

Spatial Planning for Urban Infrastructure Investment

A Guide to Training and Practice

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dpu

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Introduction

Piped water, all-weather roads and walkways, solid and sanitary waste disposal, street lighting, electricity – all these and more make direct improvements to the quality of life. And all of these have physical dimensions that determine who will enjoy them, to what extent, and when.

It is common knowledge that the greatest problems of urban development – those of increasing poverty and inequity among urban residents – require policies and actions well beyond the performance of any physical planning practice. Yet, there are functions that spatial planning can carry out that make substantial differences. The guidance it can give regarding the timing, location, quality, and size of a service infrastructure project offers more than greater efficiency and effectiveness when investing scarce resources. Spatial planning draws attention to poverty and inequity by presenting conclusions about their physical dimensions. Realistic spatial planning – planning that pictures the future in physical terms – will inevitably raise the level of awareness about poverty and of inequity, and it will add substantial support to arguments for the provision of facilities and networks that can service those who are poor and those who are left out.

The provision of advice to the programming of investments in urban infrastructure from a physical development perspective has been widely neglected and perhaps even forgotten among practitioners. Urban planning commonly means efforts to envision a future that satisfies ambitious objectives and to bring this future about through control of the use of land and the structures placed upon it. Widespread disappointment with land use and building regulation – due partly to its failure to reduce poverty and social injustice – have greatly weakened interest in the physical planning on which regulation is based.

It is a mistake to reject spatial planning that guides urban infrastructure investment planning along with that aimed at land use regulation. Planning for urban infrastructure does not try to determine the future so much as it aims to cope with the future. The motives for its application are not to control but to provide knowledge of opportunities and costs. It seeks to be alert and responsive to the occasions when its advice can be of value, especially during the selection and prioritisation of urban infrastructure projects.

Decentralisation of responsibilities to local governments and the accompanying emphasis on the improvement of urban services increase the desire for appropriate, effective, and efficient infrastructure projects. Spatial planning has important messages to give regarding all three qualities, drawing upon a physical perspective that also reflects social and economic factors.

The contents of this document are aimed at broadening the capacities of local level institutions to appreciate and perform spatial planning that will bring about better infrastructure investment projects, ones that can have real impact on the most serious urban development problems that we face.

This manual is the product of research conducted by the Development Planning Unit (DPU), University College London, and funded by the Department for International Development (DFID) of the British Government. The research team was led by Michael Mattingly from the Development Planning Unit (DPU), University College London, and included Julio D. Dávila (DPU, University College London), Haryo Winarso (Institute of Technology, Bandung) and Tom Carter (formerly of Llewelyn-Davies Hong Kong). More about the research will be found in the section entitled The Foundations: the Research and Pilot Training Workshops. A large number of people in different countries generously shared with the team their time and expertise, providing valuable insights into the practice of urban spatial planning, mainly in Asia and Africa. Their contributions are acknowledged on the final page.

The contents of this manual can be downloaded from the research pages of DPU's website (www.ucl.ac.uk/dpu), where various reports of conclusions drawn from the research can be found as well.

Michael Mattingly
London, May 2001

How to Use This Document

Presented on these pages are both a training manual and a user's manual. The training manual provides materials to be given to trainees as well as guidance to trainers on the preparation and use of these materials. The two can be readily identified in the Table of Contents.

To use the document as a practitioner's manual requires only that the two parts – the training materials and the notes for trainers – be referred to simultaneously by the practitioner.

The contents are meant to be used both in circumstances where there are no physical planning policies as well as where they already exist. In the second case, it is often that existing policies are somewhat out-of-date, do not comment on all basic matters relating to investment programming, can be unrealistic in their treatment of the future, or in other ways are not adequate for guiding the formulation and maintenance of urban infrastructure investment programmes. Even when this is not so, it is advisable to regularly review the conclusions of available spatial planning, so that advice drawn from them can be given with the confidence of knowing that they have withstood systematic re-examination. The approach presented in this document considers existing spatial planning policies along with other policies that are likely to shape the future city or town. Emphasis is placed on judging that such policies are indeed backed by genuine intentions and sufficient commitments.

The approach and methods in this document should not be expected to produce spatial planning that can guide the regulation of land use. They do not have this aim in mind. They emphasise speed and simplicity, in order that frequent repetition is possible and so that advice is readily available when investments in urban infrastructure are being planned. If these qualities can also be turned to good advantage in the service of land use regulation, so much the better. However, users are warned that attempts of this kind have met with failures that, in turn, have provoked resistance to the application of these methods where they might aid investment planning.

Notes for the Trainer

Preparations Trainees will need to be given copies of all pages presented in the section of the Table of Contents described as Materials to be Given to Trainees. These pages, including the maps, are presented in this document in a way that permits easy photocopying. The Programme and the first page of the Introduction will require insertion of the times, dates, names, etc. of your particular circumstances before they can be copied.

With the exceptions of Maps 1 and 2, it is desirable that the copies of the maps be made on the most transparent paper that is available at reasonable cost. This is because they will be used best if they can be overlain on one another or on the base provided by Map 2.

The trainer will need to have overhead projection transparencies of all of the maps, or else make digital copies if a form of computerised projection system is to be used.

Most importantly, the trainer must become very familiar with the contents of these notes. Based upon these notes and the searches for additional information they may provoke, the trainer must plan how each activity of the training programme will be carried out. The trainer must also plan the comments that will be made in each session to facilitate understanding by the trainees. This will include adapting examples to fit local conditions.

The First Workshop

Regarding the Introduction Welcome all participants, obtain a list of their names and institutions, and have them introduce themselves to one another.

Explain in a few sentences what the training is about.

Then take the participants through the handout note entitled Introduction. Do this as a brief lecture, highlighting the major points in the handout as guided by the following notes. When you come to the illustrative problem, have the participants work on it in groups, and then reclaim their attention after a suitable period of time so that you can discuss with them their conclusions. Note that in the middle of this lecture it is suggested that you introduce the programme for this first workshop, rather than introduce it earlier when the participants have little idea of what the training is about.

The major purposes of this introduction are to:

- 1.** make participants see that spatial planning that guides infrastructure investment is not the spatial planning most familiar to them, and that the training is not about land use regulation or other aspects of land management usually connected with the spatial planning of towns and cities.

- 2.** remind participants of – or introduce them to – the capacity of spatial planning to give information about the kind, quantity, size, quality and location of an element of urban infrastructure, information that is valuable when urban infrastructure projects

are being chosen and arranged in an investment programme.

While the second of these is the more important, the first is essential because of the commonly held views of spatial planning that will be brought into the training sessions. If there are urban planners taking part, discussions during the early part of training will inevitably branch off into considerations of illegal construction, of land development control, of compensation for land purchased, and the like; all of which are preoccupations of those dealing with conventional urban spatial planning. These are preoccupations that will take everyone's attention away from the actual concerns of the training. In order to encourage participants to be open and speak up as soon as possible – so that the training is built upon constant discussion of the knowledge presented – a small amount of this digression can be permitted. Nevertheless, be prepared to bring it to an end by reminding everyone that the spatial planning to be examined is not about these other matters, and that some of its greatest potential has been overlooked and neglected because these other matters have attracted so much attention.

The nature of spatial planning

Following the order of matters noted in the handout given to trainees, first, remind them that the ability of spatial planning to guide infrastructure investments has been forgotten and neglected. It is now very rare for spatial planning to be used for this purpose, and even more unusual for it to be carried out just to serve this purpose. Yet, the urban comprehensive planning programme launched in the United States in the 1950s – perhaps the largest ever known – was motivated by a desire to coordinate and give a future perspective to the various infrastructure investments supported with funding through separate sectoral programmes of the US Federal Government.

These days, the practice of spatial planning for urban areas is almost always seen only as a means for creating and justifying policies for the control of land development. Because decentralisation policies and practice are drawing more and more attention to the provision of public services at local government level, this is a very appropriate time to discover again and use this overlooked power of spatial planning, especially because it is easier to tap effectively.

It is appropriate at this point to acknowledge that the spatial planning referred to is physical in its nature. Its subjects are land, buildings, and physical space. These are subjects it shares with town planning, city planning, town and country planning, and other commonly recognised forms of urban planning. However, there is an important difference. These other forms of urban planning are performed to provide a basis for land use regulation and building control, and/or they are performed to determine in physical terms – in the manner of an architect's plan for a house – what a city or town should become.

Much planning for towns and cities is practised in an attempt to control the future. In contrast, the spatial planning described in these training materials aims to equip its users to better cope with the future. That is to say, that it tries to anticipate what will happen and to prepare to deal with problems and opportunities that might arise. It is important for the trainees to realise this, for it will help them understand that this planning is not to be confused with the more familiar planning that is used as a basis for land use control or to state what a city should become. The other urban planning encounters major difficulties in practice that usually weaken it considerably, such as

the impossibility of predicting the future (as it often supposes it can do) and the administrative and social conditions that make land development laws and regulations unenforceable. Urban spatial planning to guide infrastructure investments does not need to confront these obstacles, so these obstacles do not challenge its utility.

Consequently, trainees should be helped to understand that the products of this spatial planning are not policies or actions or proposals for the same. Nor are they predictions of what will happen. Rather they are expressions of what is likely to happen from a particular perspective taken with regard to a town or city, the perspective of its physical growth and change. They help those who listen to them to anticipate certain aspects of the future. These expressions of what is likely to occur are valuable when taken into consideration during decisions about urban investments, for with them in mind, one can better prepare to deal with the future.

It is important that trainees realise that information from this perspective is not the only information that decision makers will use, and that it is still of value if a decision results that is contrary to the advice it provides. Decisions about service infrastructure are very political in nature because they deal with who gets the benefits of public resources. As such, they involve many perspectives. It can be assumed that a decision made in the face of information about physical development is more likely to be better than one in which such information is not present, even if other matters take precedence. The concerns of physical development have at least been given consideration, in such a case, and this has repercussions on the knowledge and skill of the decision maker that can affect later decisions as well as later reviews of this initial decision.

The training material

Next, sketch out the background of the knowledge presented in the training materials. Stress that it has been taken from the lessons of practice experience, most of which was obtained by studying spatial planning practice associated with urban infrastructure investment in Indonesia and Nepal. Both of these countries have had substantial nation-wide programmes of financing for urban infrastructure. Similar methods were introduced into India, but they did not become accepted practice. In fact, the greatest lesson learned from India was how strong adherence to a conventional view of the function and nature of urban physical planning can block the use of spatial planning to guide urban investments. A short history of the investigation underpinning these guidelines is given near the end of this document, in a section entitled The Foundations. For more details about this research, visit the website of the Development Planning Unit (www.ucl.uk/dpu/) where several papers on it are posted.

Bring out the unconventional features of the methods that the research found in practice. Emphasise that they are speed and simplicity. In both Indonesia and Nepal, the preparation of an investment programme for an urban area was completed in two or three months. The up-dating and revision of an existing spatial plan – or the creation of one, if need be – had to take place as quickly, whereas conventional methods could take one or two years. Ideally, investment programmes are to be revised each year, so spatial planning has to be performed every year in preparation for this revision.

In both Indonesia and Nepal, local governments have traditionally been weak, and the coming of decentralisation policies has revealed how little capacity these levels of government possessed for the tasks they must now perform. Consequently,

the spatial planning methods that have been used are much simpler than the methods of planning aiming to serve land use regulation. It is not just a matter of reducing the amount of staff time required. It is also to democratise the expertise, so that highly specialised knowledge and skills of spatial planning are not needed. New local governments and small local governments simply will not possess such specialised knowledge and skills. It is better that they can command simpler methods that allow for a significant degree of guidance to be given to investment programming, than for there to be no consideration at all of spatial planning factors. Those who put together investment programmes are not the recognised spatial planners, yet if they understand at least simple methods of spatial planning – such that they can perform some spatial planning for themselves, if necessary – their decisions are likely to be the better for it.

The training programme

This is a good point at which to distribute and discuss the programme for the workshop that is beginning (the first workshop). Emphasise that you will have to keep to the times stated because there is a great deal to be presented. It is better to negotiate any changes to the programme after this workshop is underway, when you have some feeling for the rate at which its business is being carried out.

This course of training is comprised of three elements:

- 1.** a workshop to introduce the method, which can be done in two days (see the sample programme for the timing). More time than this can be given to it, but there is reason not to extend it very much. Its purpose is to enable the participants to use the descriptions of methods they are given as handouts; the purpose is not to explain every detail of the methods. The methods will be better learned – and better adapted to a particular situation – if a participant has to think for herself or himself, using the handouts as a guide;
- 2.** a period of application of the methods to real situations by the trainees when they have returned to their usual places of work, during which actual spatial planning is performed that leads to the identification of needed infrastructure projects from a physical development perspective. This can be a period of about 3 to 4 weeks: time enough to carry out all of the Tasks to some degree, but not so long that the work can be put aside for a while, dulling memories of the explanations given in the first workshop;
- 3.** a second workshop, immediately following the application, that is used to review the experiences and conclusions of the trainees' work on real situations, a review that corrects mistakes and explains what was not adequately understood. This will take one or two days to carry out. It should allow time for the trainees to present the conclusions of their planning for each other to appraise, discuss, and share, as well as time for the trainer to provide the additional guidance.

Spatial planning and infrastructure

Now you should introduce the nature of the advice that spatial planning can give to infrastructure investment. Identify advice it can give about the kind, size, location and timing of a project as given in the handout, but do not spend much time on this. Engagement with the illustrative problem described in the handout argues better than words that spatial planning has the capacity to guide infrastructure investment. You must preserve adequate time for the problem, at least an hour for the work on it and

the discussion of the results.

The illustrative problem uses a fictitious case that is named Town 2000. This case is returned to at several points in the first workshop to show ideas and methods. Introduce the elements of the problem using an overhead projection transparency of Map 1: Locations of Illustrative Infrastructure Project Proposals. The locations of the proposed projects are shown on a base that is the same as Map 2: Existing Land Uses. Identify and explain the nine proposals one at a time, maintaining the order in which they are listed, so that the lack of logic in their sequence can be discovered. Locate each on Map 1 and give the reason why it has been proposed, elaborating imaginatively on the reasons for need stated in the third column of Table 1 of the handout note.

Have trainees work in groups in order to get everyone talking and to free up the mood of the workshop. But keep the groups small, only two or three in each.

The problem is not there just to illustrate certain points. For the participants, it is also a break from listening to someone else talk; they can now talk among themselves, as well as get up and move about, which is a physical relief. Moreover, they give something of themselves, increasing their involvement in their training, thus increasing the chances that they will take away knowledge and understanding.

It is not necessary that a solution to the problem is actually produced by the trainees. In fact, this is not really possible. A thoughtful ordering of the nine projects would take much more time, even to produce a poor arrangement of them. The aim is to force participants to think in particular ways that draw from spatial planning and to better appreciate what spatial planning can do for them. The problem reminds them that investments have requirements for space and location, and that these affect and are affected by other users of space. The problem also makes them picture a capital programme, so that there is an image to remain in mind during the rest of the training, one that can exist side by side with a spatial plan.

Draw on a flip-chart or black/white board an investment programme format to partially fill in during the discussion of their conclusions. This is useful for illustrating some of the consequences of placing projects in a particular order. It also creates the picture of a capital programme for the participants to keep in mind throughout the training. The format should look something like this:

PROJECT	2001	2002	2003	2004	2005
Project 4	cost				
Project 7		cost			
Project 2		cost			
etc.					
Total cost	amount	amount	etc.		
Total funds available each year	3 million	3 million plus unspent funds carried over	etc.		
Unspent funds carried over	amount	amount	etc.		

They will have difficulty placing in the programme the very large investment required of the addition to water treatment capacity. Under the given rules of the challenge, it cannot be constructed in stages, so it can only be accommodated in the programme by saving funds in one or more years and carrying them over to provide all the 5 million required in one year. This, of course, is not realistic; the rule is created so that the problem will illustrate certain points.

If they do not pick up the following aspects themselves, bring these to their attention in the discussion:

- that possession of a site or sites is needed before a primary school or schools can be built;
- that it may be economically advantageous to purchase sites very much before there are funds to build upon them if the expected increases in land values will be greater than the costs of the idle investments in land;
- the new industrial site cannot be used until the road to it has been built;
- if water mains are extended to the new areas first, they will be damaged during the construction of the roads. If the roads are completed first, they will have to be dug up in order to put in the water mains. Probably the best solution would be to build the foundations for the roads and put in the water mains before surfacing the roads. This would require a redefinition of the roads project;
- providing water mains to the new area can be more efficient and effective than providing them to existing housing areas because the cost per household can be higher when mains are installed after roads and other networks have been put in place and when the housing has been built in an irregular pattern;
- anticipating the new residents by programming infrastructure installation for them can result in more service to people (measured here as the five-year total of people served) than if investments are used only to meet the deficiencies experienced by the existing population;
- the investment in a new industrial area serves economic development objectives that may be thought important even though there is no direct service to the population that is evident;
- the choice of one primary school or two and the choice of one site or two sites has important implications for cost effectiveness. These choices depend upon spatial planning information;
- the site for the additional water treatment and storage facility has to be in a location that can serve the new areas through gravity flow (because it is at a higher elevation). This, of course, requires knowledge from spatial planning of where these new areas might be, their elevation and the elevations of the possible sites for the facility;

The total of people served over the five-year period is an indicator of the support from its electorate that the local government can expect because of its investment decisions. Consequently, the rules of the problem call for this indicator to be maximised at the same time that efficiency in the use of the available funds is sought.

When introducing briefly each of the projects, use an overhead projection of Map 1: Locations of Illustrative Infrastructure Project Proposals, showing their approximate locations. You will find that some of these projects do not match with the needs for additional elements of infrastructure that are used much later to illustrate the performance of Task 7.

Regarding Task 1

Before beginning:

Explain that the first four tasks aim to produce a picture of the future of an urban area. This is done by examining what has shaped the present, by taking note of current policies of government and other influential organisations, by identifying the opportunities for and constraints to physical change, and by using knowledge of all three as the foundation for making good estimates of what is likely to take place during the next five years. Remind the participants that the future cannot be accurately predicted or determined much at all, so that picturing the future is largely a matter of judgement. The better the judgement, the more likely that the picture will be close to reality. The better the understanding of the current situation, of government policy and of physical constraints and opportunities, the better will be judgements about the future that is likely to occur.

A perspective of five years is used because it is a common horizon for capital programming. Also, it is close to the view that many elected politicians will take when making decisions about expenditures. This should be changed if particular circumstances justify a shorter or longer horizon. For instance, use of three or four years may fit better with investment budgeting procedures in some cases.

The Task

Then, draw attention to the Purpose and the Questions outlined in the handout note for Task 1. Afterward, highlight the major points of the handout responding to each of the Questions.

It is important to put across to the participants that there is always a good deal of information and many good opinions (i.e. judgements) available to them that are often overlooked. These are in the possession of others involved in the affairs of the town/city. It is very worthwhile to use Task 1 to build up or extend professional networks that can be used more or less continuously to maintain a good knowledge of trends and how they are changing a town/city.

At the same time, trainees may need to be reminded that there is never enough knowledge available. Consequently, lack of information – and analysis of it – is almost never a convincing excuse for being unable to give advice on infrastructure investment from a physical planning point of view. The procedures set out in the training materials are based on experiences in which exercises in elaborate and lengthy data collection and analysis were avoided, in order that advice could be given quickly in response to needs and opportunities. The quality of the advice is improved incrementally; as spatial planning is regularly up-dated, so the knowledge base is built up. For this reason, maintaining networks that reach to well-informed individuals – and continual monitoring of data sources – are crucial activities.

It is also crucial that the judgements of what is happening and will likely take place are supported by observations. Since it is spatial planning that is of concern here, this means observations of certain physical aspects of the town or city. Urban changes can be very sudden. Many errors have occurred because of a judgement by someone who could not be bothered to leave her/his desk and verify documented data or hearsay with visits to the places they describe. Moreover, there are sensitivities to physical conditions that are best obtained by experiencing them, sensitivities that are very important in making judgements. Those who give spatial planning advice – regardless of their professions – and those who decide investments in urban infrastructure – regardless of their administrative or elected positions – need to move out and about in their town or city.

Remind participants that changes in local wealth affect the nature and extent of poverty, in turn changing the access of those who are poor to services in which there may be investment. Given that those who are poor are less able than those who are not to provide themselves with adequate water, drainage, waste management, and so on, it falls upon a just government to give particular attention to their needs when planning the investment of public funds. So, it is important that spatial planning give special attention to the physical dimensions of urban poverty.

Regarding Task 2

Draw attention to the Purpose and the Questions outlined in the handout note for Task 2. Afterward, highlight the major points of the handout responding to each of the Questions. Task 2 calls for good contact and communication with the staff and offices of government, non-governmental organisations (NGOs) and possibly even foreign donor agencies, as well as with political observers who can comment wisely on commitments to policies and projects. Good commentators on government policies and projects may be found in NGOs and community based organisations (CBOs) as often as anywhere else.

A 'policy' is here taken to mean more than the dictionary definition: a course of action adopted by government or another organisation. While a policy is therefore an agreement and not just a proposal, it is also not a course of action that has been adopted in a superficial, routine manner. The handout note asks for its user to judge if a course of action has actually received the kind of commitment from government or an organisation that provides the resources of money, powers, and/or staff for its implementation because the policy actively governs decisions that are made. Only when a policy has bite is it worthy of consideration when attempting to picture the future. To obtain a good sense of what might happen, one must get beyond both the rhetoric and the wishful thinking of the organisations who say they have adopted policies.

Physical development plans are notorious for their ability to be mistakenly accepted as statements of policies. Even those plan proposals adopted through formal procedures are often not backed by genuine commitments to implement them. It is also true that commitments to plans are not easily identified, since the policies involved are mostly about future actions. The lack of real commitment may become obvious only at the time when a so-called policy is finally discarded for another, and it is realised that its implementation has never been attempted. Again, the opinions of others involved with the affairs of the city/town can be valuable in judging the identities of true policies.

It is not often recognised that integrated, future-oriented and objective-oriented statements of policies for either economic or social development rarely, if ever, exist for particular cities or towns, as they commonly do for physical development in the form of plans. Yet, there may be plans for national or regional economic development, and even some statements of national social development policy that are plans, more or less. Consequently, social and economic policies will have to be sought in a number of offices and in a variety of documents. Warn the trainees that they must not lose sight of the purpose of this exploration of social and economic policies, which is to anticipate how they are likely to affect the physical structure of the town. The most obvious ways they will do this is by calling for services that must be provided with the networks and facilities that become urban infrastructure investment projects. However, there will be other effects that are less direct, such as ones that influence where those who are poor can live.

Regarding Task 3

After drawing attention to the Purpose and the Questions outlined in the handout note for Task 3, then introduce sieve mapping as the way to go about answering the Questions. The immediate aim is to give the participants a sense of what is expected of them, which is to at least try a bit of sieve mapping and, if there is time, to carry out a full application of the technique. Announce that you intend to give a substantial amount of time to this, because they must clearly understand the description provided of the method for this key element of spatial planning. Even though some of them will be familiar with this technique or just find it simple, they tend to enjoy working with information in this way. As a result, the participants not only become (re)acquainted with the technique; because this graphic approach presents the information so clearly, they also are compelled to think in very real terms about the effects of constraints and opportunities on the physical growth of the town/city.

Describe verbally the sieve mapping to be done and how it will produce a picture of the constraints and opportunities in answer to Question 9. Demonstrate sieve mapping using overhead transparencies of the maps (numbers 2 to 6) provided for the fictitious Town 2000, at the same time that you are presenting the method given in the handout for dealing with the first eight questions. Show how information can be accumulated by laying one map of characteristics over another. Although it is possible, using an overhead projector, to read several transparent maps that are overlaid on a base map, it is actually difficult to maintain alignments during the build up, and the results are not very clear. It is better to place only one at a time over the base map and to trace each time onto a third overlay (one that is initially blank) the areas affected by the factor. This builds up the information on the third overlay. A major advantage of this procedure is that it parallels the best that the participants are able to do in the training workshop, as well as when they are later using the method in their work. Even if they work on sheets of the most transparent of papers, it is impossible to see through more than two sheets to an underlying base map.

Begin by distributing to every participant a copy of Map 2: Existing Land Uses, for the fictitious Town 2000 to use as a base map. As you talk about the first question, give each an overlay on transparent paper of Map 3: Slopes over 15%, which has information answering the first question, plus a blank sheet of transparent paper. Ask participants to join you in tracing onto the blank sheet the areas where slopes are too steep. Follow this same procedure for each of the next two questions. When you have finished with the three questions, ask the participants to summarise what can be learned so far, that is, the location of land not yet built-up that is free from steep slopes, flooding, and ground conditions that are not good for urban construction. Give them time to work on this, moving among them to help those who are having difficulties, once you have hastily (accuracy in this demonstration is not important) accumulated the information yourself and can roughly identify such land yourself.

Then return to the questions and continue to highlight points in the handout note for each, demonstrating with an overhead projection transparency of Map 6: Good Agricultural Land, on the base map as you go along. If you have ample time, you can distribute copies of Map 6 on thin, transparent paper for the trainees to work with. Give them help to come up with their own answers to compare to the conclusions shown on Map 7: Areas of Best Opportunities for Urban Expansion. Remind them that they should note the extent of the existing built-up area.

Regarding Question 1, Map 3 assumes that a 15% slope is too steep. Point out that the amount commonly considered to be too steep for construction will vary from place to place.

The purpose of Question 8 is simply to locate those areas into which extensions of existing service networks would be most expensive, usually because there are not main elements of the networks (like major roads or water mains) nearby to which direct connections can be made. A boundary at some appropriate distance (for example, 500m) from the edges of built-up areas that are served by water and road networks can be used as a rough indicator of this situation. Question 8 is addressed after locating the areas where there is opportunity for expansion in terms of the earlier questions. It is used to distinguish any of these opportunities areas that are better than the others in terms of the ease with which service networks can be extended to them. Inform the participants that parts of the residential areas to the south-east do not yet have local roads or piped water (you can find these areas on Map 10, showing estimated additional facilities needed for some kinds of infrastructure), so expansion in this direction cannot as easily be served as by extensions of existing infrastructure in other directions.

Trainees should be made aware that the questions about forests and good agricultural land represent constraints that commonly arise as a consequence of government policies. During application of this method, the answers formulated in Task 2 should be reviewed to determine if these and/or any other government policies are applicable in the given circumstances and therefore should give rise to questions to be asked in this Task.

The question about rights of way for major roads and for high tension electricity lines, as well as those about forests and good agricultural land, raise concerns that research found have been given attention in practice. Point out to trainees that they illustrate matters that will not have importance in every application of the method. There will be others like them that are relevant in a given case. The lesson to be drawn is that users of the method should feel free to add or subtract to the list of questions, as suits the circumstances of the case to which it is being applied.

Regarding Task 4

It needs to be emphasised that this task is concerned with the future. Here the outputs of the earlier tasks are used to create a picture of the future town/city. It is the physical characteristics of the future town/city that are of interest in the end, but to reach these, it is necessary to consider social and economic as well as physical factors.

Draw attention to the Purpose and the Questions outlined in the handout note for Task 4. Afterward, highlight the major points of the handout responding to each of the Questions.

The case of the fictitious Town 2000 can be used to illustrate methods for responding to Questions 5, 6, 7, 8, and 9. Start by providing answers to the earlier questions 1 to 4 (there is not a great deal to be gained by making up fictitious details that justify these answers). For instance, tell the trainees that there has been economic growth averaging 2.5% per annum that is expected to rise slightly during the next five years to 2.6 or 2.7%, and that the population growth rate of 3.0% will also rise slightly to 3.2% per annum, producing an increase in the town's population of 15,000 over five years. Many of these will be poorly skilled migrants with little capital from the rural areas, and the remainder will be additions to households already in the town that are mostly poor. With population continuing to grow faster than the economy, there is likely to be less wealth per person. Consequently, it can be expected that 80 to 90% of the additional population will be poor. An illustrative answer to Question 5 is that the town's central business area is expected to continue to expand

to the north as it has been doing, given that continued growth in the farming activity around the town and in the town's own activities and population will support continued growth in the town's service activities. At the same time, conversions are likely to continue of single family structures to multi-family structures in the area of older housing near to the town centre to the north-west, making this the place of residence for more and more of the town's poor families. These changes are shown on Map 8: Physical Change Likely to Happen in 5 Years. Thus, an answer to Question 6 is that approximately 5,000 additional people within the next five years will live in this district of existing housing, and to answer Question 7, very nearly all of them will be poor. This means that the remaining additional population of 10,000 is expected to be accommodated by expansion of the existing town, answering Question 9. Considering the analysis performed on Town 2000 to illustrate the methods of Task 3, the current trends in the physical expansion of the town identified in Task 1 (to the west and north-west and the north-east) and the government policies likely to be implemented to prevent any more expansion to the north-east onto good agricultural land, it is expected that expansion during the next five years will take place to the west at certain locations and into one area in the north-east. This conclusions can be shown to the trainees on an overhead projection of Map 8.

If you wish to make up a complimenting scenario to explain detailed illustrative answers for Questions 10, 11, and 12, you can do so, of course. For example, you can suggest that if Town 2000 is using 150 square meters per inhabitant, expansion to match an additional 10,000 inhabitants at the same intensity of use would be about 150 hectares. However, these answers are usually envisioned easily enough without illustration. There is a danger here that too much effort will be put into specificity and detail that are not justified by the major assumptions and judgements that have to be made to reach this stage in the formulation of the basis for spatial planning advice. Calculations of the land area needed over 5 years should remain very rough, the categories of land use into which this additional land is divided should remain general (and not be broken down into sub-categories of residential or industrial, etc.) and the locations that poor households might occupy can be expressed as approximate and in terms of alternatives, if that is appropriate.

Regarding the Review Exercise

At the same time that this exercise forces trainees to go over the presentations and notes, it allows them to think in terms of situations that are real to them, rather than the imaginary example of Town 2000. As a result, they can become more deeply involved in the discussions and in the training as a whole.

Undertaking the review exercise at the start of the second day acts to remind everyone of the material covered in the first day. If the terms of reference for the review exercise are introduced as the last activity of the afternoon before, trainees can give some time in the evening to preparing their presentations. The only alternative is to provide an hour at the start of the second day for this preparation, which eats into the already crowded schedule. The towns and cities to be the subjects, and the members of the groups to work on them, should be decided at the time the terms of reference are given out at the end of the first day.

The purposes of the exercise are served even though it is undertaken rapidly, with a corresponding lack of accuracy and precision. There is certainly not time to utilise actual sieve mapping techniques, although major conditions limiting future physical expansion can be taken into account from memory. The matters highlighted in the notes handed out are to be considered as best one can without

data and without time for any more than very superficial analysis. Even so, the picture that emerges of growth over the next five years – as rough as it may be – will remind many trainees that they do not regularly reflect on what the future might hold for their towns or cities.

Given the shortage of time for presentations and the benefits to be gained from working with other people, only a few towns or cities should be chosen for use in the review exercise. Each should be known to several trainees, so that an active group can be formed around each city or town. Groups may need to be provided with large sheets of paper (such as from a flip chart) on which they can draw rough maps of their subjects.

Presentations must be kept brief, which can be difficult for those who do the presenting. This exercise must be kept in perspective: its product is of limited value, and the value of carrying it out does not increase as more time is spent on either the preparations or the presentations. Ensure that presentations actually state what a group thinks the city or town will be like in 5 years. Although this is the most dramatic outcome of the exercise, there will be a tendency instead to dwell upon the details of what exists.

Regarding Task 5

Before beginning:

Explain that Tasks 5, 6, and 7 use the conclusions of the earlier tasks to come up with estimates of the additional infrastructure that could be needed for the town/city as it grows and changes during the next five years. This is done by identifying the service infrastructure that exists now and by estimating the infrastructure that might be required for the town/city by the end of the five year period. A comparison of the existing service infrastructure can be made to that required, thus identifying the additions that might be needed.

The Task

Use Map 9 of Town 2000, Selected Existing Service Facilities, to illustrate how an inventory of existing infrastructure can be presented graphically. Such a map can, of course, be keyed to a text that gives basic information on the sizes and qualities of these existing facilities.

Regarding Task 6

Despite the small amount of text given to it, Task 6 is a substantial activity. In practice, it is one that must be done with a concern to balance effort and detail against the timing of opportunities to give advice. In any case, the nature of standards of infrastructure provision is such that they are always rough measures and do not justify meticulous application.

Some trainees will find it difficult to accept either the ideal or the practical as standards they should utilise, and it is worthwhile trying to persuade them otherwise, emphasising that they will be giving advice, not deciding the issue.

Regarding Task 7

Map 10: Estimated Additions Needed to Existing Education, Health, Water Distribution and Road Infrastructure can be shown as an overhead projection to illustrate the advice on spatial locations that Task 7 can produce. This map can be placed over a transparency of Map 9 showing the locations of existing selected service facilities. Note that it deals with only some of the categories of service facilities that could be presented on such a map.

One additional primary school is justified on the basis of the past provision of four primary schools for a town of approximately 100,000 inhabitants. Because the area to the south-east would have the greatest difficulty using the existing schools because of the major roads to be crossed to reach them, it is shown as the priority for the area to be served by this single addition. Application of a more ideal standard concludes that two more primary schools are needed, and arrows indicate the general areas that these could serve, if there is to be an even distribution of schools throughout the town's residential districts. A specific location for these schools is not shown, for that is a matter to be settled according to the opportunities that present themselves, when a school is chosen as an infrastructure project in the investment programme.

As recommended in the handout, this illustration assumes that all built-up areas should have networks for roads and water distribution. Parts of the residential areas to the south-east are at present without these networks, so they are shown as needing them, along with the expected areas of expansion.

Regarding Task 8

This task is best introduced through open discussion, a workshop involving all of the trainees. The aim is to force them to critically examine the series of events by which urban infrastructure investments are decided and programmed, looking for circumstances where spatial planning advice is not provided or where its provision could be made more effective.

A practical way to go about this is to first highlight from the list in the handout the points in a process at which such circumstances might occur. Then ask participants to identify any events in the process in which they work that fall into these categories. These can be written on flip-charts of a board for all to see as they are named. Next, each event listed can be examined by all in terms of the provision of spatial planning advice actually made to it. To finish, all trainees can join in suggesting how spatial planning advice might be made available where it is not provided, and how its provision can be strengthened where it is now weak.

There is little doubt from studies of practice that the degree of attention given to spatial planning advice depends a great deal upon the context in which it is provided, as well as the initiative and persistence of those with spatial planning knowledge. For example, procedures laid down by central government for the use of spatial planning in Indonesia's Integrated Urban Infrastructure Development Programme were not consistently followed at local government levels. In both Indonesia and Nepal, there was a tendency for the provision of spatial planning advice to be a one-time event in the creation of an urban infrastructure investment programme, occurring only during the early stages. Indonesia's urban investment programme did not succeed in building sufficient ownership at the local level of the spatial planning undertaken. In both countries, adequate capacities were not built in local government to maintain spatial planning and advocate references to it. Decision makers at all levels did not have sufficient appreciation of spatial planning. They persisted in ignoring the future and the physical features and relationships of their investments. They consistently undervalued spatial planning advice and did not remember to seek this advice when taking decisions that it should have informed. From this we learn that conscious steps must be taken to promote urban spatial planning throughout the whole of a process that is programming investments and to give spatial planning conclusions a continuously high profile.

Second Workshop

The second workshop is more than an examination of what the trainees have done with the knowledge and skills provided, and it is more than a way for trainers to learn of weaknesses and strengths of the training process and the materials used. It is an opportunity for discussions among those taking part to share their judgements and experiences, which may happen all too rarely. Moreover, it has proved to be an opportunity for them to inform their own organisations of the nature and magnitude of urban infrastructure needs, if higher level officers of these organisations are present to witness the conclusions reached. This has launched initiatives to establish annual meetings to pool proposals for infrastructure from a physical planning perspective. It has also provoked the outlining of plans for subsequent training that would reach others with key roles the play in the process of programming infrastructure investments. Finally, this second workshop has provided to the organisations represented by both trainees and guests a platform for frank and open exchanges of urban infrastructure investment policy and the means for implementing it.

Pilot workshops in Uganda and Ghana have shown these consequences of a training programme – even one involving small numbers – can arise with such force and enthusiasm that they could have greater impact than the transfer of skills and knowledge delivered by the training.

When leading this second workshop, urge that the given terms of reference be followed. All the cases worked upon should be presented. This is not just to give everyone's efforts due consideration, but also to bring out the scope and magnitude of the facilities required, the variations from place to place, and the reasons for them. There is much all can learn from the differences that each is able to see or pick up. When there are only a small number of cases to be covered, they can each be given substantial time – two to three hours has actually been taken in some instances. This permits a focus on details and a depth of analysis that can be very helpful to all, while allowing a full discussion of the general issues that arise. Satisfactory second workshops of two days as well as one day have been conducted.

Before concluding the entire training exercise, engage the trainees in a discussion of further actions that would make use of the training and/or extend it. The aim is for them to generate proposals and to be motivated to take such proposals to appropriate organisations for their implementation. The training is more likely to be used if senior staff of the trainees' organisations are at this last workshop to witness the presentations. Then a discussion on applying the methods and knowledge can be held between the trainees and these representatives. Recommend that this include a discussion of how the training can be extended to others within the organisations represented and to other organisations that are key stakeholders or actors in the process.

**Materials to be Given to Trainees:
Notes on Method and Illustrative Maps**

(Illustrative programme for a first workshop of two days)

Spatial Planning to Guide Urban Infrastructure Investments: First Workshop

(place and date)

(names of institution organising the training and of any collaborating institution)

PROGRAMME

(date)	8.00	Registration
	9.00	Opening of the workshop
		c Introduction and welcome address
		c Remarks by the facilitator
		c Address by an official of the organising institution
		c Break with refreshments
	10.15	Session 1: appreciating the benefits of spatial planning advice on infrastructure investments
	1.00	Lunch
	2.00	Session 2: picturing the future of a town
	3.45	Break with refreshments
	4.00	Continuation of Session 2
	5.00	Introduction to Session 3: profiling and picturing the futures of some local urban areas
	5.30	End of the first day of the workshop
	6.00	Workshop dinner for all participants
(date)	9.00	Introduction to the second day of the workshop
	9.15	Session 3: profiling and picturing the futures of some local towns/cities – a review exercise
	10.30	Break for refreshments
	11.00	Session 4: estimating additional infrastructure requirements from a spatial planning perspective
	1.00	Lunch
	2.00	Session 5: guiding urban infrastructure investment with spatial planning
	3.45	Break with refreshments
	4.00	Preparation for the Second Workshop
	4.30	Close of the First Workshop

(Illustrative programme for the second workshop)

Spatial Planning to Guide Urban Infrastructure Investments: Second Workshop

(place and date)

(names of institution organising the training and of any collaborating institution)

PROGRAMME

(date)	9.00	Brief review of the terms of reference for individual work and organisation of the order of presentations
	9.15	Presentation and discussions of conclusions regarding the first town/city (as decided by the number of towns)
		Presentation and discussions of conclusions regarding the second town/city (and so on for all the towns/cities)
(90 minutes before the end)		Discussion of possibilities for future actions arising from the training
(30 minutes before the end)		Presentation of certificates attesting to participation in the training

Introduction to the Workshops

(date of commencement)

(name of institution organising the training and of any collaborating institution)

Workshop Convenors:
(names of the trainers and of their institution)

Spatial planning (also known as physical planning or planning of land development) can play an important role with respect to the planning of investments in urban infrastructure. This role has almost been forgotten in many places. Instead, physical planning is most often performed only to provide a basis for managing land, especially for regulating land use. Sometimes, it is also the basis for creating policies for the physical development of a town or city.

Decentralisation of government to local levels has occurred, in many countries, at the same time as programmes to improve the provision of services in urban areas. This has raised awareness of the importance of better and more service facilities, especially to reduce poverty and to improve local economic growth.

In at least one of the large nation-wide attempts to improve urban infrastructure provision – that of Indonesia – suitable spatial planning was seen as essential. It was expected that every year each local government would review and revise intended expenditures on urban infrastructure over the next 5 years, taking advice from its own plan for the physical growth and change of the city or town. However, it was quickly realised that in general the existing physical planning policies were out of date and usually did not provide enough of the information needed. Consequently, ways of preparing spatial plans were devised for revising physical planning policies – or creating altogether new ones – that would respond to the needs of infrastructure investment planning. These methods were different from those that were usually carried out. The idea of using unusual urban spatial planning methods for these purposes has spread to several other countries.

The most unconventional features of these new methods is that they are faster and simpler than past practices – faster, because the decisions about infrastructure projects could not wait for up-to-date physical planning advice, especially if these decisions were being made every year at budget preparation time; simpler, because local governments commonly lacked enough highly trained and experienced staff to carry out the conventional physical planning procedures on a regular basis. These workshops bring you key lessons that have been learned from the experiences of trying these methods in three countries: Indonesia, Nepal, and India.

The British Government's Department for International Development provided the funds to obtain the lessons of experience through research in these countries. The Development Planning Unit of University College London conducted the investigations and produced from an analysis of them a set of recommended procedures for spatial planning that can advise decisions on urban infrastructure investments. Those recommendations are the basis for the training to be presented in this programme of workshops.

There is a programme for the next two days presented on another sheet of paper. It outlines how key parts of the training manual text will be presented and demonstrated so that you can become familiar with the contents and be able to use them. If

you return to your offices with these sections and the understanding of them that this first workshop provides, and if you then attempt to apply this knowledge to a town for which you are responsible or otherwise know, there will be a reason for meeting again after several weeks. During this second workshop, we can together review any difficulties you have experienced when trying to understand and use the contents of the training manual. This will permit you to improve your abilities to apply these methods.

Using Spatial Planning to Guide Urban Infrastructure Investment

Spatial planning can give advice about the kind, size, location and timing of an infrastructure project.

- kind: this refers to the general nature of the project, for instance that it is to build a school, and more specific features of the project, for instance, that it is to be a primary school. Spatial planning can do this by identifying where elements of infrastructure in a town or city are already located (thus verifying counts of available facilities) and how they spatially relate to possible users (thus identifying weaknesses in physical coverage of the service they provide, and the additional facilities needed).
- size: for example, one school to serve about 200 pupils. Those who might be able to use the school can be identified from knowledge of how many people live in its service area nearby.
- location: the place where it will be located. This can be general, as in a particular area of a town or city, or it could be specific, as on a particular piece of land or site. Spatial planning can show where there is land of suitable size and qualities for the construction of a school and where it can be reached safely and conveniently by those who might use it.
- timing; when the project will be carried out. In investment programming, this is usually a matter of which future year. Spatial planning can indicate when the use for which the project is need is likely to exist (in the above example, when the households sending children to school are likely to occupy land nearby with their homes) and which other capital investments must be carried out before the project (such as land that must be bought beforehand on which to place the school) or there are not added expenditures (such as when it is necessary to tear up a new road surface in order to put in water pipes that should have been installed first).

Advice from spatial planning is not the only kind that it is important to take into consideration when projects are selected and arranged in an investment programme. Yet, if spatial planning advice is not there, the opportunities it provides for more efficiency and effectiveness in the use of invested money are lost, including those opportunities for putting in place networks and facilities needed for social and economic development.

Note that the use of spatial planning to manage land is not being considered here. If spatial planning is to be the basis for land use regulation or guiding the sale or lease of government land, for example, more complex and slower methods of performing spatial planning may be appropriate. Even so, rapid and simple planning can provide a start on which to build with more elaborate methods. Indeed, if performed regularly every year in order to advise capital programming and annual budgeting,

the methods presented here can over time add greater complexity to spatial planning.

An Illustrative Problem to Raise Awareness of the Issue

A small problem can be used to raise awareness of some of these advantages of spatial planning advice. This is a problem that can be worked on individually, although the benefits of it are enhanced if it discussed among several people who are addressing it at the same time.

Although the features of this problem are imaginary, they do reflect the reality of situations faced during the programming of urban infrastructure. These features are given in Table 1.

The challenge of the problem is to place these individual projects into an order of sequence – and thus assign each of them to a particular one of the next five years – that minimises the total cost in money (of both investment and the cost of idle investment) and maximises the 5-year sum of people served each year, while not exceeding a total annual investment of 3m, which is the amount of public funds expected to be available each year. In this problem, any of the funds available in one year and not spent can be carried over into the following year.

The proposed projects listed in Table 1 below are located on Map 1: Locations of Illustrative Infrastructure Project Proposals. There is a column of information describing the cost of an idle investment. This is taken to be the cost of an investment during the years when it is not providing a benefit, and it is roughly measured here as the interest that would be paid during this idle period if the amount had been borrowed. This is an important cost in determining the efficiency of an investment, and it is very much influenced by the timing of the investment. There are other significant dimensions of monetary costs that are not considered in this problem in order that it can remain relatively simple. Another column contains information on the total of people served over the five-year period. This is a rough indicator of the support from voters that the local government can expect because of its investment decisions. An investment that is late will serve users for fewer years than it could, and they will be dissatisfied. The rules of the problem call for this indicator to be maximised at the same time that efficiency in the use of the available funds is sought.

Placing these nine projects into an order of sequence over 5 years that respects funding limitations will produce an investment plan statement, one often called a capital programme. This is very different from a spatial plan statement – often in the form of a map – such as that which can be produced by the methods outlined in the training material that will be provided. Yet the two are both plans and can be complementary.

Table 1. Illustrative Infrastructure Projects for an Imaginary Town

SPATIAL PLANNING FOR URBAN INFRASTRUCTURE INVESTMENT

Project	Time of need	Reason for need	Amount of public investment	Approximate five-year total of the costs of idle investment	Five-year total of people served during each year
1. land for a new industrial area	as soon as possible	to attract new private sector investment	1,000,000, increasing by 50% a year	200,000 for every year that it is not used	not applicable
2. additional water treatment and storage capacity	2002	to provide potable water for the population additions expected during the ten years following 2002, that are likely to locate in areas at a higher elevation than the existing facility. (Although designed for 10 years ahead, investment planning is only for 5 years, in this case.)	5,000,000	according to when it is built: 900,000 if 2001 800,000 if 2002 700,000 if 2003 600,000 if 2004 500,000 if 2005	according to when it is built: 45,000 if 2001 42,000 if 2002 36,000 if 2003 27,000 if 2004 15,000 if 2005
3. primary school	1/2 as soon as possible; 1/2 in 2003	to service an existing housing area and an adjoining area beginning to develop	3,000,000 if provided as two schools of 1,500,000 each on two separate sites. 2,000,000 if a single school serving both areas	according to when schools are built. If 2nd of 2 schools: 20,000 if 2003 10,000 if 2004. If one school only: 59,000 if 2001 39,000 if 2002 19,000 if 2003 3,000 if 2004 0 if 2005	according to when it is built: 21,000 if 2001 18,000 if 2002 15,000 if 2003 11,000 if 2004 6,000 if 2005
4. extension of water mains into an existing housing area	as soon as possible	to provide existing residents who are currently without piped water	500,000	not applicable	1,000 for each year it exists
5. extension water mains into areas where new housing is likely to locate during the next 5 years	as soon as possible	to provide expected new residents with piped water	500,000	according to when it is built: 200,000 if 2001 120,000 if 2002 60,000 if 2003 20,000 if 2004 0 if 2005	according to when it is built: 15,000 if 2001 14,000 if 2002 12,000 if 2003 9,000 if 2004 5,000 if 2005
6. extend main roads into the same areas of new residents as 5	as soon as possible	to provide road access into an expected extension of the town	2,000,000	800,000 if 2001 480,000 if 2002 240,000 if 2003 80,000 if 2004 0 if 2005	according to when it is built: 15,000 if 2001 14,000 if 2002 12,000 if 2003 9,000 if 2004 5,000 if 2005
7. redevelopment of the existing public market	as soon as possible	to improve the efficiency and cleanliness of the existing market and to increase the income to the local government	1,000,000	not applicable	not applicable
8. site(s) for new school or schools of project 3	as soon as possible for one school; 2002 for the 2nd of two schools	to provide a site(s) for the new primary school or schools	200,000 for a site among existing housing. For a site in the future housing area: 100,000 if for a 2nd school; 200,000 if the only school (but prices increase by 50% each year from 2001)	depends on the year it is purchased and the choice of one or two schools	not applicable see 3. above
9. bridge and road to the industrial area proposed in 1	as soon as possible	to provide access to the proposed industrial area	1,000,000	200,000 for each year that it is not used	not applicable



Map 1: Locations of Illustrative Infrastructure Project Proposals

1

Picturing the Future of an Urban Area, Part 1: What is Happening?

- Purpose** To identify the trends that have shaped the urban area as it is today.
- Questions**
1. How has the population been growing?
 2. How has the use of land been changing?
 3. How has the economy been changing?
 4. How has the distribution of wealth been changing?
- Method**
1. To estimate population growth, first assemble any existing data about population of the urban area. This can be found in appropriate government offices, but there may be other sources. Development projects and university studies sometimes obtain useful population information. Obtain information for a series of years so that you might see the speed of change. There is little reason to cover more than 10 years. Where there are very different figures for roughly the same point in time, use both thus creating a range of possibilities. Form a judgement about the reliability or accuracy of each set of data that you use.

Then, use the available population figures to calculate the approximate rate per year at which the population has been changing between the dates of the figures.

Finally, discuss your conclusion with others in the urban area who would have a sense of its growth and change, such as the electricity and water providers and the operators of large businesses. If they do not agree with your estimate, consider their arguments and make any adjustments to your estimate that you think are justified.
 2. Understanding changes in the use of land should be done in two parts. The first addresses the built-up part of the urban area; the second deals with the conversion of land to urban uses.

To picture significant changes to the built-up areas, first remind yourself of the current land uses of the town or city and their locations by travelling around the streets and making general observations. Use this and your memories to tentatively identify the major places where buildings have changed (e.g. a single storied shop is replaced by an office of many floors) or the use of buildings have been changing (e.g. a building has been converted to a use that is different from before, such as from residential to a shop or from single family residences to a building housing many families).

On a map, mark these areas and note the changes taking place. Then discuss your tentative identifications with the local urban planners in government, with some of the business people of the town (a chamber of commerce is useful for this purpose), with some of the agents who take part in the buying and selling of buildings, and with some businesses that construct new houses or other buildings.

To picture the conversion of land to urban use, ask those offices that perform

urban planning to show on their maps where there have been recent changes to the boundaries of the built up areas. At the same time, ask a sample of agents involved in the buying and selling of land to indicate where on the edge of the town/city there have recently been transactions. Make field visits to check the information you are given with visual observations and by asking residents or local leaders at those places you visit about the locations of land on which there has recently been construction and of land whose ownership recently changed.

3. To identify important changes in the economy of the town or city, obtain the opinions of local business people through their associations (such as a chamber of commerce) and/or through interviews with business leaders. Local and regional government officers dealing with economic development should also be consulted. With them, seek to reach conclusions about:

- a rough estimate of the speed (the rate) at which the economy of the town/city is currently growing or shrinking. A recent increase in the speed could cause an increase in in-migration and a decrease in out-migration, causing the total population of the town/city to grow at a faster rate, and vice-versa. If there is not data on the value of production, changes in the amount of recorded employment can be used as a more approximate indicator of changes in the economy of the city/town;
- the identity of particular kinds of manufacturing or service business that are undergoing substantial growth or decline, causing changes in the incomes of the residents and changing the demand for buildings and land in those places where the building of these factories and businesses tend to be located;
- significant changes taking place in economic activities around the city/town (e.g. changes in farming) or nearby (e.g. substantial growth of the shops and offices in the centre of a neighbouring town or city) that – according to the relationships between them (does the town/city have substantial business servicing a surrounding agricultural area?) – might bring growth or decline among certain parts of the town's/city's economy, or even add a new part to the economy.
- changes in national and global economic activities that might have effects on the economy of the town/city. It is not at all easy to see the signs of changes that might bring new investment from outside, but it is possible to note indications that there will be a decline in certain economic activities because of changes in world markets.

4. To picture current changes to the overall local wealth:

- consider the effects of current changes in the local economy identified in 3 above;
- consult with local business people, especially their associations and the banks;
- use any basic statistics available government offices and from banks;

in order to obtain, with those consulted, a judgement of whether the local wealth (remembering to adjust any statistics for inflation, if they have not already been adjusted) is growing as fast as the population and therefore whether average wealth is increasing or decreasing.

To then picture trends in the growth and distribution of wealth, use any basic and reliable statistics available from government sources. Nevertheless, consult with those government offices and NGOs concerned with social services in order to obtain judgements, in general terms, about the current situation and the direction of change. One important concern here is whether or not the overall wealth available to pay for services is increasing as fast as the need for services, indicating that costs per user of service facilities constructed could be higher or should be lower to be affordable. Another critical matter is change in the proportion of the population that are poor. This can help when estimating the needs of those to be served by public investments, as well as their capacities for paying the costs per user of the qualities and quantities of facilities.

Given that those who are poor are many different kinds of people – different in gender, age, ethnicity, income, vulnerability, and so on – it will be important to uncover these differences as time and other resources permit, so that they can be reflected in the physical dimensions of investment decisions, such as size and location.

2

Picturing the Future of an Urban Area, Part 2: What Do Influential Organisations Want the Urban Area to Become?

Purpose	To identify the intentions of policies of government and of other influential agencies that aim to shape the urban area.
Questions	<ol style="list-style-type: none"> 1. What are the significant existing physical development policies? 2. What are the significant existing economic development policies? 3. What are the significant social development policies, especially those for alleviating poverty?
Method	<p>1. Physical development policies are usually found in a town or city plan. It is characteristic of urban planning that many of the policies found in plan statements are out of date or are otherwise unrealistic. Nevertheless, it is not detailed plans that you are after, but rather those conceptions of the form of the urban area and its dominant physical characteristics that you should take from a town or city plan.</p> <p style="padding-left: 20px;">In particular, extract what the plan document says about:</p> <ul style="list-style-type: none"> ● where expansion of the built-up areas should take place and the timing of this expansion (i.e. the phases of expansion); ● the economic and social roles that the urban area should perform in the development of its regions and the country; ● the major changes and additions to the physical structure of the city/town that should be made so that it can perform these roles; ● any other major changes in the uses of land in the built-up areas that should be made; ● any other major changes to the road system. <p>If an urban physical plan does not exist, or if these basic policy contents are too unrealistic or out of date, you can bring about the formulation of fundamental policies through an exercise – often called “visioning” – to develop an image of the future city or town that is wanted. This usually involves government, business, community, and others who live or work in the town taking part in an open discussion of what the town should become and what policies government should adopt to bring this about. This discussion sometimes takes the form of a public forum, accessible to all, that is concentrated in one or two days.</p> <p>It is assumed here that government policies best represent the negotiated interests or intentions of those holding a stake in the city or town. This is an assumption that may not be true if the existing physical development plan is the result of a process that excluded any of the key stakeholders in the future of the town/city. The failure to involve key stakeholders may be reason to treat existing physical develop-</p>

ment policies as not likely to be implemented because of the resistance or lack of support they will encounter.

2. Economic development policies do not often exist for a particular city or town. Those that do can be obtained from the offices of local, regional or central government that are concerned with economic development. Policies of influential NGOs and foreign donor agencies that are not available from these sources will have to be obtained from the local representatives of such organisations themselves. It is important to learn from these policies:

- the economic role that the urban area is expected to perform in the development of its region and the country;
- the major changes and additions to the physical structure of the city/town that are to be made so that it can perform these roles;
- the major physical changes and additions that are to be made by the projects of government, NGOs, foreign donors and other development agencies;
- any other major changes in the uses of land in the built-up areas that are to be made;
- any other major changes to the road system.

These may be different from the policies contained in physical development plans because they are formulated in different offices of government or by other agencies, and/or at later times.

3. Overall social development policies for a particular town/city are very unlikely to exist. However, there are likely to be some policies for poverty alleviation. These can be learned from the appropriate local government offices. Policies and projects of influential NGOs and foreign donor agencies that are not available from these sources will have to be obtained from the local representatives of such organisations themselves. It is important to learn from them the major changes and additions to the physical structure of the city/town that are needed to implement these policies and projects.

3

Picturing the Future of an Urban Area, Part 3: What are the Opportunities for and Constraints to Physical Change?

Purpose	To identify the physical conditions that determine the relative suitability of land for urban use.
Questions	<ol style="list-style-type: none"> 1. Where is there land that is too steep to build upon or prone to landslides? 2. Where are the areas prone to flooding? 3. Where are the areas where ground conditions are not good for urban construction? 4. Where are there forest areas? 5. Where are the rights of way for major roads not yet built and for high-tension electricity lines? 6. Where are the built-up areas? 7. Where is the good quality agricultural land? 8. Where are the areas that cannot be served by the easy extension of existing systems? 9. Considering these physical factors, what are the constraints on, and opportunities for, using areas of land in and around the town for urban purposes?
Method	<p>Before trying to answer the last question, carry out a sieve map analysis of the town and its surrounding lands using the answers to the other questions.</p> <p>To perform a sieve map analysis, mark on transparent paper the areas identified by answering each of the questions except the last. Mark a separate sheet for each question. Mark these areas by placing each sheet separately over a base map and by using landmarks on the base map to locate information you have obtained in order to answer the question. Mark the areas using colours, patterns of hatching, or boundary edgings. When all the information has been marked on these various sheets, they are placed in combinations on top of the base map. Areas can then be seen that combine a) all or b) some or c) none of the locations having the physical features that have been mapped on the separate sheets.</p> <ol style="list-style-type: none"> 1. To map the areas too steep to build upon, obtain information describing the lines of equal elevation of the land surface above sea level, often called contour lines. These can be obtained from the government office responsible for mapping and other offices of government that use lines of elevation, such as those that do land planning, land registration, and engineering design for roads or water distribution systems. Often the base map you have will show lines of elevation. <p>Using the scale of the base map to measure the distance between lines of dif-</p>

ferent elevations, shade on the overlay map those areas where the rate of increase in elevation (i.e. the slope) is too great for easy building construction. Ask construction engineers, urban physical planners, or building construction inspectors what is the maximum acceptable slope in your area.

To mark areas prone to landslides, consult land planners or building engineers that work locally. Check the information you are given with long term residents near to the areas involved.

2. To map areas where flooding might occur, ask local officials such as urban planning officers and those who register land. Local community leaders and politicians are often enough informed about their communities to remember the limits of floods that have occurred.

3. To map areas where ground conditions are not good for urban construction, get information from planners, engineers, land surveyors or agricultural extension workers about the presence of rock on the surface and soils that greatly shrink and expand (such as black cotton in East Africa). Very elastic soils are not suitable for building upon because they move the foundations of buildings. Surface rock prevents the use of pit latrines and septic tanks and makes very difficult the burying of water lines and any sewer pipes.

4. To map the areas of forests, use any information that may be on your base map that shows forest areas. However, you must always check that this information is correct by making a field visit to observe roughly where the forest boundaries now stand. A recent aerial photograph can be helpful to draw boundaries on an overlay, but even the information on it should be checked by field visits.

5. To map rights of way for major roads not yet built and for high-tension electricity lines, obtain information from government engineers and from the local office of land administration. Often these rights of way have already been mapped by those engaged in urban planning.

6. To map the areas that have been built upon for urban use, obtain maps from those offices that perform urban planning. Ask them to update these maps with their estimates of recent changes to the boundaries of the built up areas. You will be doing this anyway, in order to answer part of Question 2 of Task 1. Make field visits to check that the information given you is roughly correct. If there is no up to date mapping of the built up area, visit the various limits of the town with a copy of your base map and roughly sketch out the edge of the built up area on a transparent paper placed over it. Any recent aerial photography can help. Discuss the estimates you have drawn on your overlay with several of those who are locally engaged in selling, buying, registering or planning land.

7. To map the land that is being preserved for agriculture because it is good for this purpose, obtain information from the government agencies concerned about agriculture. People engaged in rural or urban land planning may have this information. Areas of land will be designated as having different levels of quality. Indicate on your overlay all those lands that are of good quality for agricultural purposes. This and the concern of Question 4 for forest areas are examples of policies that might be identified

in Task 2 that are likely to shape the physical character of the future town/city.

8. This question is to be addressed after all of the others have been used to identify the best opportunities for expansion (the outcome of sieve mapping with the given Maps 2 to 6 is shown on Map 7: Areas of Best Opportunities for Urban Expansion. Answers to Question 8 are to be used to indicate those places where the possibility of extending service facilities should be examined more closely.

To map the areas that cannot be served by the easy extension of existing systems, use only the information on the locations of existing water distribution and road systems that has to be produced for Task 5. This will be good enough to represent the other service networks, given that this exercise, in any event, acts to indicate where substantial judgement is needed about the effects of a condition. Mark out those built-up areas that are currently served by each of these two services. Then draw a boundary roughly 500 m from the edges of the built-up areas that are served. This is an indication of the areas most easy to service with extensions of the existing system.

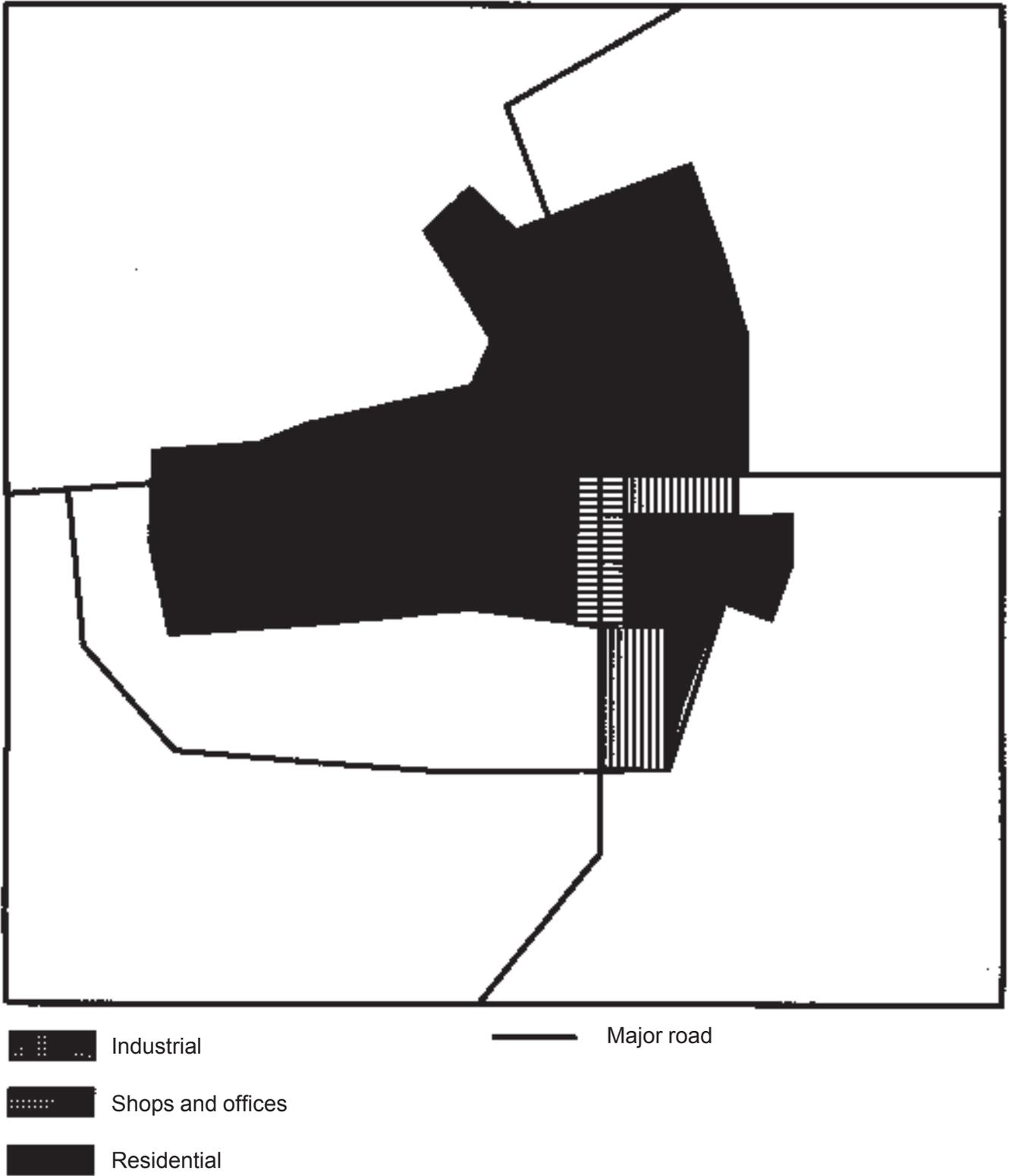
In addition, map those areas that could not be served by easy extension of the existing water system because they are higher in elevation than the level of the water storage tanks and reservoirs that feed the distribution systems. There will be no water pressure to serve these areas.

Also map those areas that could not be easily served by extension of the existing road system because they are across rivers and other major drainage channels from the built up part of the town or city. Bridges will have to be built or widened to serve these areas.

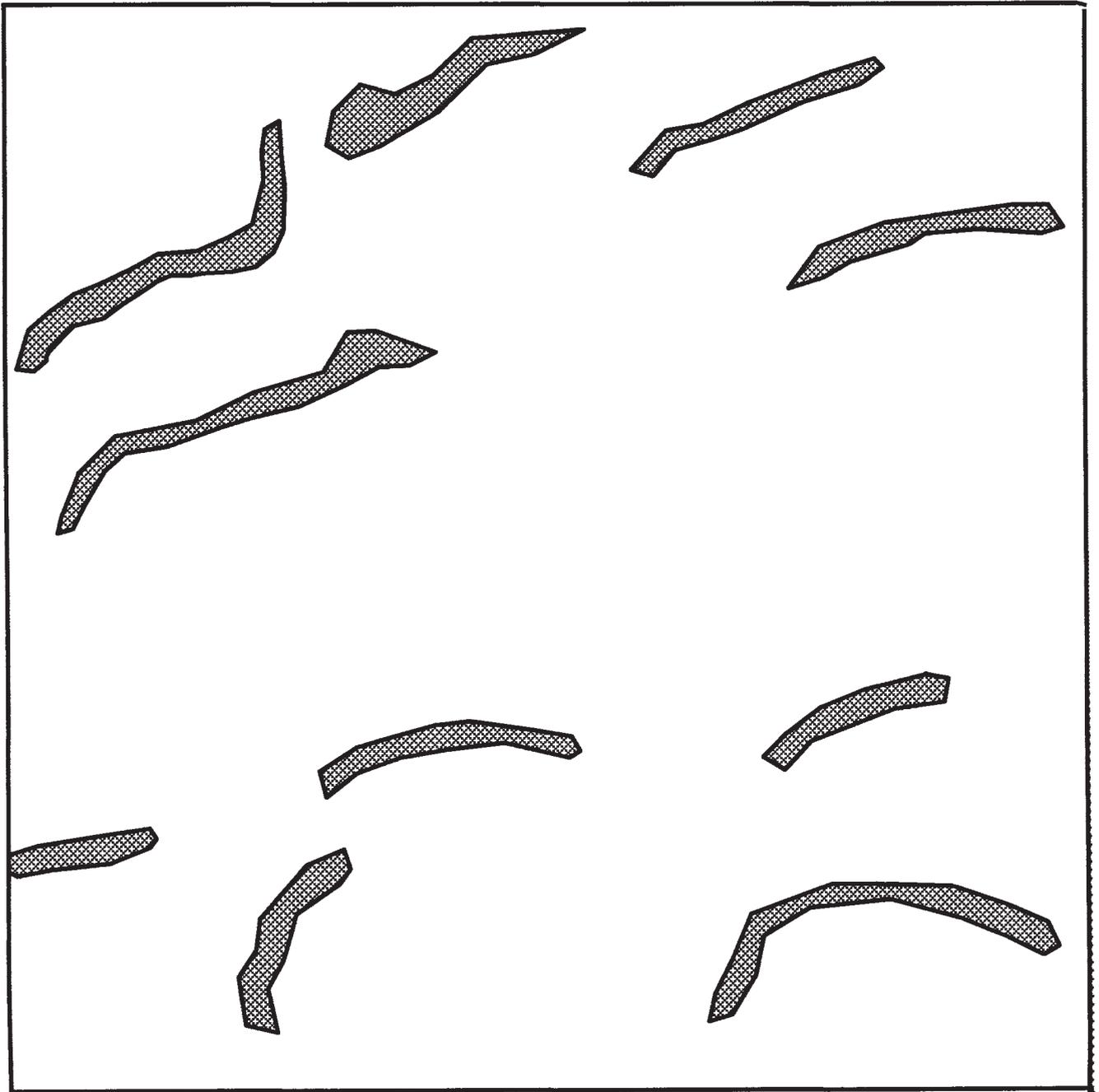
If there is a sewerage system, map those areas to which it cannot easily be extended because they cannot be drained into it. These are those lands that are lower in elevation than the nearest point of connection to the sewerage system.

After overlaying a map with this information on another showing the opportunities for expansion, note where there are indications that land is affected by this constraint and interpret from the details of the situation if there will be significantly greater costs if service networks are extended to these locations. For example, an area across a river may still be an opportunity for expansion when it is small and near a sizeable bridge, whereas one far from an existing bridge may call for construction of an additional bridge.

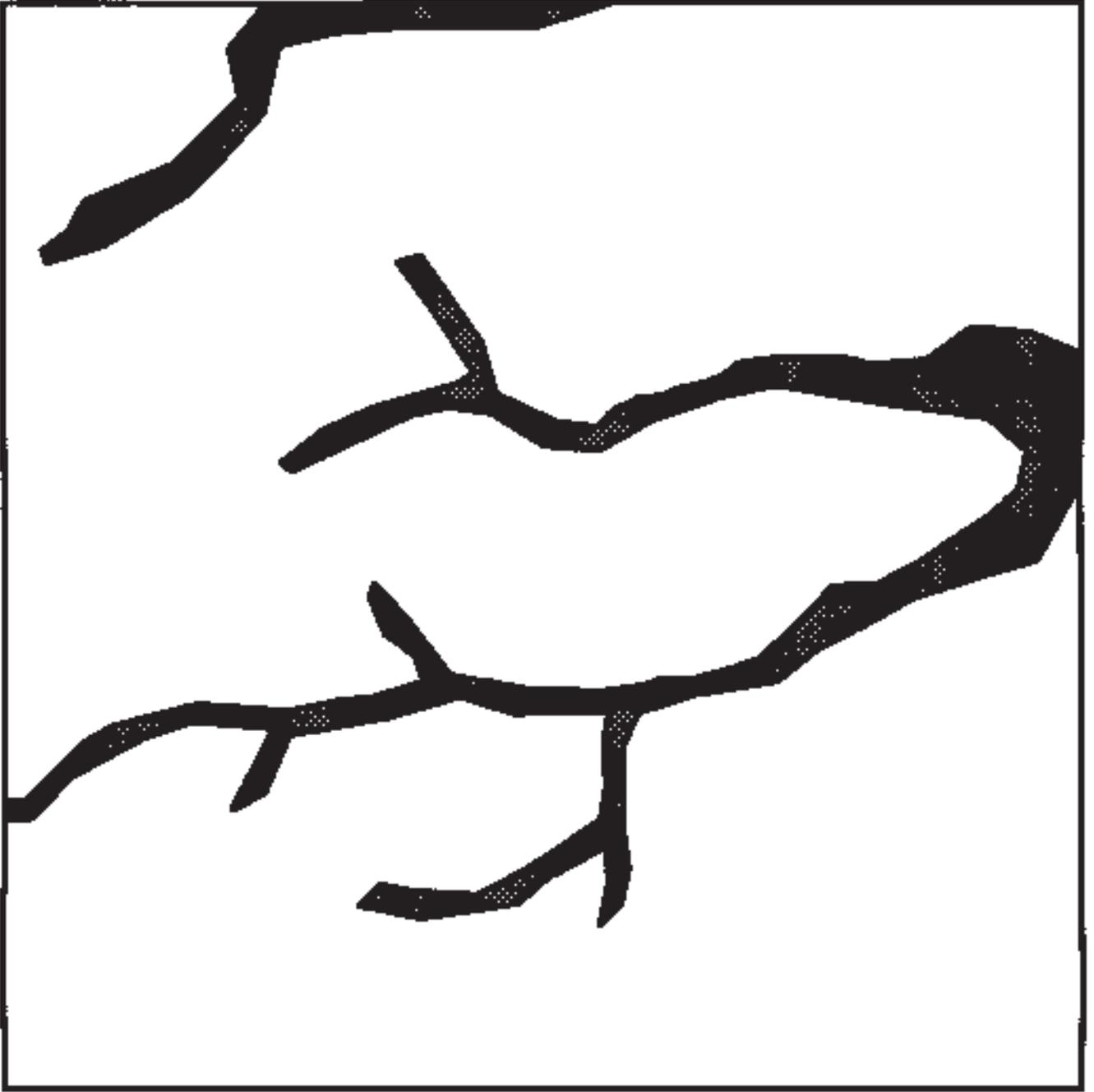
9. By carrying out the sieve map analysis, you can locate those areas where there are constraints on their use for urban purposes. By placing at a time one or two of the overlays (created as described above) on the base map, the sum of the areas marked upon all the overlays can be built up on a single transparent sheet that each time is placed over the others and upon which any marked areas are traced. The result is a map showing all those areas where there is a constraint upon the use of the land for urban purposes. At the same time, in its blank spaces where nothing is marked this map shows those areas where the best opportunities are for urban development to take place.



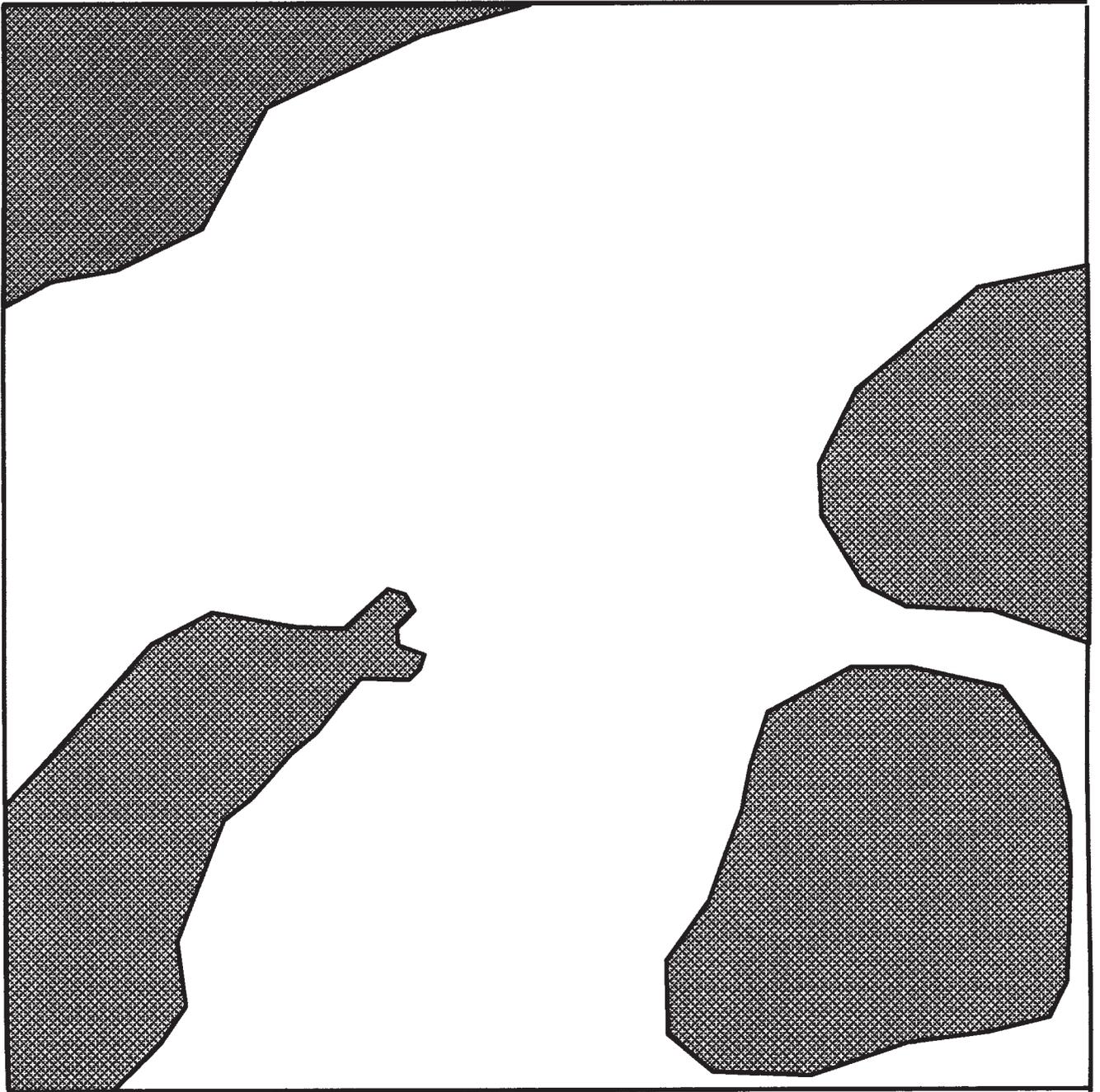
Map 2: Existing Land Uses



Map 3: Slopes over 15%



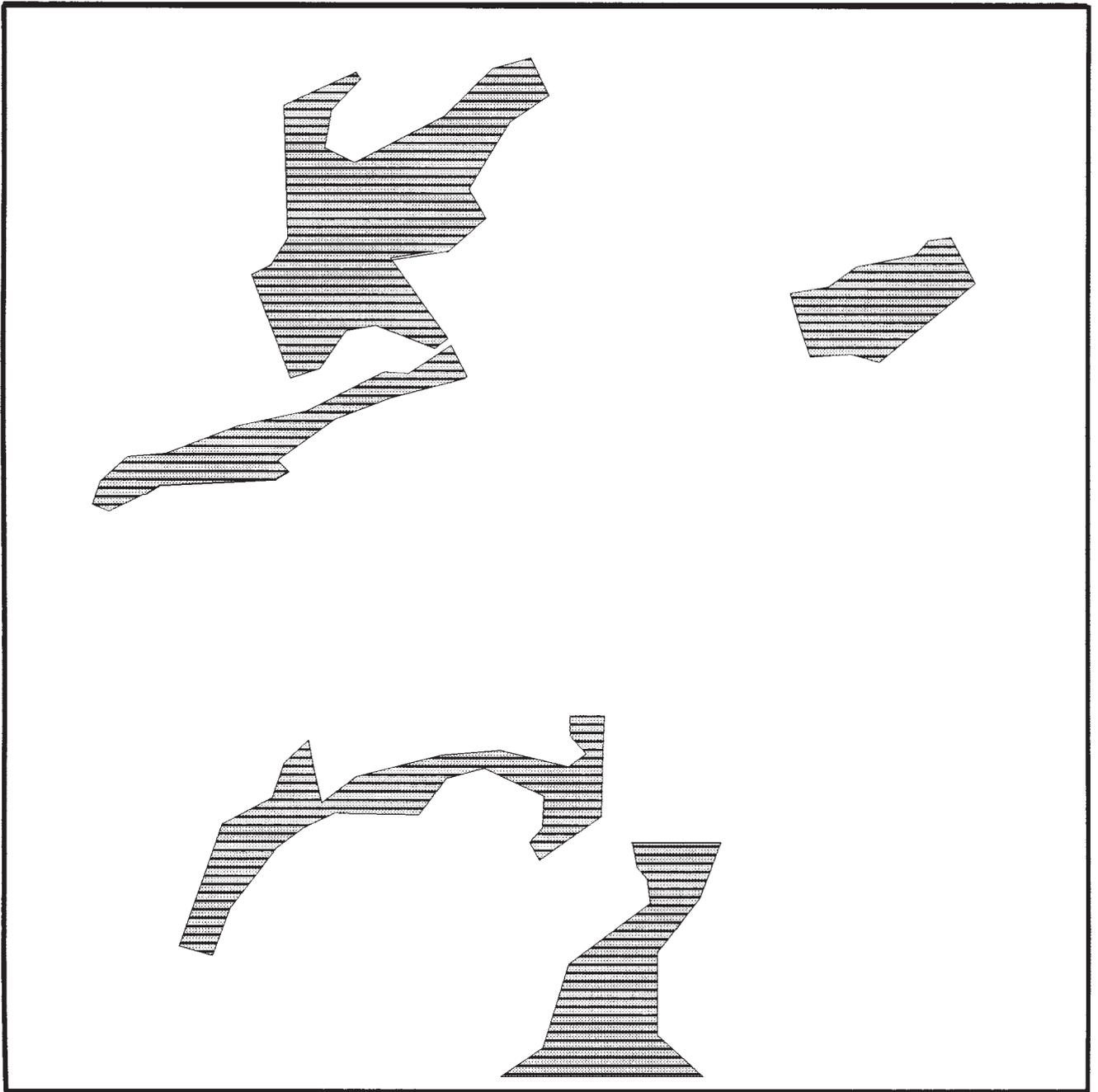
Map 4: Land Subject to Flooding



Map 5: Land with Foundation Problems for Roads and Buildings



Map 6: Good Agricultural Land



Map 7: Areas of Best Opportunities for Urban Expansion

4

Picturing the Future of an Urban Area, Part 4: What is Likely to Happen?

Purpose	To construct a picture of how the city or town is likely to change and grow that can be used to estimate infrastructure needs and locations.
Questions	<ol style="list-style-type: none"> 1. How are activities near to the town/city likely to change? 2. How is the economy of the town/city likely to change in the future? 3. How is the population likely to grow in the future? 4. How is the distribution of wealth likely to change and affect the extent of poverty? 5. In what ways are the built-up areas likely to change in the future? 6. How is this likely to change the numbers of people living in the built-up areas of the city/town? 7. How is this likely to change the spatial distribution of the poor in the built-up areas? 8. In which places and directions is physical expansion of the town/city likely to occur? 9. How many people are likely to be living in these new areas? 10. How much land area is likely to be involved in this expansion during the next 5 years? 11. For what purposes in general are the areas involved likely to be used? 12. Where in these areas are the poor likely to be living?
Method	<p>Now that you have identified trends, policies that might affect them, and the constraints and opportunities for physical change, it is time to use all of these to help you make guesses about the future that will answer the above questions. Remember that trends do not necessarily tell you what will happen next. You must use your judgement of what the future is likely to be.</p> <p>1. Considering the effects of any relevant policies of government or other organisations that are likely to be implemented, guess at changes that are likely to take place in the following nearby activities. These are ones that are likely to affect the economy and the use of land by the town/city; they are changes in:</p> <ul style="list-style-type: none"> ● the size and economic activities of the nearby cities and towns; ● the rural activities (farming and livestock rearing, mineral extraction, etc.) that take place on the lands surrounding the town.

2. Consider trends in the national economy identified in Task 1 in answer to Question 3 and likely changes in them. Estimate the effects of national and regional trends and changes on the town's/city's economic activities during the next 5 years. Estimate the effects on the economy of the future changes around and near to the town/city pictured in answer to Question 1 above.

Identify economic initiatives emerging in the town/city through discussions with local business people, their associations, and local banks. Estimate how these initiatives are likely to increase or counter the effects of national and regional changes.

Estimate the effects of any economic development policies identified in answer to Question 2 of Task 2.

From the resulting picture, estimate if there will be a significant change in the current growth rate of the local economy, up or down. Also note any particular major economic activities that are likely to grow or decline substantially.

3. Project the trend of the rate of population change estimated in Task 1 over the next 5 years. Nothing can be gained by trying to precise about this projection, for the figures on which it is based are always approximate and the future is never entirely consistent with the past. Adjust this rate, considering:

- likely changes to activities near to the town that may cause more or less people to migrate to the town, as described in answer to Question 1 of this Task;
- likely changes to the economy of the town that might cause more or less people to migrate to the town or to leave the town, as described in answer to Question 2 of this Task; and
- the extent to which past change has been the result of a sudden and substantial disruption in trends – such as by a drought or an armed political conflict – that will no longer have its effects.

Use the adjusted rate to calculate a likely change in population over the 5 years.

4. Considering the likely changes in the economy of the town/city and in the overall wealth of the town/city, the likely effects of social policies, estimate how the proportion of the population who are poor will change. Considering as well the origins of new residents in the future (those that migrate from outside, what skills and capital will they bring with them? Those that come from the natural increase of the existing urban population, what skills and capital will they have?), plus the likely effects of any poverty alleviation policies, estimate the proportion of the future addition to the population in five years that is likely to be poor.

5. Taking into consideration the following:

- any significant changes to the town's/city's economy that are likely to affect the built-up area;
- the locations where there are tendencies to change the existing land uses identified in answer to one part of Question 2 in Task 1.;
- government policies for physical development that are likely to be implemented as identified in answer to Question 1 of Task 2;

estimate where during the next 5 years any changes in the use of land are likely to take place in the built-up areas and what those changes are likely to be.

6. Taking into consideration the following:

- any significant changes in the population of the town/city that is likely to happen as identified in answer to Question 3 of this Task;
- major changes in the use of land are likely to take place in the built-up areas and what those changes are likely to be, as identified in answer to Question 5 of this Task;

estimate where during the next 5 years any significant increases or decreases in the existing populations of the built-up areas are likely to take place.

7. Considering:

- any likely changes to the income distribution during the next 5 years estimated in answer to Question 4 of this Task;
- the estimates of changes in the use of land in the built-up area made in answer to Question 5 of this Task;
- any estimates of significant increases or decreases to the existing populations of the built-up areas given in answer to Question 6 of this Task;

estimate any substantial changes to where poor people live that are likely to occur in the built-up part of the town/city during the next 5 years.

8. Considering:

- the opportunities and constraints to new construction around the town/city identified in answer to Question 9 of Task 3;
- the current trends in the expansion of the town/city identified in answer to part of Question 2 of Task 1;
- the likely changes in activities near to the town/city, estimated in answer to Question 1 of this Task;
- the likely implementation of government physical development policies identified in answer to Question 1 of Task 2;

estimate the places and the directions in which the expansion of the built-up area of the town/city is likely to take place.

9. Considering:

- the additions to the population during the next 5 years that were estimated in answer to Question 3 of this Task;
- the portion of them that is estimated will live in the built-up area, in answer to Question 6 of this Task;

calculate as the remaining portion of the population increase the number of people who are likely to take up residence in extensions to town/city during the next 5 years.

10. Considering the past rate of the use of land for urban purposes in the town/city, and making changes to that rate justified by:

- recent trends in the use of land identified to answer Question 2 of Task 1;
- the likelihood that any government policies on intensity of land use identified in answer to Question 1 of Task 2 will be implemented;
- expectations for changes in the proportion of poor in the population of the town/city estimated in answer to Question 4 of this Task;

estimate the amount of land that is likely to be needed for expansion during the next 5 years by the additional population and activities (identified in answer to Questions 3 and 2 of this Task) that you have not estimated will be accommodated by changes to the built-up area (in answer to Questions 5 and 6 of this Task).

The past rate of the use of land can be roughly calculated by dividing the total size of the built-up area by the population residing in it.

11. Considering:

- the proportion of poor among the population that might take up residence in the extensions of the town/city during the next 5 years using estimates made in answer to Question 7 of this Task;
- any policies likely to be implemented for changing the rates at which the poor use land for housing and economic activities consume land that were identified in answer to Question 1 of Task 2;
- the rates at which the poor currently use land for housing;
- any major new economic activities identified in answer to Question 2 of this Task that are likely to locate during the next 5 years in areas of expansion;
- the rates at which economic activities similar to any new ones expected currently consume land in the built-up areas;

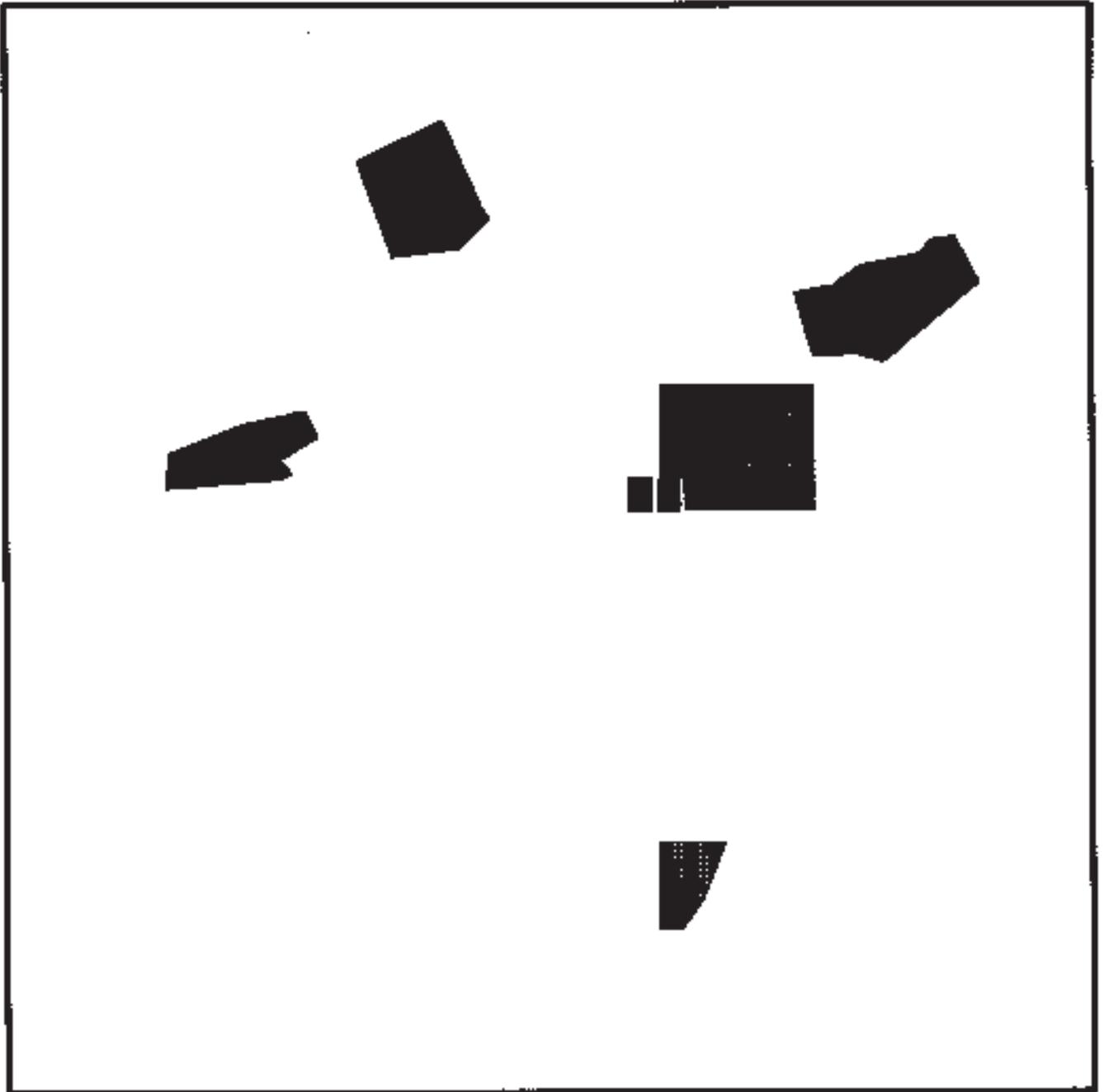
estimate the proportions into which the land needed for expansion could be divided among housing the poor and other major categories of use, such as manufacturing industry or business.

12. Considering:

- the proportion of this population that is likely to be poor, as estimated when arriving at an answer to Question 7 of this Task;
- the amount of land that these poor are likely to require for their housing, as estimated in answer to Question 11 of this Task;
- the directions and places where physical expansion is likely to take place, as estimated in answer to Question 8 of this Task;

estimate the locations where the poor are likely to be living in the extensions of the town/city that are likely to occur during the next 5 years.

Of course, there can be several alternative possibilities in answer to this question. These alternatives should be kept in mind during the processes of identifying infrastructure projects and of programming investment in them.



-  Change from residential to shops and offices
-  Conversion of houses from single family to multi-family
-  Likely areas of expansion for residential use
-  Likely areas of expansion for industrial use

Map 8: Physical Change Likely to Happen in 5 Years

Review Exercise:

Building a Profile of your Town and Picturing Its Future

Purpose To identify changes in participants' own localities.

Method Working in groups, identify a town that you are familiar with. Use your own knowledge of the town and its surroundings to answer the following questions.

1. Growth trends during the past five years

Has the town's population been growing at a slow, medium, or fast rate?

Have the economy of the district and the town been growing? How fast?

Has the town's area expanded in any particular directions? If possible, draw a rough sketch map to indicate the main features of the town and the directions of growth.

2. Existing commitments of government and other organisations

Identify any on-going or future commitments to plans, programmes or projects of government, NGOs and donor agencies that are likely to help shape the future growth of the town. In particular, name any interventions in the physical, social development and economic development (including agriculture, manufacturing, trade) sectors.

3. Growth over the next five years

Will past trends be sustained or change? Briefly discuss this in terms of:

3.1. Population in the town and in its surrounding area

3.2. Economy

Private and public investment in the town and in its surrounding area

Employment in the town and in its surrounding area

3.3 Society

Distribution of wealth

Proportion of poor in the town's population

3.4 Land

Using your sketch map, identify any areas not suitable for growth due to flooding, forests, good agricultural land (and any other reason not covered by these).

On the sketch map, identify places and directions where physical expansion is likely to occur.

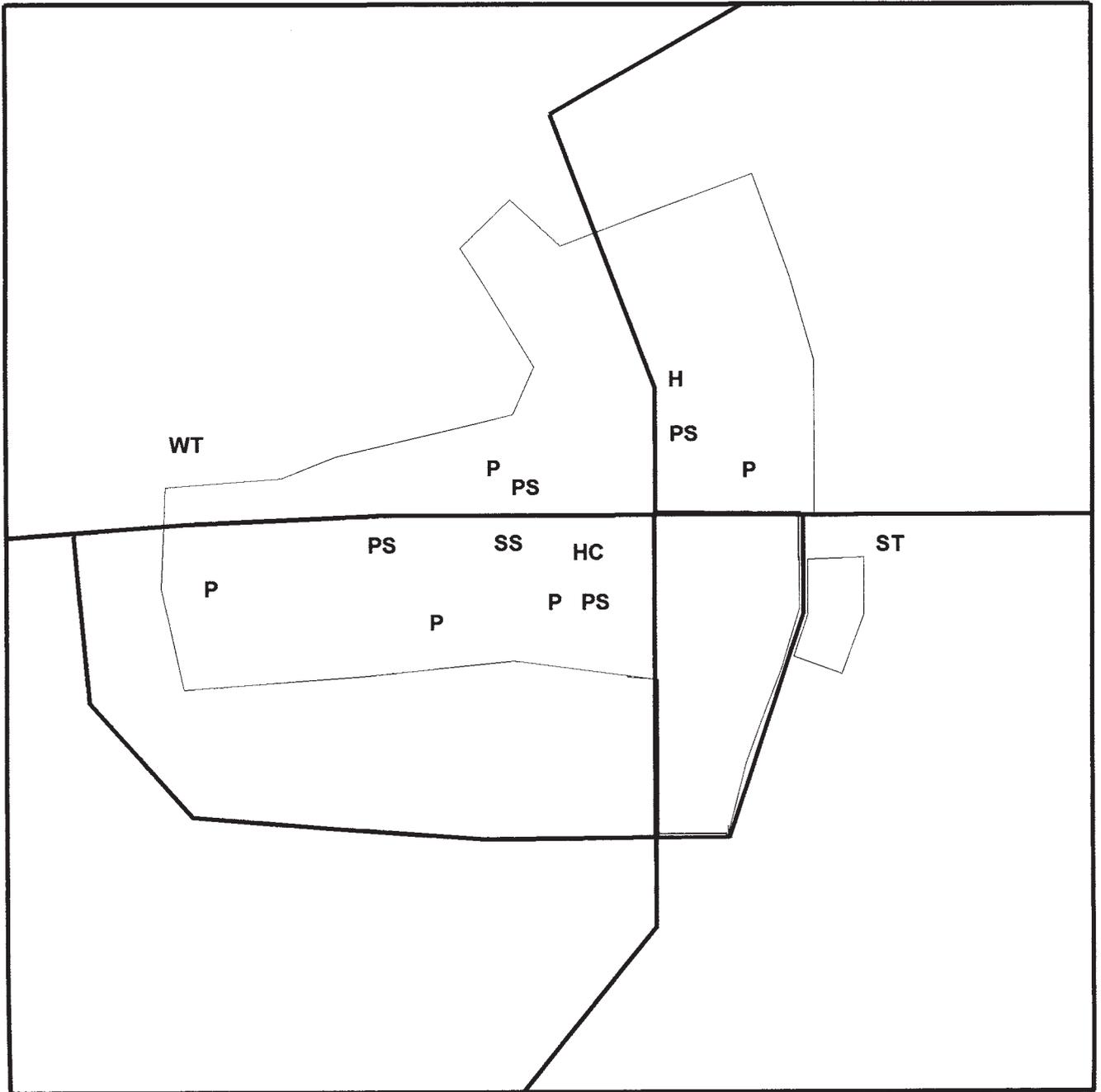
5

Estimating Additional Infrastructure Requirements, Part 1: What Infrastructure Exists?

- Purpose** To identify the existing elements of infrastructure serving the city or town.
- Questions**
1. What kinds of infrastructure are of interest?
 2. Where are the elements of infrastructure of these kinds located?
 3. What are the sizes and qualities of these elements of infrastructure?
- Method**
1. All facilities (such as schools, health centres, parks, public open spaces, and markets), networks (such as for roads and for water and electricity distribution), and land rights belonging to public agencies are of potential interest. This is because all of these require investments of capital. Include those not in the city or town but directly connected to its activities, such as a waste disposal site outside of the urban boundary. Include all, no matter what level of government is involved. A local government agency may be able to feed its spatial planning information into decision-making by higher levels of government.
 2. If urban planning has been carried out recently, maps locating infrastructure are likely to be existing in the responsible government offices. However, these will probably need to be updated.

When no previous mapping exists, or when existing mapping needs updating, first seek information from the individual government agencies responsible for these facilities. Some are likely to have already placed the information on maps for their own use.

If time and/or human resources are very limited and the existing infrastructure elements are very many, prioritise the kinds of infrastructure elements of interest, giving highest positions to those involving the largest public investments (e.g. major roads), those providing high priority public services (e.g. water) or a combination of both. Make a judgement of the range of the topmost priorities for which it is feasible to collect and map information. Then confine your task to only these kinds of infrastructure elements during the first attempt to formulate spatial planning advice.
 3. Obtain information on the sizes and qualities of the existing elements you are mapping from the same sources that gave you their location. Key this information to the locations of elements on the map. Limit information to that which is basic (e.g. that a school is primary level and for 200–300 pupils, as opposed to more detailed information on the sizes of classrooms, land area, hours of use per week, etc.).



- | | | |
|----------------------------|----------------------------------|--------------------------------|
| PS Primary school | WT Water treatment plant | H Hospital |
| SS Secondary school | ST Sewage treatment plant | HC Health centre |
| P Sports area | — Major road | — Edge of built-up area |

Map 9: Selected Existing Service Facilities

6

Estimating Additional Infrastructure Requirements, Part 2: What Infrastructure is Required?

Purpose	To estimate the kind, location, size, and essential quality of provision of infrastructure elements appropriate for the next 5 years.
Questions	1. What infrastructure is needed for the town/city during the next 5 years?
Method	1. For each kind of public infrastructure of interest, roughly estimate the quantities, and essential qualities of the elements suitable for the population estimated for the town/city when answering Question 3 of Task 4, and for the wealth of that population, for its activities, and for the spatial distribution of this population and its activities estimated to occur in 5 years in answer to Questions 4 to 12 of Task 4.

To identify appropriate kinds, quantities, sizes, and essential qualities of infrastructure needs, standards are applied. There are standards of service that government seeks to reach and these are expressed as policy. They can be obtained from the responsible government agencies. Because government policies of this sort are frequently unrealistic in practice, it is often useful to take the results of their application as describing an ideal or very good provision, and to describe a more practical provision as that which continues what has been possible to date. For networks, a practical provision would be continued use of the kinds and essential sizes (e.g. road widths, pipe sizes) of the past. For facilities (such as schools), estimates of a practical provision of the quantities needed can be pegged to population size, using the current ratios of provisions to population (e.g. the number of primary schools for the total population, such as a school for every 5,000 households), perhaps adjusted by considerations of likely changes in government policies and in available funding.

Both levels of provision – that which is ideal and that which is more practical – should be applied so that a range of requirements is defined. It can be assumed that service networks (e.g. roads, water distribution, drains) are required for all built up areas. The qualities of their provision may be distinguished in terms of what is ideal and what is practical. Advice given to investment planners should include both what is ideal and what is practical.

In many cases, estimates of what is needed for some kinds of infrastructure will have already been made by the particular agencies responsible for them. You should consult with these agencies and review their proposals in terms of the conclusions reached by Task 4. If possible, you can persuade them to make changes that better reflect the picture of the future that has been drawn up by performing Task 4. In any event, it is necessary to prepare estimates of requirements that are based upon the likely future growth and changes, so that advice from a physical development perspective can be given.

7

Estimating Additional Infrastructure Requirements, Part 3: What Additional Infrastructure Is Wanted?

Purpose	To estimate elements of urban infrastructure in which new investment is needed for physical development.
Questions	<ol style="list-style-type: none"> 1. What additions and replacements of infrastructure are wanted for the next 5 years? 2. Where might these be located? 3. What is the logical order for making these additions and replacements?
Method	<ol style="list-style-type: none"> 1. Compare the existing facilities and networks identified in answer to Questions 2 and 3 of Task 5 with the estimates made in Task 6 of what is required for the town/city of the next 5 years. The differences in quantities indicate the additions that are wanted from a physical development point of view (for example, 5 primary schools wanted compared to 3 primary schools existing). The differences in qualities are indications of either replacements of, or additions to, existing facilities and networks that are wanted (for example, an increase of the capacities of some existing schools from 300 to 500 pupils). <p style="margin-left: 20px;">Make these comparisons using first the practical level of provision required for the next 5 years estimated in Task 6. Then make the comparison using the ideal level of provision.</p> 2. For service networks (e.g. road and water distribution), identify those areas where extensions or replacement of them are required, paying particular attention to: <ul style="list-style-type: none"> ● the areas of likely expansion of the town/city, as estimated in answer to Questions 8, 9, 10, 11, and 12 of Task 4; ● the built-up areas where major changes may occur, as estimated in answer to Questions 5, 6, and 7 of Task 4; ● the central business area; ● the principal residential areas; ● the principal areas of manufacturing industries; ● any major office areas not in the central business area. <p style="margin-left: 20px;">For service facilities (e.g. schools), distribute the estimated additions so that they fill gaps or strengthen weaknesses in the service coverage of the existing facilities. When doing this, give particular attention to the gaps or weaknesses likely to be created during the next 5 years in the coverage of:</p>

- the areas of likely expansion of the town/city, as estimated in answer to Questions 8, 9, 10, 11, and 12 of Task 4;
- the built-up areas where major changes may occur, as estimated in answer to Questions 5, 6, and 7 of Task 4;

On transparent paper laid over a base map on which are marked the locations of the existing infrastructure elements identified in Task 5, these estimates can be placed as notes attached to general locations. This is illustrated by Map 10: Estimated Additions Needed to Existing Education, Health, Water Distribution and Road Infrastructure During the Next 5 Years.

The various agencies responsible for services usually make their own estimates of additions and replacements for infrastructure. These agencies should be consulted to learn of their estimates and the basis for them. However, it should be kept in mind that the responsible agencies tend to give insufficient attention to the:

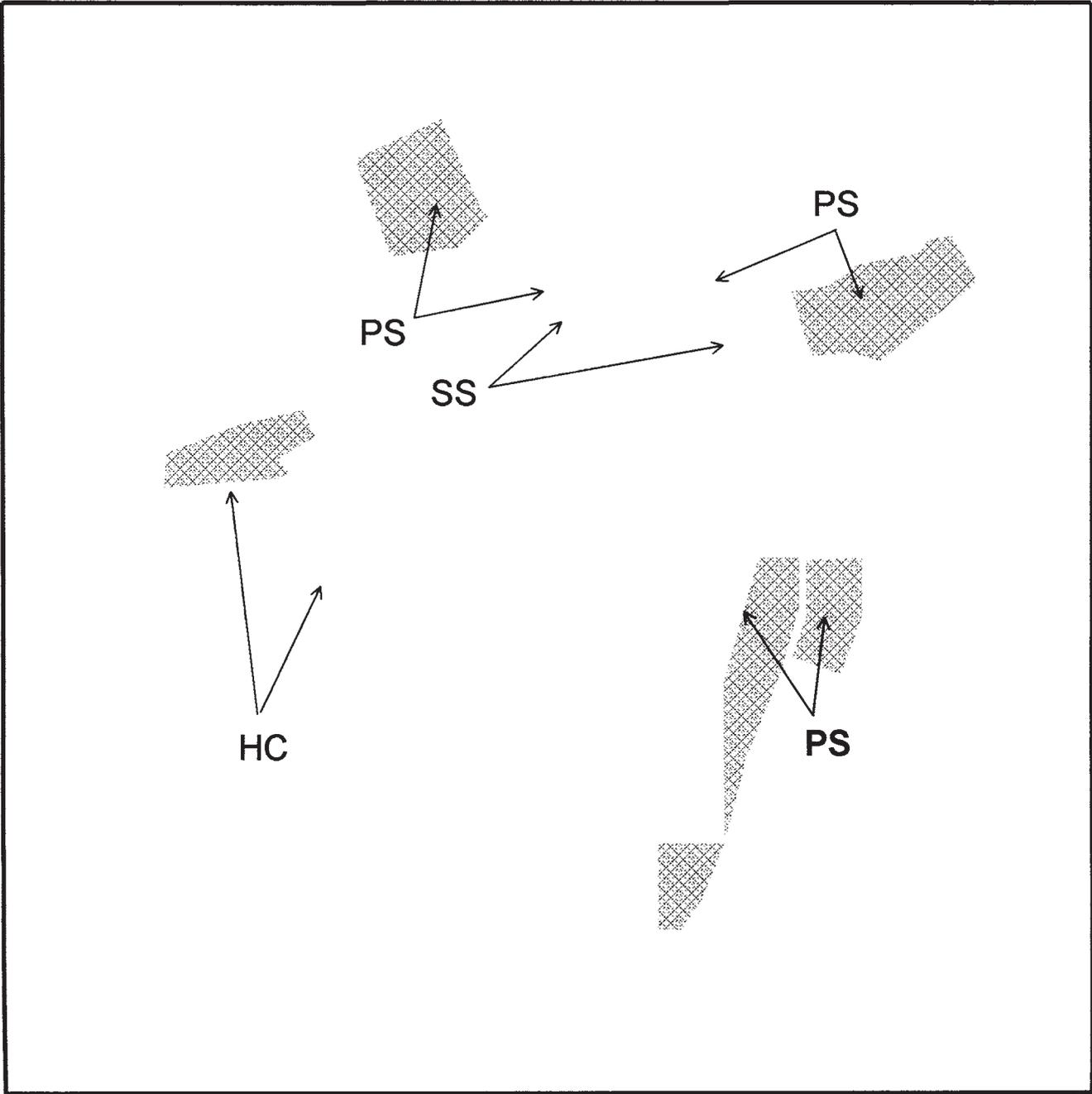
- needs of areas into which the town/city will expand;
- needs of new activities or major increase in activities (including substantial population increases) likely to occur in the built-up parts;
- changes to the standard of provision of service infrastructure to that they have worked with in the past, especially changes that are in accord with the overall development objectives that are expressed for an urban area in a development plan.

Consequently, when reviewing estimates already prepared by the responsible agencies, it is important to maintain adequate concern for these aspects of service requirements and to put forward different estimates when they are justified from a physical development point of view.

3. Estimate the time at which it is appropriate that an element of infrastructure be in place. Appropriate timing is judged from consideration of the following:

- what other investments must be carried out before this investment can be used? An investment in this infrastructure element will be idle until these others are performed.
- when are the users of the investment likely to be in place in the urban area? Investment in facilities for new populations or for new buildings will be idle if they are implemented before it is necessary to serve these populations and activities.

Therefore, the timing for installing each element of infrastructure can be expressed in two ways: first, as simply the year, or second, in terms of the installation of other key infrastructure elements that it should follow.



 Area needing a water distribution network and local road network

PS Additional primary school, practical standard

PS Additional primary school, ideal standard

SS Additional secondary school, ideal standard

HC Additional health centre, ideal standard

Map 10: Estimated Additions Needed to Existing Education, Health, Water Distribution and Road Infrastructure During the Next 5 Years

8

Guiding Urban Infrastructure Programming: When is Planning Advice Useful?

Purpose	To promote the use of rapid spatial planning advice at appropriate points throughout an urban infrastructure investment programming process.
Questions	<ol style="list-style-type: none"> 1. At what points in an infrastructure programming process is guidance from a spatial plan critical? 2. What guidance can be given by spatial planning at each of these points? 3. How is this guidance delivered?
Method	<p>1. Experience has shown that there are many points in the process of deciding a programme of infrastructure investments where guidance from spatial planning can improve choices of what projects are in a programme, the amount of money they are each allocated, and the timing of the expenditures involved. In very general terms these are the following:</p> <ul style="list-style-type: none"> ● when problems and opportunities are identified and discussed that call for investments in infrastructure; ● when infrastructure projects in which to possibly invest are first identified; ● when these projects are assigned to locations in or around the town/city; ● when assigning initial priorities to these projects and deciding which ones will no longer be considered; ● when the projects being considered and their priorities are being formally reviewed by institutions in government or in civil society; ● when detailed designs for these projects are carried out; ● when costs are assigned to these projects; ● when these projects are appraised; ● when priorities assigned to these projects are changed as the result of appraisals; ● when new projects are added to the list from higher levels of government; ● when deciding the year in which an investment will be made; ● when the priorities and timing are changed by the funding agencies; ● when project designs are changed during implementation.

Analyse the process of urban infrastructure investment programming that operates in your situation and identify in it any points that more or less correspond to those listed above.

2. Spatial planning performed as in the previous Tasks 1 to 7 can provide the following guidance that is appropriate to decisions made at the points identified above:

when problems and opportunities are identified and discussed that call for investments in infrastructure:

Discussions of problems and opportunities – such as at local level meetings of political leaders and residents – often do not include good knowledge of physical development considerations. Information picturing the future – from Task 4 – and the basis for the estimates of the infrastructure that is required made in Task 6 will help in understanding if problems and opportunities are as serious as they may first seem. This information may also draw attention to problems and opportunities of which these discussions would otherwise be ignorant.

when infrastructure projects in which to possibly invest are first identified:

This is the first listing of additions and replacements to existing infrastructure. Task 7 can place projects on this list that are based on physical development considerations.

Proposals for projects will come from other sources, for example, from political leaders, elected bodies, service providing agencies, and offices of government ministries. They may also come from grass-roots level processes in which communities participate. Each of these sources will emphasise different considerations. The process for putting together an initial list of projects for a programme will have ways to bring together projects from these different sources. Projects arising from concerns of spatial planning, represented by the conclusions of Task 7, should be among them.

In some countries, Nepal and Uganda are among them, spatial planning advice is used in meetings at community level involving residents and local government officers and/or elected officials to identify and discuss possible investment projects. In Nepal, officers with spatial planning knowledge will later visit the sites of problems or opportunities with community representatives to verify the usefulness of particular proposals. At this level, it is easier for people who are poor to learn about and comment upon spatial planning advice regarding infrastructure investments.

when these projects are assigned to locations in or around the town/city:

Infrastructure investments eventually involve a place, no matter what. The physical relationships embodied in the picture of the future that is the conclusion of Task 4 provide advice on the location of every proposal, from what ever source.

when assigning initial priorities to these projects and deciding which ones will no longer be considered:

Almost always, lists of project proposals must be cut down because some are too unrealistic or do not deal with sufficiently important problems or opportunities. Among those remaining, some can be singled out as having the greatest urgency or dealing with matters of the greatest importance. The analyses of requirements produced by Task 7 based upon spatial planning conclusions of Task 4 provide advice on what is important and what is urgent from a physical development perspective. For example, decision makers can be advised that it is necessary to purchase land before money can be spent upon construction of a school.

when the projects being considered and their priorities are being formally reviewed by institutions in government or in civil society:

If an initial list of priority projects is then subject to the review and approval of particular institutions, those institutions will usually impose some of their own judgements of what is important upon the list, changing priorities and even replacing projects with others. For example, these may be higher levels of government with powers over local government decisions or they may be political bodies deciding the recommendations of technical officers. Considerations of spatial planning concerns are just as relevant in making the decisions that result in these changes as they were in the decisions that identified possible projects and assigned initial priorities.

Ministries and regional departments responsible for services may add to a proposed list of projects that was created at local government level. The bureaucratic (and physical distance) from the local level is often great enough that spatial planning factors are easily overlooked, if not ignored. Yet the concerns of spatial planning are no less relevant to their decisions as they are to a local level decision about which projects go into a list of expenditures.

when detailed designs for these projects are carried out:

Many of the details of design are in response to physical characteristics that are expressed by spatial planning. For example, the project's location decides the physical features of the site it will occupy that the design must take into consideration, and planning analyses contribute to the definition of a project's size and qualities.

when costs are assigned to these projects:

In addition to the obvious costs of the aspects of the project that relate to physical features of size, quality and location, spatial planning can reveal opportunity costs of investments unable to produce benefits because other infrastructure elements are not in place, such as industrial sites lacking piped water.

when these projects are appraised:

Appraisal involves measures of what a project is likely to achieve for the investment made. Reference to spatial planning is necessary if the physical achievements (the effectiveness in physical terms, such as the number of households to be provided with water connections) are to be identified.

when priorities assigned to these projects are changed as the result of appraisals:

If a project is rejected as a result of its appraisals, this can change the performance and logic of other projects that are planned to have important physical relationships to it. For example, if a project to create an industrial estate does not satisfy appraisal criteria and is dropped off the list, a road project to provide access to the estate should also be removed. Reference to spatial planning provides a basis for detecting the occurrence of such changes in performance and logic. If new projects are added to the list of priorities to replace those rejected, spatial planning factors have a logical place among those considered in their choice.

when new projects are added to the list from higher levels of government:

Ministries and regional departments responsible for services may add to a proposed list that arises from local government level. The bureaucratic (and physical distance) from them is often great enough that spatial planning factors are easily overlooked, if not ignored. Yet the concerns of spatial planning are no less relevant to their deci-

sions as they are to local government decision about which projects go into a list of expenditures.

when deciding the year in which an investment will be made:

This is the matter of putting priority projects into a sequence that decides the year when each will be funded and carried out. Logically, it requires physical relationships to be considered, such as when a project is dependent upon the completion of another and when the users of a facility will be in place, thus justifying its construction. These are matters on which spatial planning can advise.

when the priorities and timing are changed by the funding agencies:

If their lending rules or objectives cause funding agencies to change project priorities or timing, or cause certain projects to be rejected at this stage in the process, their are aspects of the programming constructed upon spatial planning concerns that must be reconsidered, and any decisions on replacement projects deserve consideration of spatial planning factors.

when project designs are changed during implementation.

Problems that arise during implementation can involve changes in physical aspects of a proposal that deserve consideration in spatial planning concerns. For example, if a project is moved to a different site because land cannot be obtained or because information about the site features turns out to be incorrect, it is only logical that spatial planning advice be taken on the new location and the change in the spatial relationship between the project and other infrastructure elements.

3. Experience shows that spatial planning guidance may not be considered after the initial identification of possible projects, their assignment to particular locations, and their initial prioritisation. Because the programmes of projects that are ultimately implemented are frequently very different from the initial list of priorities, there are possibilities here for many changes to investments programmes that have not included considerations drawn from a spatial planning perspective.

Delivering guidance to all decisions made about infrastructure investment programmes is consequently an important challenge. A first step in meeting this challenge is to analyse the existing process of creating and agreeing an urban infrastructure investment programme, so that the places where decisions are made are clearly identified and certain of their features are known: when these decisions are taken, where in administration structures they are taken, and who is involved. Next, identify and use any opportunities to participate in these decision-making events so as to provide those present with relevant guidance from a spatial planning perspective. If you cannot participate yourself, ask anyone from your networks of personal and professional associates who is participating to carry your advice into the meeting. In any event, provide written advice. Timeliness is critical. Decisions will not wait for guidance to be formulated. Capital investment programming usually involves annual repetition of its basic activities, so it is not difficult to predict when advice can be used and therefore by what date it must be prepared.

The need is to be pro-active and to search out and seize opportunities to give guidance, rather than expect guidance to be asked for, even if that is what laws or administrative protocols call for.

Terms of Reference for Individual Work Between Workshops

During the weeks until the second workshop is conducted, you should attempt to perform all of Tasks 1 through 7 with regard to an urban area for which you have responsibility or that you know well. This means that you will create a picture of the future of that urban area in answer to the questions of Task 4 and then go on to identify what additional infrastructure projects are wanted in this urban area in answer to the questions of Task 7.

You should ensure that time is given to each and all of the Tasks, so that you actually reach conclusions about a set of answers to the questions of Task 7. This means that you will have to stop work on each Task before you are entirely satisfied with what you have done. Nevertheless, it is necessary that you perform ALL of the seven tasks in order that any one of them can achieve its use.

At the next workshop, time will be given for a presentation of the conclusions reached for every one of the towns examined during the intervening weeks. Each presentation should begin with by taking no more than approximately 20 minutes to provide short answers the following questions. These answers will provide the basis for a longer discussion.

- 1.** Where and how are the built-up areas likely to change in the next 5 years?
- 2.** In which places and directions is physical expansion of the town likely to occur in the next 5 years?
- 3.** Roughly how much land is likely to be involved in this expansion during the next 5 years?
- 4.** Where are the poor likely to be living at the end of the next 5 years?
- 5.** From a physical development point of view, what major additions to and replacements of infrastructure networks and facilities are wanted during the next 5 years? This should be expressed in terms of the kind of infrastructure network or facility and a rough estimate of the size.
- 6.** In general terms, where would each of these additions or replacements be appropriately located?
- 7.** From a physical development point of view, what is the logical order in which these additions and replacements should be provided?

As a conclusion to your presentation, you should identify any significant difficulties that you experienced in understanding and using the descriptions of the seven Tasks. The meeting will clarify and further explain the approach and methods in order to overcome any problems identified. The conclusions you reached and the way that you used the methods in the training materials will be commented upon.

The Foundations: The Research and Pilot Training Workshops

With the financial support of the Infrastructure and Urban Development Department of the Department for International Development of the British Government, investigations were carried out in Indonesia, Nepal and India of practices to formulate and use spatial planning to guide urban infrastructure investment programming.

The Integrated Urban Infrastructure Development Programme (IUIDP) launched by the Indonesian Government in the middle of the 1980s had accumulated substantial experience. It featured the use of comparatively fast and simple methods of spatial planning because most urban areas lacked physical development plans. Even when urban plans became common, these procedures were used to review and improve them so that they could service the needs of the IUIDP. During the early months of 1999, members of the research team examined the use of these methods in seven cities in particular, chosen with advice from central government and its consultants. Although details of procedures for spatial planning were set down in official documents, accounts of actual practice could only be obtained through extended interviews with consultants and government officers who worked at the local levels to implement the IUIDP. The differences between documented procedures and those described in accounts of practice were often considerable.

Investigations were conducted in Nepal later in 1999 to identify and extract the lessons of experience in the practice of Integrated Action Planning. Integrated Action Planning was formulated on principles taken from Indonesia's IUIDP, and its execution in municipalities began in 1992 as the result of an initiative by GTZ aimed at strengthening the capacities of local governments. In partnership with Central Government, this planning had been launched in 22 municipalities by 1997. Its advocates hope that Integrated Action Planning will become a regular activity of urban governments in Nepal, helping them not only prepare their annual development budgets and coordinate expenditures from different sectors and institutions, but also to update and implement their physical development plans. During the research, technical staff and elected officials were interviewed in seven municipalities, chosen with guidance from the GTZ programme office in Kathmandu and available documentation was examined. Not surprisingly, this investigation found that the practice of integrated action planning with regard to spatial factors did not always fit with the concept.

Practice experience was sought in India because of documented accounts of the interest aroused there by the activities of Indonesia's IUIDP. However, no substantial use of spatial planning to guide urban infrastructure expenditure programming was identified, despite explorations in Karnataka and Kerala States of promising activities located with the advice of the Human Settlements Management Institute of HUDCO. Instead, interviews at both national and local levels led to a general impression that, on the one hand, the urban planning legal framework discourages the use of spatial planning methods that are not conventional because of the greater speed and sim-

plicity of their preparation, while on the other hand, conventional urban planning is increasingly viewed as having little relevance to important decisions of urban management.

The recommendations presented in this document were formulated from analysis of the experiences studied, including the weaknesses that emerged in all three countries. Training materials were created for the dissemination of these recommendations. These materials and a processes for the delivery of their contents were next tested in pilot training events in Ghana and Uganda.

The Office of the Brong Ahafo Regional Coordinating Council hosted the training in Ghana, bringing together over 35 staff members from various government and non-government organisations involved in the provision of infrastructure facilities and networks throughout the region, including many of its own district economic planners and town planners. In Uganda, the Decentralisation Secretariat of the Ministry of Local Government assembled officers from eight of the country's municipalities. In both cases, after receiving draft versions of the training materials, with explanations and exercises to explain their application, the participants then used them over a period of weeks to formulate and review spatial planning for actual towns and municipalities that might give guidance to investments in service facilities. A final meeting with the participants in each country provided feedback on the adequacy of the draft materials and the training processes employed. Modifications were tested in the Uganda trials that were suggested by the experience of the earlier pilot training event in Ghana.

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