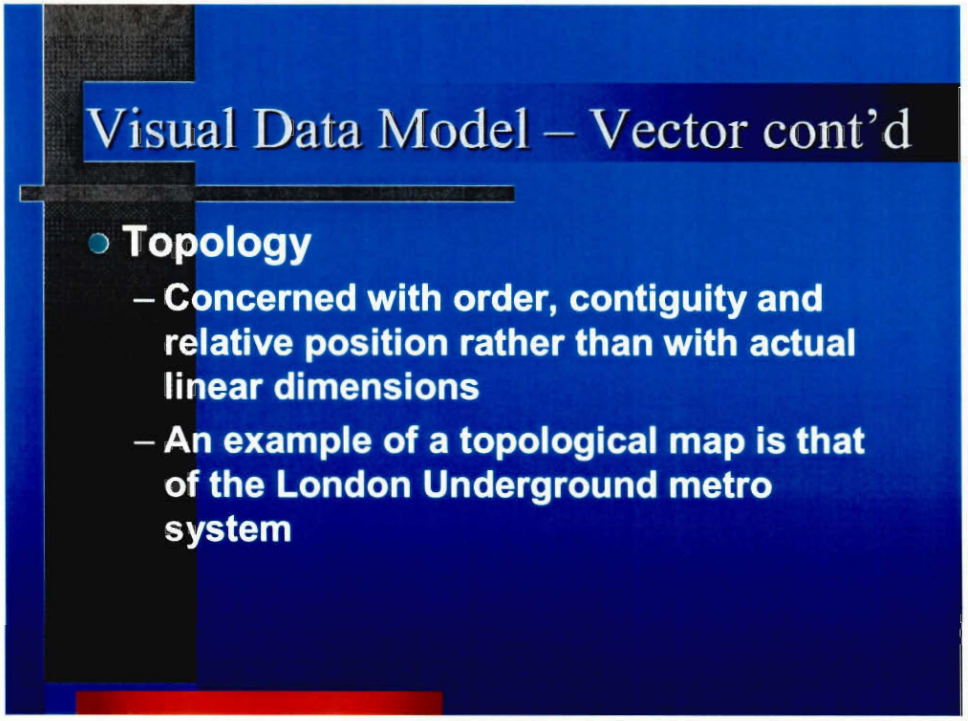
Slide 8



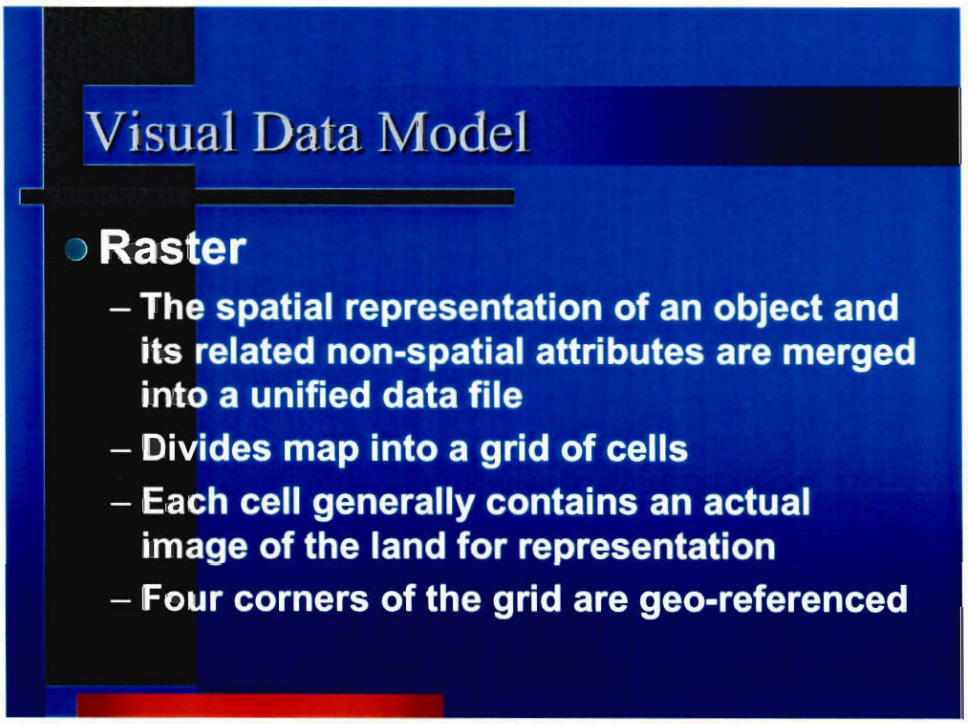
Slide 9



Slide 10



Slide 11



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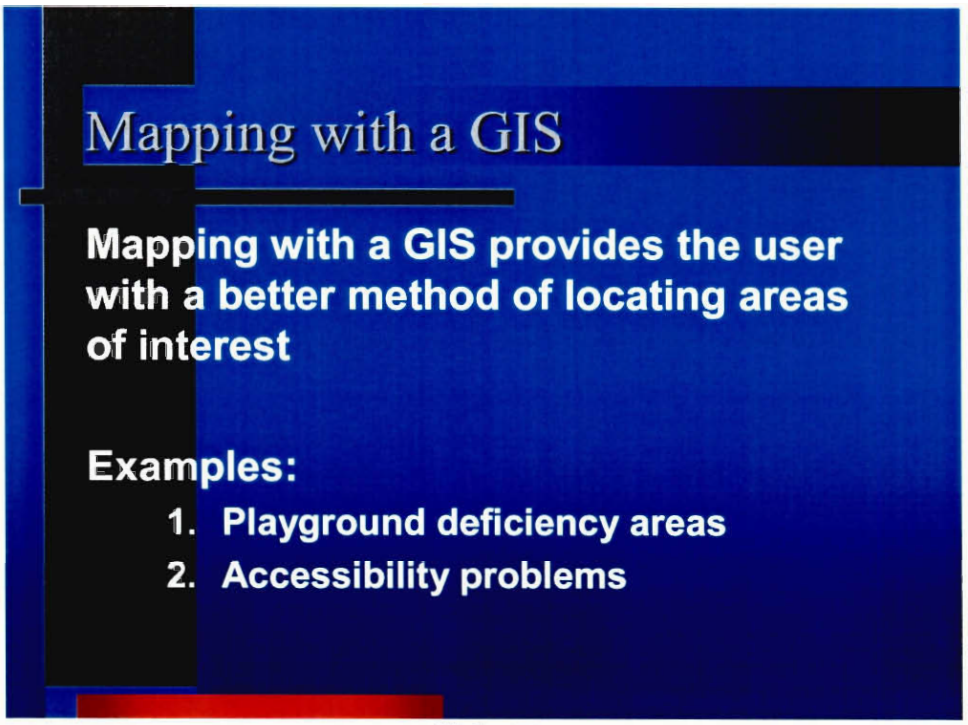

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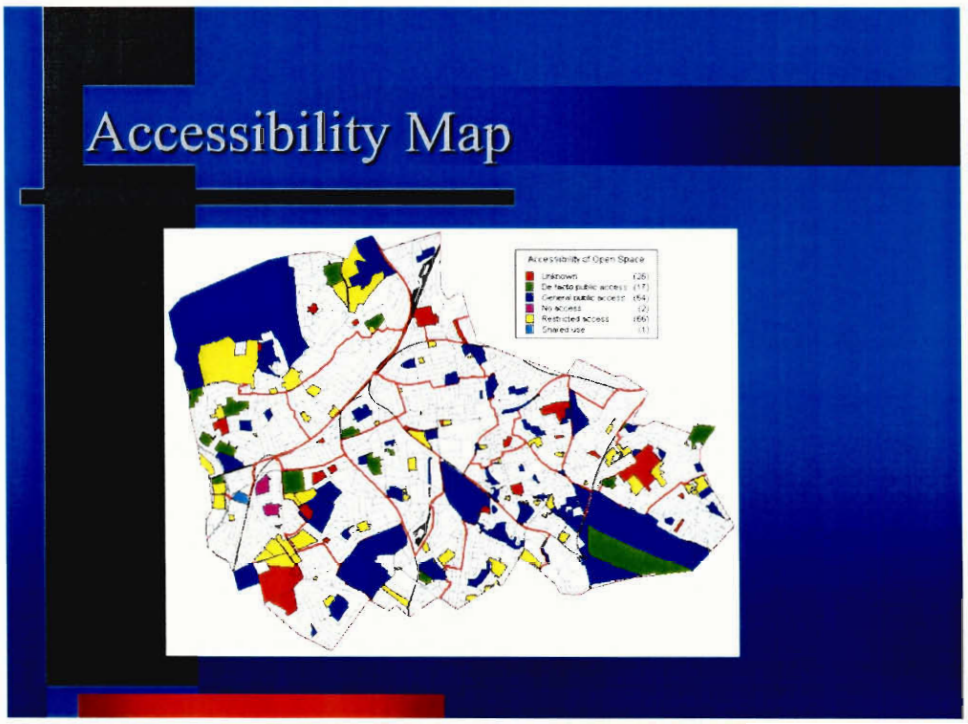

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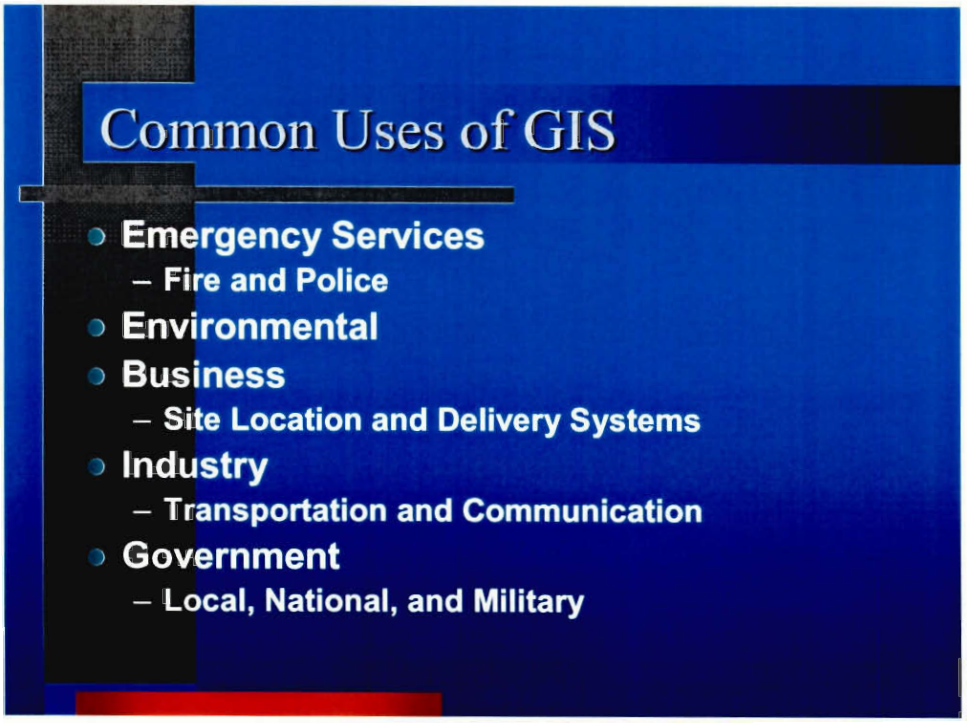

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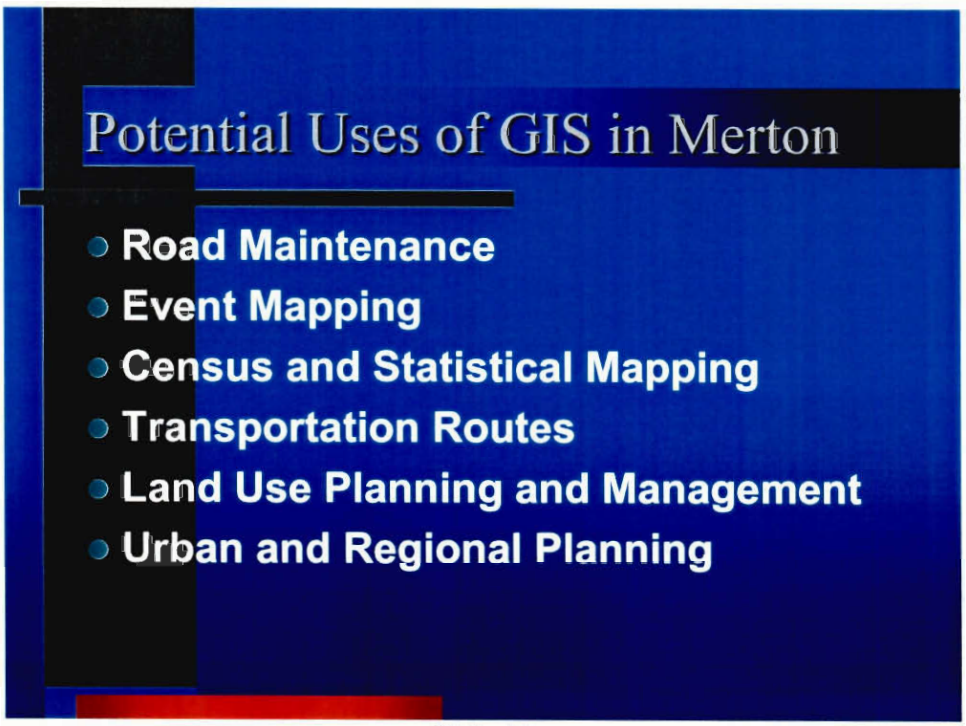

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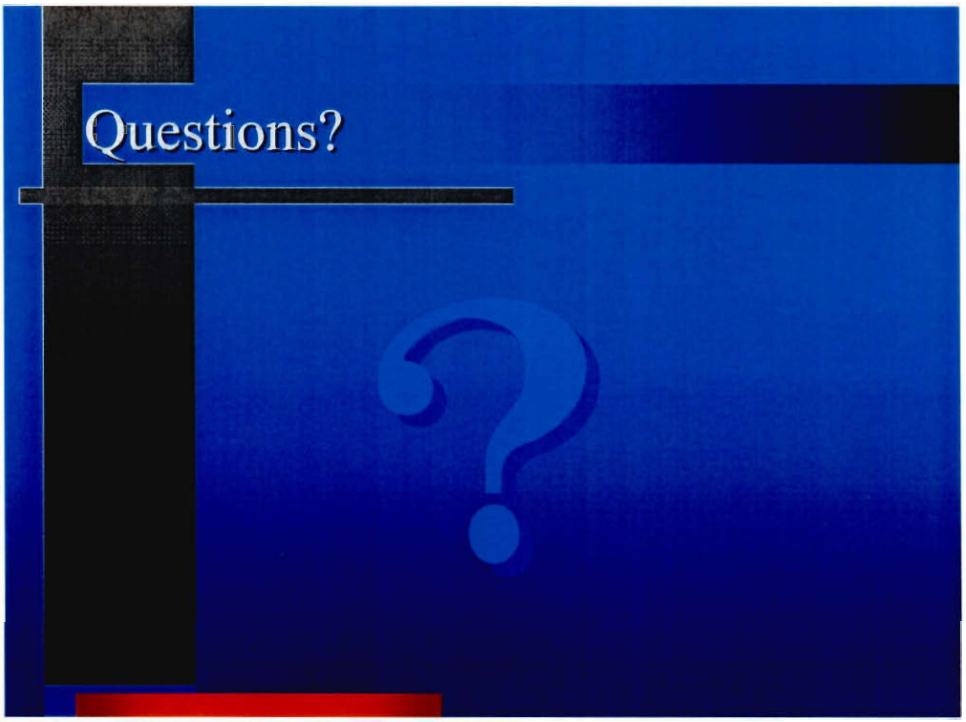
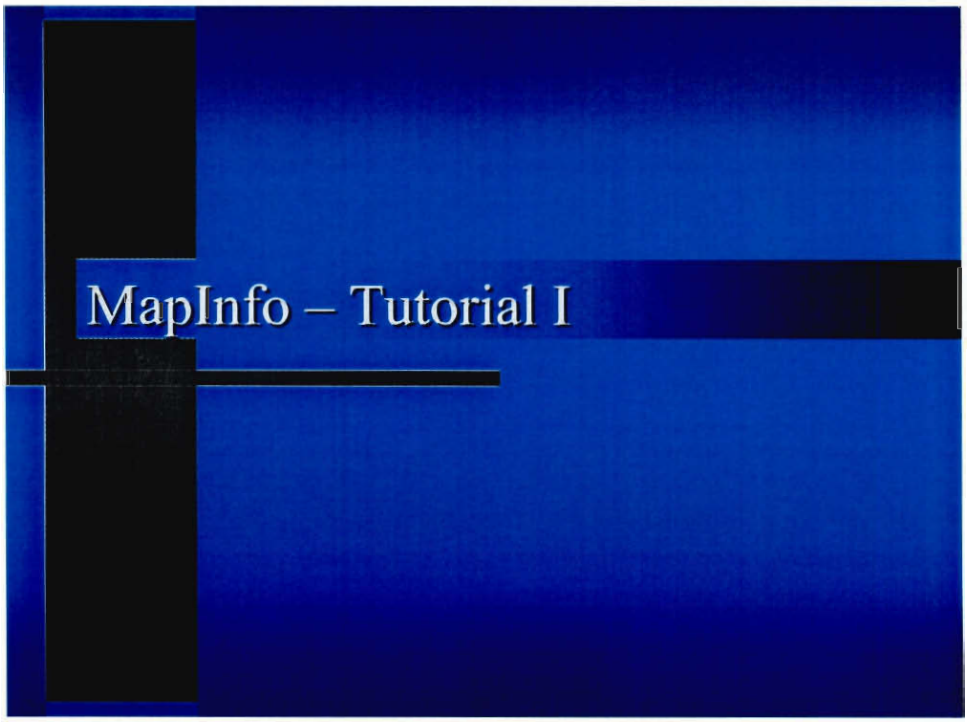
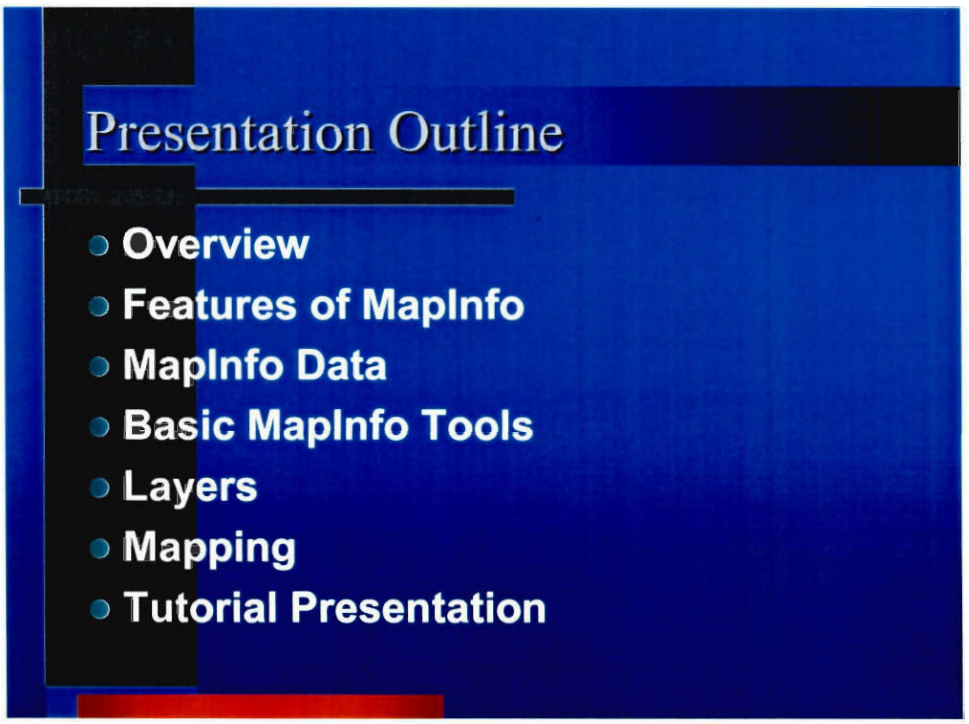


Slide 23

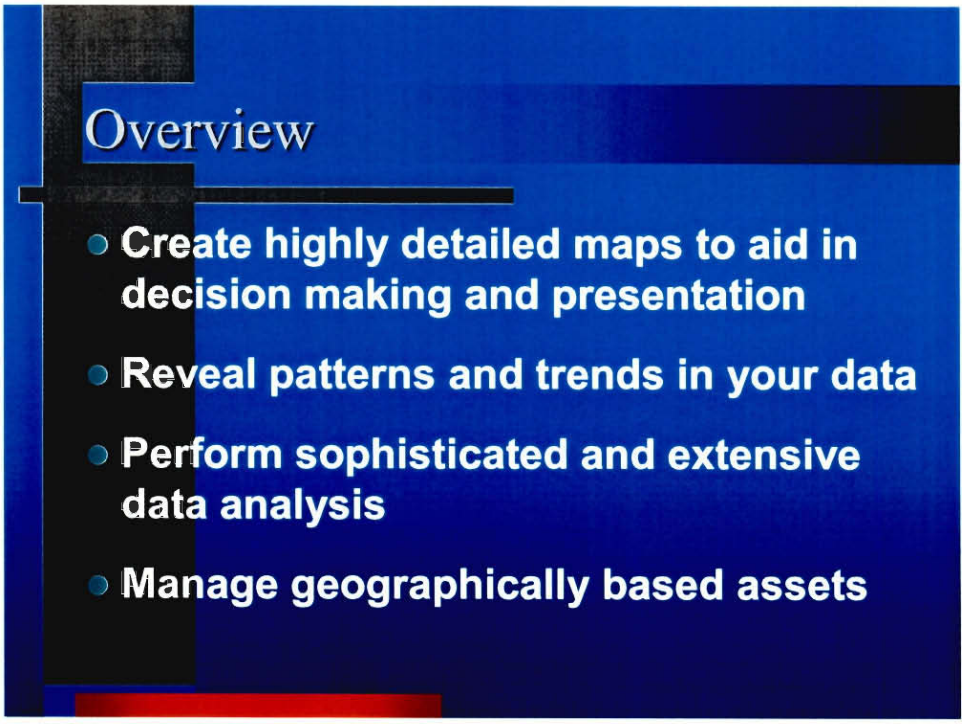
Appendix M – MapInfo I Presentation



Slide 1



Slide 2



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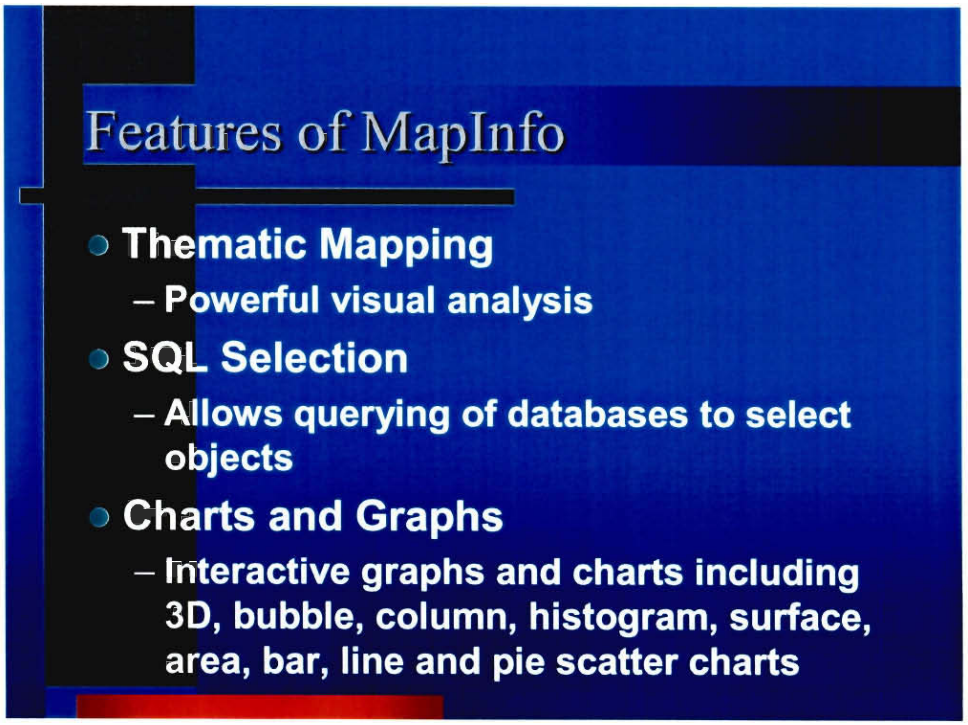

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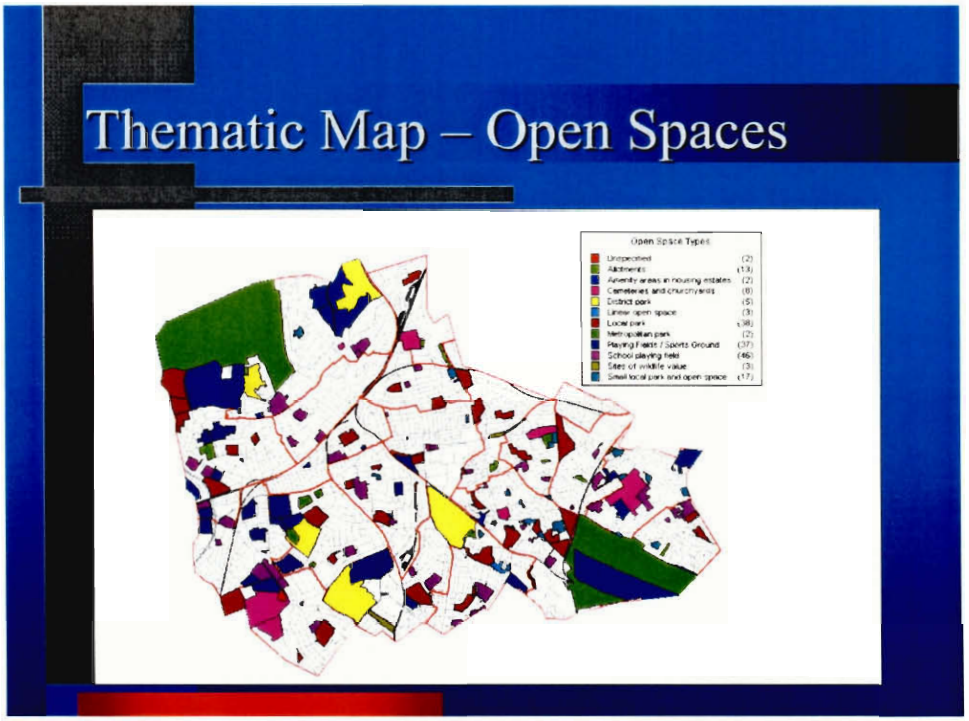

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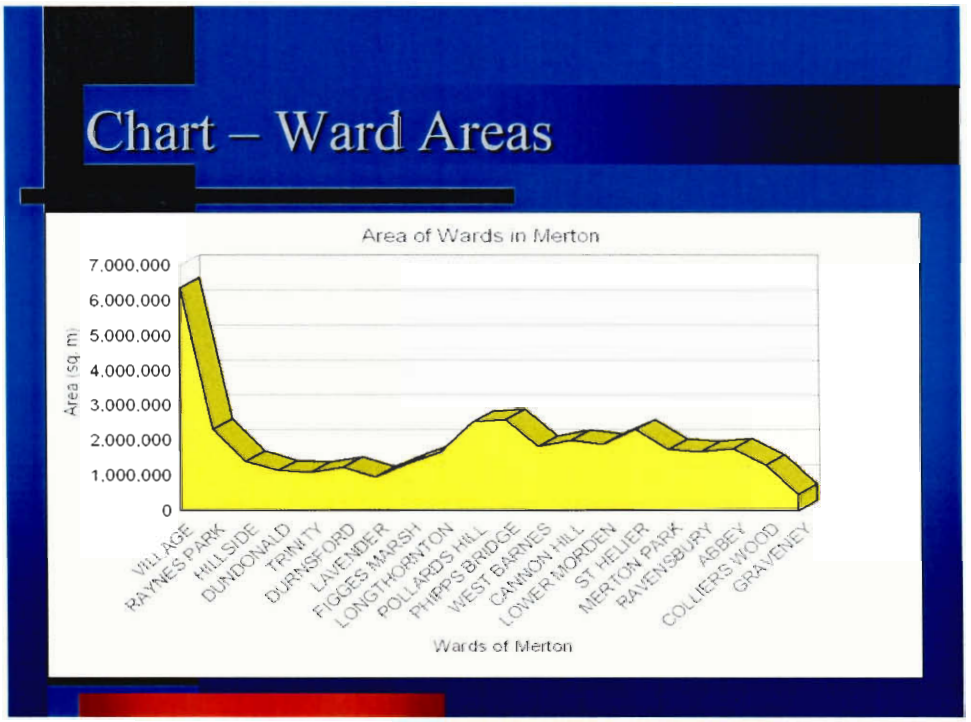

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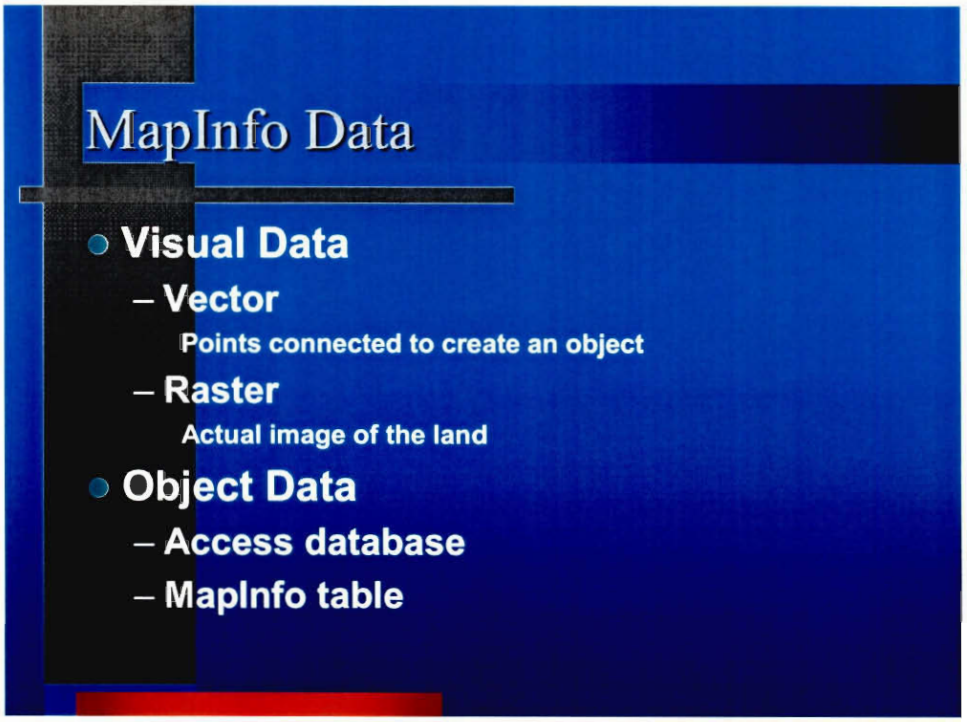

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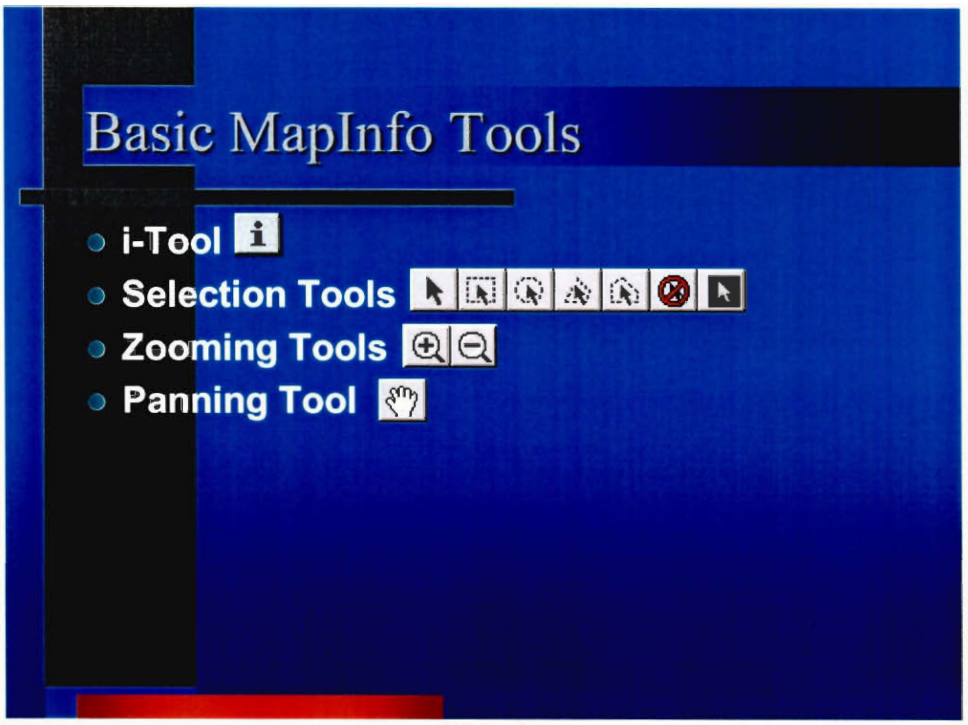

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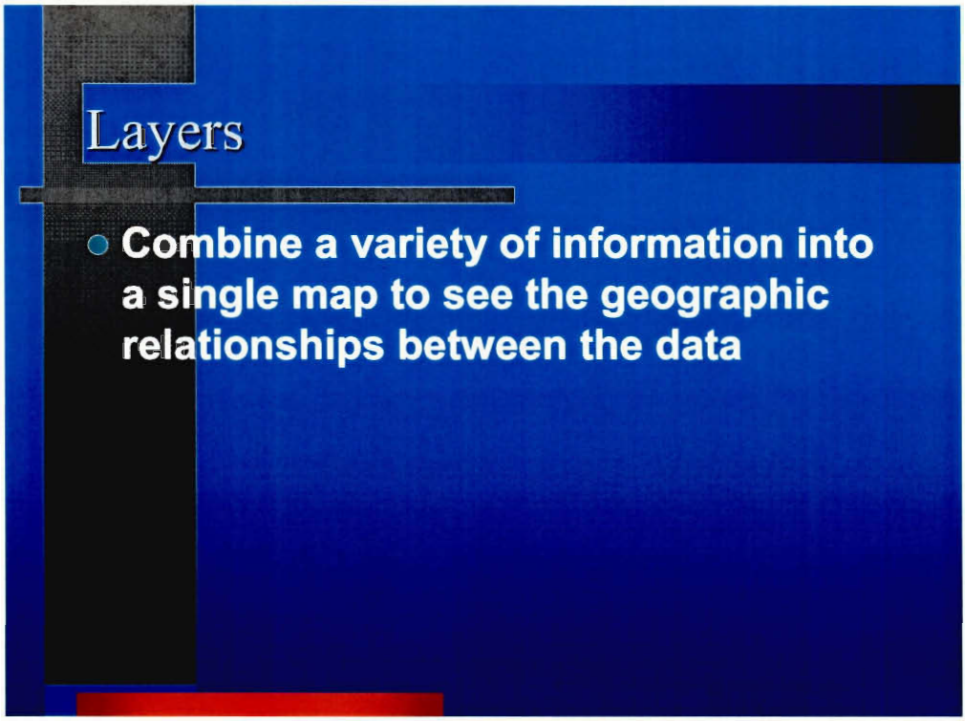

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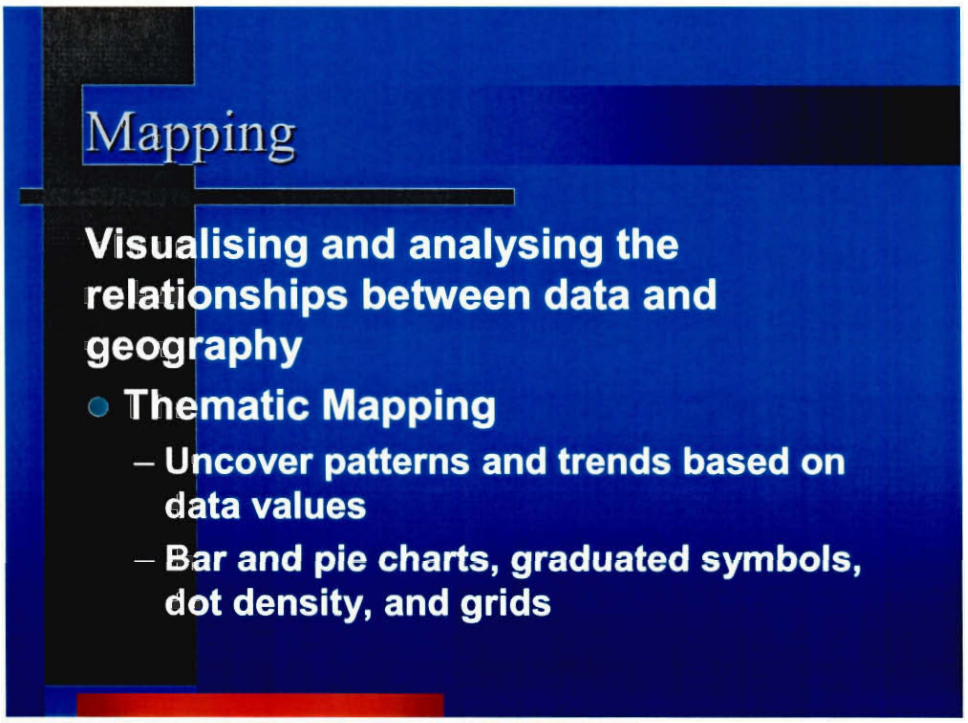

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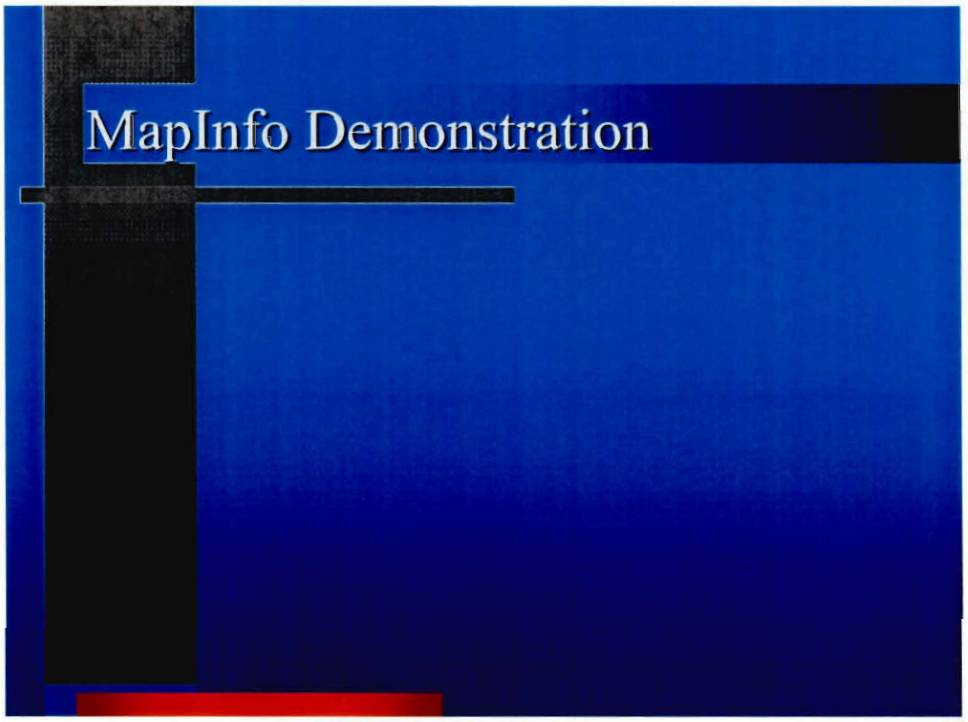

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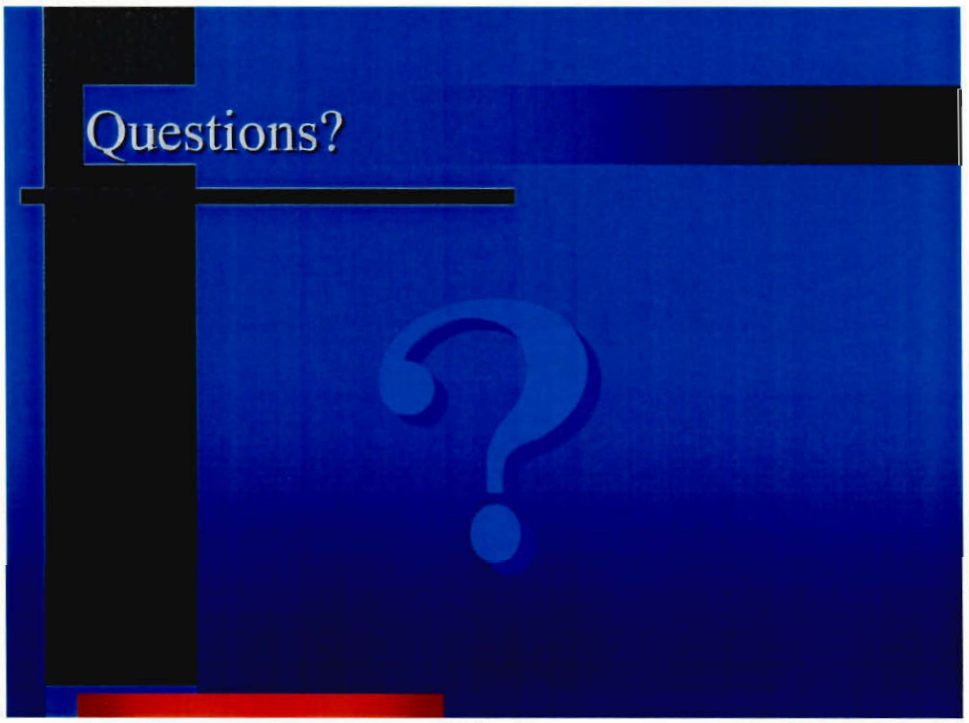


Slide 12

Appendix N – MapInfo I Tutorial

London Borough of Merton

Plans and Projects Section

MapInfo I Tutorial

MapInfo I Tutorial

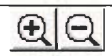
After completing this introductory exercise with MapInfo, you will have a general knowledge of the basic tools used in MapInfo. This guide will allow you to complete such tasks as:

- Opening a MapInfo table
- Using basic navigation tools
- Manipulating the styles of a map
- Importing a column of data to a table from an existing MapInfo table
- Creation of a thematic map
- Saving a table and a workspace

Opening a MapInfo Table

1. Open MapInfo
2. When MapInfo opens you will be prompted with a dialogue box. Select the option that reads *Open a Table* and click *OK*.
3. Using the file browser window that opens next, find the location of the MapInfo Table named *Ward_Boundaries.TAB*
4. Click *OK*. The ward boundaries of Merton will appear on the next screen.

Basic Navigation Tools

i-tool		Provides information on the clicked region
Selection Tool		Select regions (hold down shift to select multiple)
Zooming tool		Zoom in or out of selected area
Panning Tool		Moves the map around

1. Maximize the map window by clicking the middle icon in the top right hand corner of the window.
2. Next, at the top screen, locate the menu bar and click *Map*, then click *View Entire Layer*.
3. A dialogue box will now prompt for the layer to be viewed. Select *Ward_Boundaries* and click *OK*. The map on the screen will now be completely in view. You will now use the tools listed above.
4. Click the panning tool. (All of the tools are located on the toolbars.) You will notice that the pointer turns into a hand. By clicking on the map and holding the mouse button you will be able to pan the map. This is useful in centring the map on a certain location.
5. Click either of the zooming tools seen above. You will notice now that you are able to zoom in and out of the map. After zooming in and out, set the view back to the *Ward_Boundaries* by referring to *Step 2* above.

6. Click one of the selection tools next and you will be able to select objects on the screen.
    1. Selects a single object.
    2. Selects all objects contained in a square region.
    3. Selects all objects contained in a circular region.
    4. Selects all objects contained with in a polygon.
    5. Selects all the objects contained within a boundary.
    6. Deselect all the objects that are selected.
    7. Inverts the currently selected objects.
7. Select the i-tool from the toolbar and click on the map. A window appears that displays all of the information for that object.

Adding a Layer

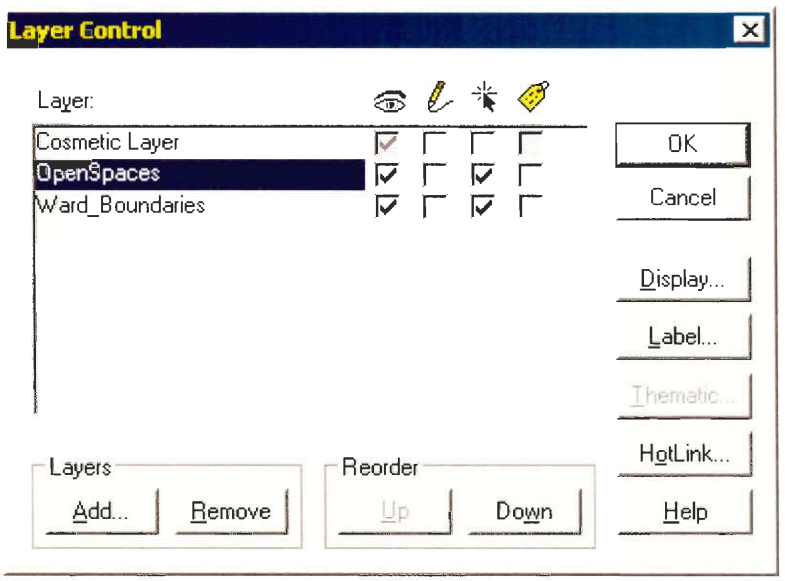
Adding a layer means adding another table to the existing map. For this example the open spaces of Merton will be opened.

1. Click *File*, and select *Open Table*.
2. A file browser window will appear; find the location of the MapInfo table named *OpenSpaces.TAB*.
3. Click *OK*. The open spaces of Merton will now appear on the screen.

Layer Control

The *Layer Control* allows you to change such things as which layer is on top or which layer can be editable.

1. To access the *Layer Control*, click the icon on the toolbar. (You can also access *Layer Control* by right clicking on a map and selecting *Layer Control*, or by clicking *Map* in the menu bar and then selecting *Layer Control*)



Layer control window

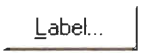
On the screen you will notice that listed after each layer to the right are a series of check boxes. In the table below you will see what each of these boxes represents.

Visible		Specifies if the layer is visible
Editable		Determines if the layer can be edited (i.e. labels added…) *
Selectable		If the layer (or any objects on the layer) can be selected when the mouse is clicked
Label		Displays a selected field for each object in the layer

* Only one layer can be edited at a time

Labelling

Labelling displays a characteristic for the objects in the layer, such as a name or an id.

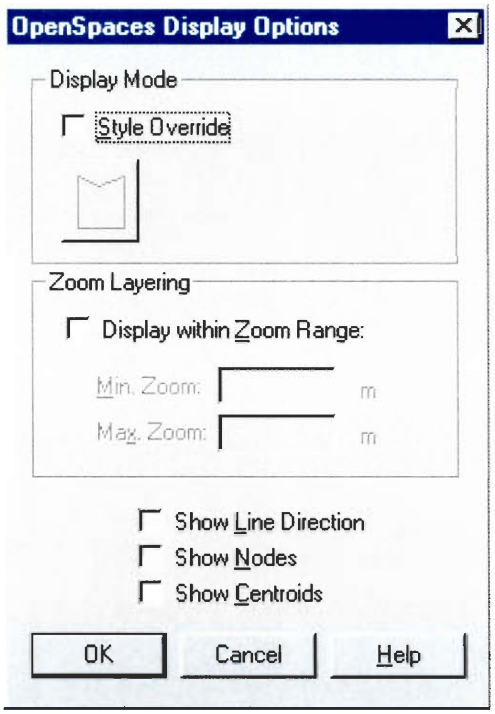
2. Click on the *OpenSpaces* layer to highlight it in blue. This will allow you to edit the options for that layer. The layer that is selected is the layer that you will change the properties for by clicking on *Label* or *Display*.
3. To label objects in a layer, click the *Label* button. 

The window that appears contains all the options for the labels. To briefly see how labels work you will display the names of the Open Spaces next to each open space. To do this, make sure that *NAME* is selected in the *Label with* select box. Click *OK*.
4. Click the label check box for the *OpenSpaces* layer to turn labels on.
5. Click *OK*. You will now see a label for each Open Space.

Changing Display Properties

6. Now we will change the colour of the Open Spaces of Merton so that they are easier to see. Open the *Layer Control* and select the *OpenSpaces* layer so that it is highlighted blue.
7. Click the *Display* button. 

8. The Display Options for the *OpenSpaces* layer will now appear.

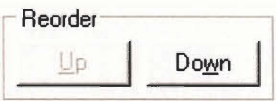


Display Options Screen

9. Check off the box next to *Style Override*. Next click on the box below the check box that is no longer greyed out.
10. Under *Fill*, click the arrow next to *Foreground* and select the colour green for the open spaces. Click *OK*.
11. Now the *Layer Control* will be on the screen. Click *OK* and the Open Spaces will now have labels and be shaded the colour green.
12. Before moving on, the labels must be turned off and the *OpenSpaces* layer must be editable. Open up *Layer Control*, uncheck the label check box next to the *OpenSpaces* layer and check off the editable box. Click *OK*.

Reordering

It is often necessary to reorder the layers to display the information on the screen properly. The layers are displayed, in the order listed, from top to bottom. To change the order of the layers, click on the layer that you want to change and click the reorder button to move the layer up or down. If the button is greyed out, then you cannot move the layer because it may already be the top layer or the only layer open.



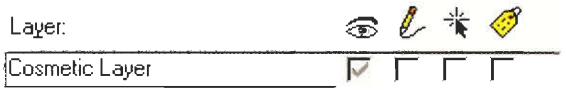
Reorder Buttons

13. Open up the *Layer Control*.
14. Reorder the layers so *Ward_Boundaries* is on top.
15. With *Ward_Boundaries* selected, click *Display*. To show how moving layers can affect the map pictured in the window, it is necessary to change the border colour of the ward boundaries layer.

16. To change the border colour, use the same steps that were used to change the colour of the *OpenSpaces* layer. When changing the style, instead of changing options under *Fill*, change the options under *Border*. Change the border colour to red and under *Width*, click on the arrow to the left of *Pixel* and select option 2, which will make the line thicker. Click *OK*.
17. Now you will see the *Layer Control* window. Click *OK*. You will notice that on the screen the Ward Boundaries are coloured in red and that the lines appear over the Open Spaces.
18. Open up the *Layer Control* and change the layers so that the *OpenSpaces* layer is on top of the *Ward_Boundaries* layer. Click *OK*.
19. You will now notice that the lines of the Ward Boundaries are under the Open Spaces.

Cosmetic Layer

As a quick note, you will see that when you were in the *Layer Control* there was a layer called the *Cosmetic Layer*. This layer is always on top and is used when new objects are added to a map. An example would be to add symbols to a map and you do not want to change any of the other layers. The symbols can be drawn on the *Cosmetic Layer* and then saved as a new table.

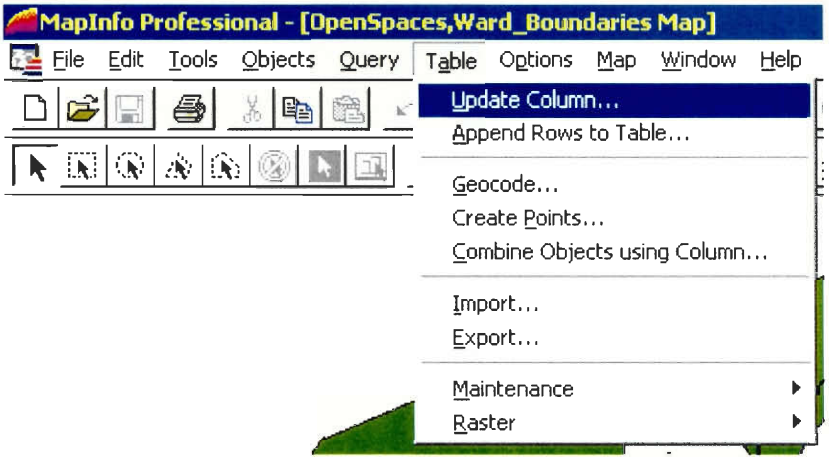


Cut-out of the Cosmetic Layer in Layer control

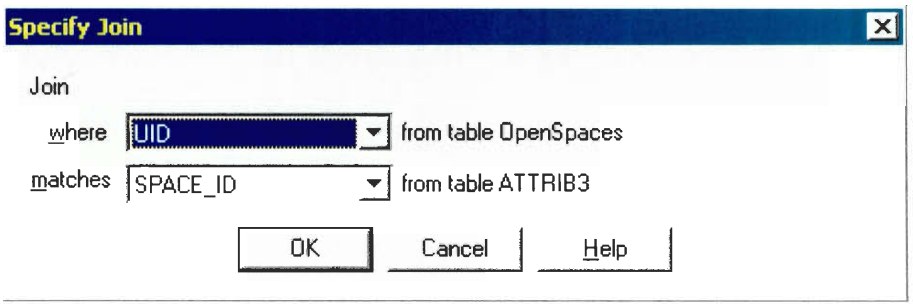
Update Column

When analysing data in MapInfo, it is sometimes necessary to move data from one table to another. In this example we will move data from a table that contains information on the open spaces in Merton to the *OpenSpaces* table that is already open on the screen. This column of data will then be used to make a thematic map.

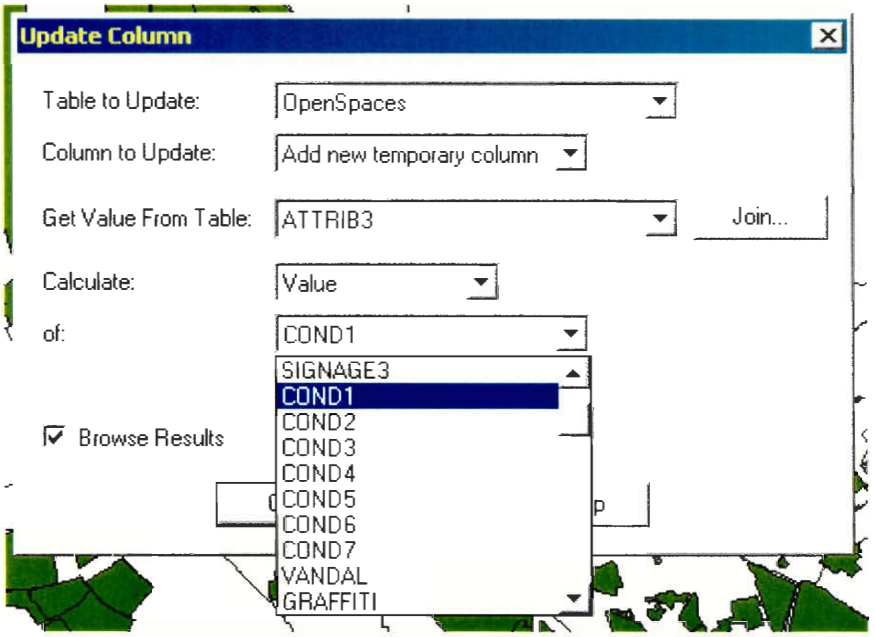
1. Open the table were the data that you want to analyse is stored. The table that will be used was supplied by WS Atkins and is called *ATTRIB3.TAB*. Open this table the same way that you opened the tables previously in this tutorial. After you open the file you will notice, however, that there is no visual data; instead there is a table of data.
2. To update the *OpenSpaces* table, select *Table* from the menu bar, and then select *Update Column*.



3. In the window that appears, choose *OpenSpaces* under *Table to Update.*
4. Next, skip down to *Get Value From Table* and select *ATTRIB3.*
5. Click on *Join.* In order for the columns to update correctly, MapInfo has to know where to put the data that you are adding. The way this works is both tables, the table supplying the data and the table being updated, must have a common field that is the same for each object or row in the table. For example, an Open Space has the name Mitcham Common and has a unique UID of 23. In *ATTRIB3* there will be a column that has this number. In this case, it is called *SPACE_ID.* What MapInfo does is when it imports the data it looks for 23 in both columns selected and puts the data from the source to the right row in the table being updated. In this example, the *where* field should be set to UID, and the *matches* field should be set to *SPACE_ID.* Click *OK.*



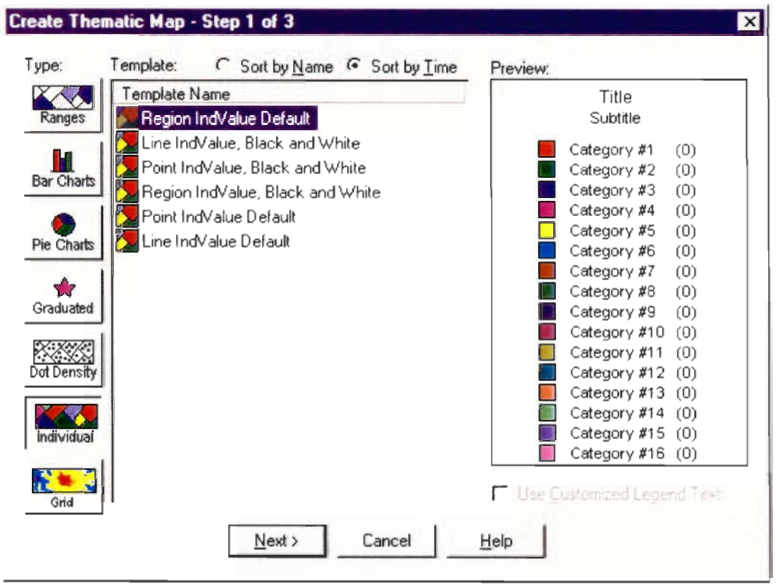
6. After completing the *Join*, the *Column to Update* field will display *Add new temporary column.*
7. The *Calculate* field should be set to *Value.* This means that MapInfo will not do any special calculations; instead it will just put the value from *ATTRIB3* into *OpenSpaces.*
8. The column to select in the *of* field is *COND1.* This column represents the condition of each open space according to WS Atkins. The screen shot below shows what the screen will look like after all the options have been selected.



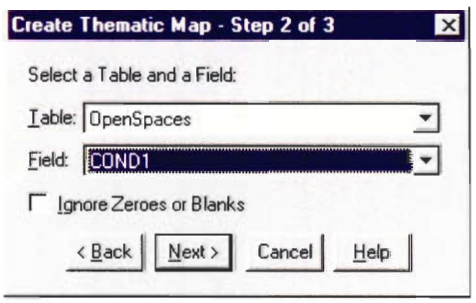
9. The check box in the bottom right of this window reads *Browse Results*. If it is checked off when you click *OK*, a table will be displayed with all the data in the *OpenSpaces* table. If you uncheck this box, then the table data will not be displayed. For this example leave it checked. This will allow you to view the data that was just updated. By scrolling the window all the way to the right you will see that there is a new column *COND1*.
10. Click *OK*. The *OpenSpaces* table will be on the screen; this table has the data for each open space. In the next section this column of data will be used to make a thematic map.

Creating a Thematic Map

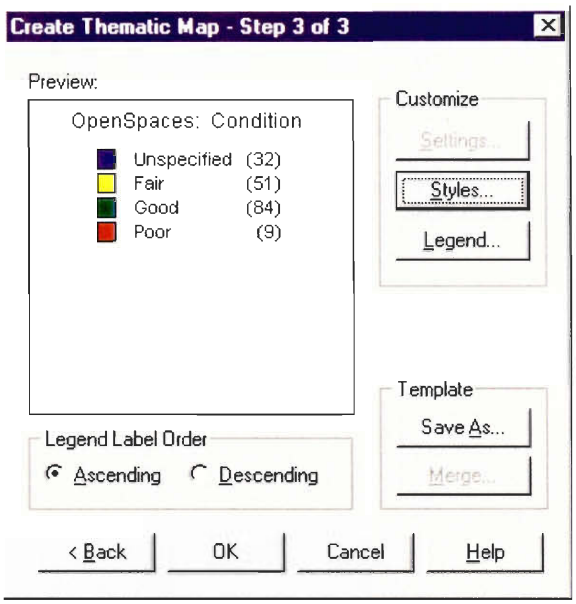
1. To create a thematic map, first select the *OpenSpaces* map. To select the map, in the menu bar click *Window* and then click on the *Open Spaces Map* which should be near the bottom of the list. The map will now be on the screen and not the table view of *OpenSpaces*.
2. Next, from the menu bar click *Map* and then click *Create Thematic Map*.
3. A new window will now open to step through the creation of a thematic map. In this example, select the *Individual* icon on the left hand side of the window. MapInfo will look at a column of data and determine the categories.
4. The template name to choose is *Region IndValue Default*. Click *Next*.



5. In *Step 2*, select the table and the field that you would like to use to produce the thematic map. In this case, you want *Table* set to *OpenSpaces* and *Field* set to *COND1*. Leave *Ignore Zeroes or Blanks* unchecked.



6. In *Step 3*, it is possible to change the legend and style of the thematic map. By clicking on *Styles* it is possible to change the colour of each category.
7. Another option that can be customised is the *Legend* button. This allows you to change the legend title and the names of each category.
8. After you are done customising the style and legend of your map click *OK*.



9. The map of the Open Spaces of Merton should look like the map in Figure 1. If the legend is not in the map you can turn it on. From the menu bar by selecting *Tools*, then select *Thematic Legend Manager**, and then select *Embed Thematic Legend.*

*If the *Thematic Legend Manager* is not in the tools menu you have to add it. Click *Tools*, then click *Tool Manager...*, then scroll down to *Legend Manager* and check off both check boxes. Click *OK* and the *Legend Manager* will appear in the *Tools* Menu.

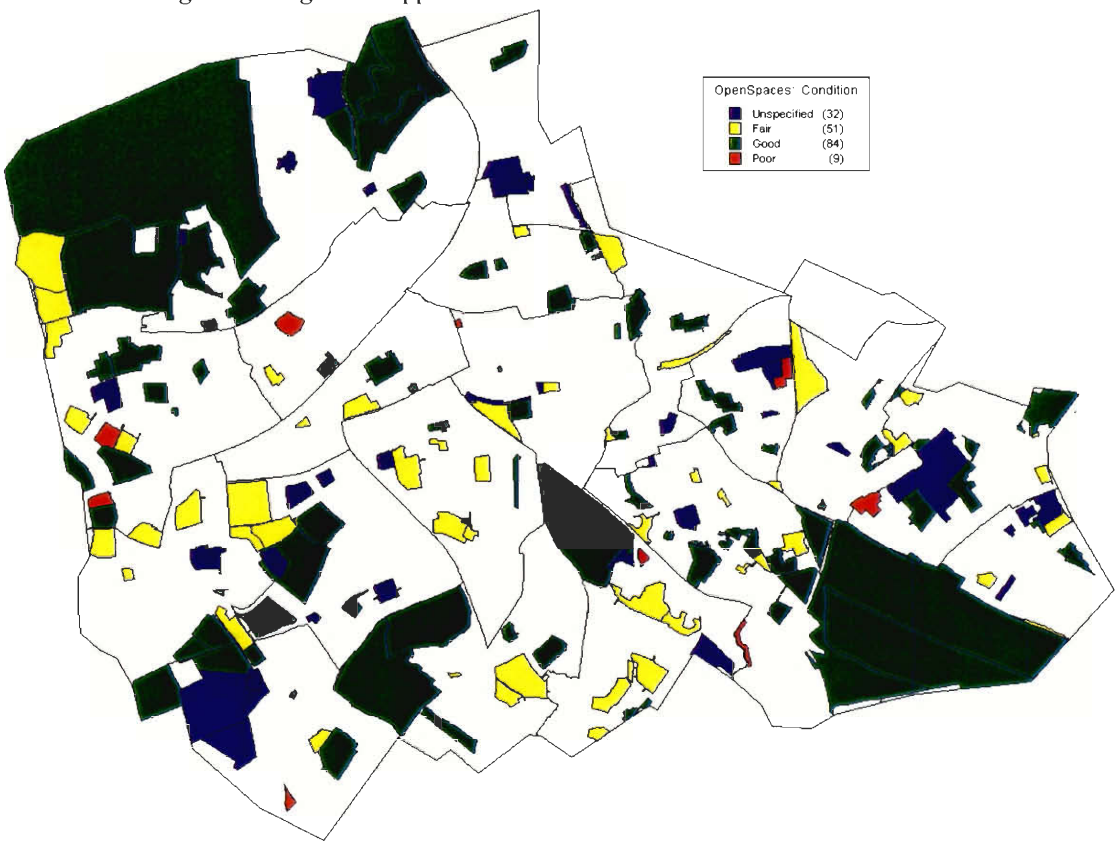
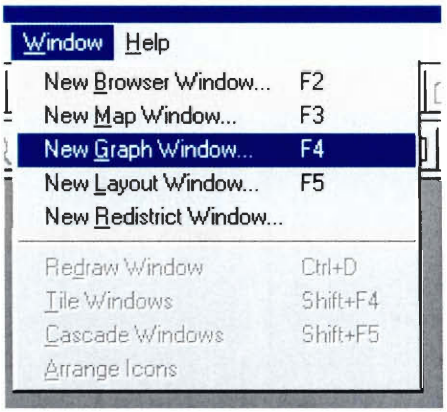


Figure 42: Thematic Map of Open Spaces Condition

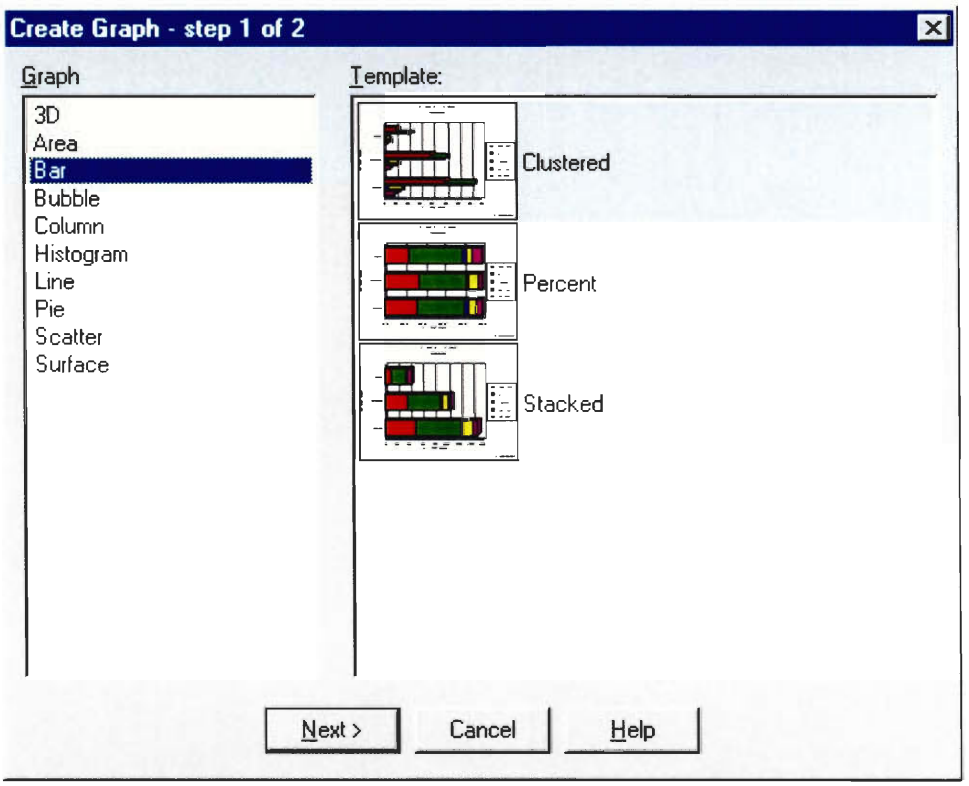
Creating a Graph

Creating a graph in MapInfo is very useful to display data that are in a table of data or to display data that can be extracted from a map. In this example, a graph will be created that displays the area of the wards of Merton in hectares. These data are not in a table but are being calculated by MapInfo using an expression. This is a different type of analysis that does not use maps.

1. From the menu bar select *Window*, then select *New Graph Window*.

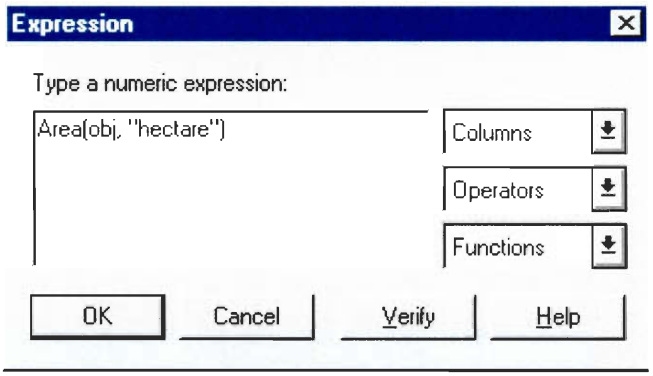


2. A window will appear to start the process of creating a new graph. For this example, select *Bar* under *Graph* and then select *Clustered* under *Template*.
3. Click *Next*.

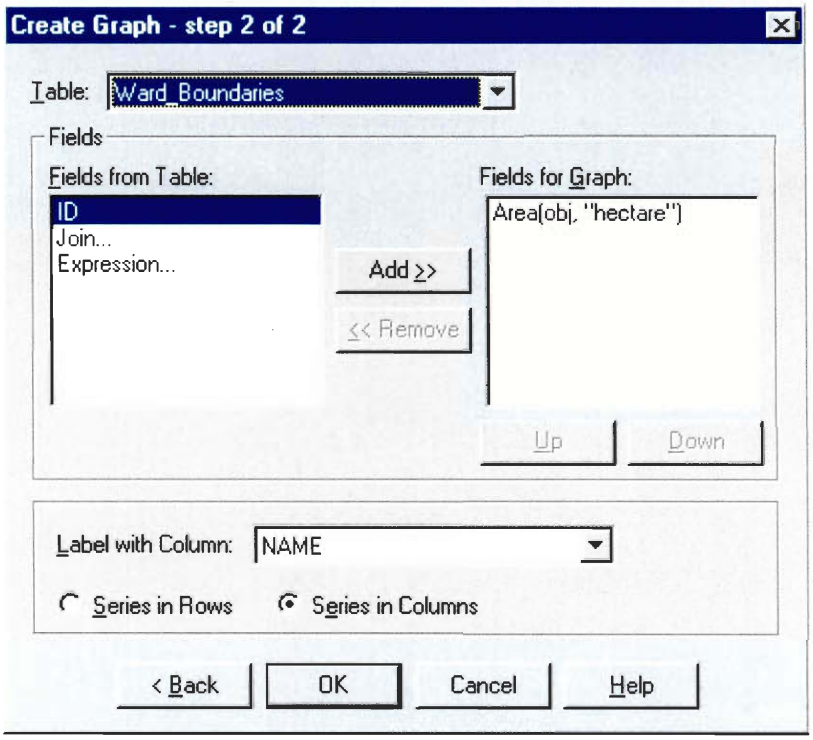


4. In *Step 2*, select the table and column to graph. In this example we want *Table* set to *Ward_Boundaries*.

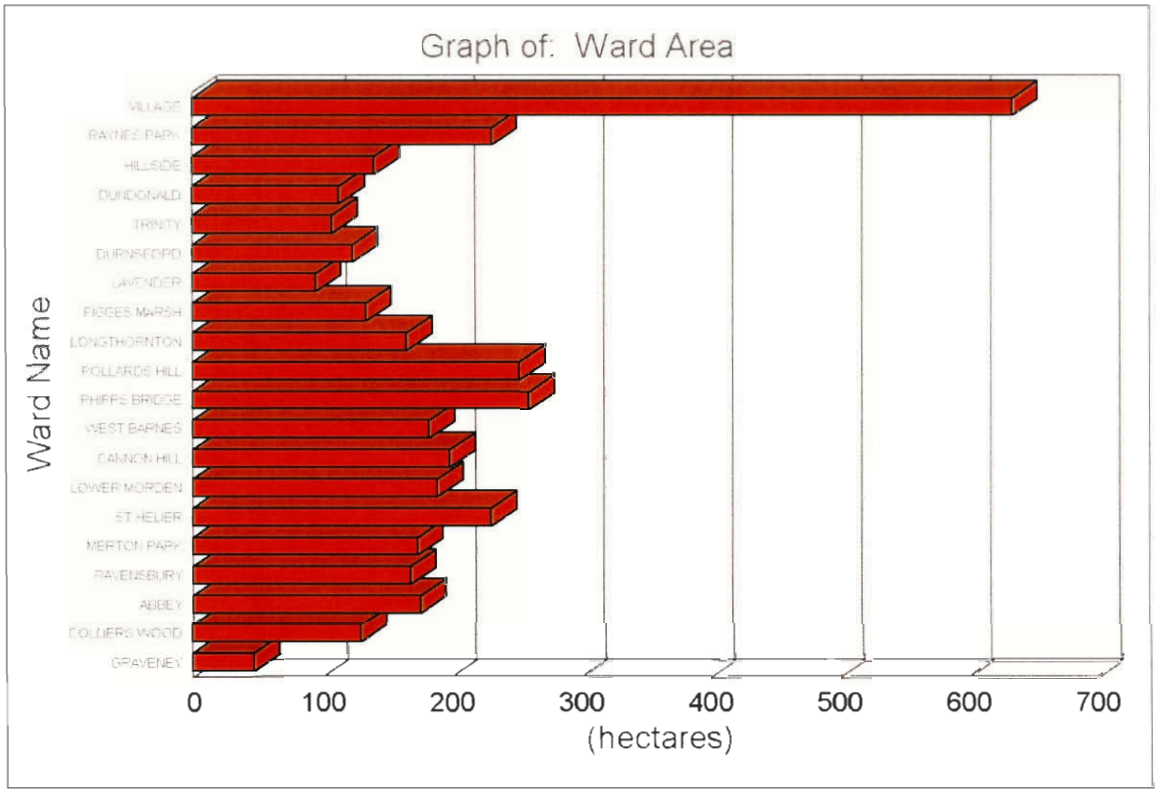
5. Under *Fields from Table* click *Expression…*
6. In the expression window, click on the arrow next to Functions and then click on *Area*.
7. Change the expression in the box from *Area(obj, "sq mi")* to *Area(obj, "hectare")*.



8. Click *OK*.
9. Change the *Label with Column* to *NAME*. Make sure that *Series in Columns* is selected.



10. Click *OK*.



On the screen should now be a graph that is not ready to print yet. To change such things as the text size you can double click on the text. To change the text you can right click on the centre of the graph to bring up a menu where selections can be made to change all aspects of the graph.

Saving Tables and Workspaces

A table is a MapInfo file that stores data in just the table format like the file *ATTRIB3* above or like the *OpenSpaces* table and has map data and object data. A workspace allows the user to save the current state of MapInfo before closing. This allows the user to end a session of MapInfo at the end of the day and the next day open that workspace and continues where the user left off the previous day.

To Save a Table

1. From the menu bar select *File*, and then select *Save Copy As*.
2. A window will appear with a list of all the tables that are currently open. From this list select *OpenSpaces* and click *Save As*.
3. A save window will appear, which will allow you to name and save the file. The suggested file name would be *OpenSpaces_COND1*. This shows that it is the *OpenSpaces* table with the added column *COND1*.
   Note: If you update a column and you do not do a Save As and you close MapInfo, you will loose the column that you added from *ATTRIB3*.

To Save a Workspace

1. From the menu bar select *File*, and then select *Save Workspace*.
2. Give your workspace a name and save it in the directory that you choose. For this example you can use the name *Tutorial*.
3. Next, close MapInfo. Then re-open MapInfo and the *Quick Start* screen will appear. Select *Open a Workspace*.
4. Now, find the location of the workspace that you just saved and click *OK*. You will notice that the screen looks the same as when you saved the workspace.

Additional Information

- Try the MapInfo Tutorial on the MapInfo CD-ROM. The tutorial on the CD-ROM is very good and will go over the basics, but also goes into more detail than this tutorial.
- For additional help in MapInfo you can use Help located on the menu bar to answer questions.
- A great resource is also the MapInfo CD-ROM, which contains the user manual and a reference guide.