Chapter 5.7

Public utilities

5.7

TABLE OF CONTENTS

PUBLIC UTILITIES 1

FOCUS AREAS 1

Utilities: A means to an end 1

Site- and community-specific characteristics. 1

Linkages 2

Process 2

QUALITATIVE GUIDELINES 2

Hierarchy of collective utility points 2

Planning of utilities to optimise fulfilment of entrepreneurial, social, recreation and other needs. 3

QUANTITATIVE GUIDELINES 5

Collective utility points primarily serving lower-order collective public utility points 5

Thresholds and time and distance standards 6

Planning, space and engineering considerations 6

Upgrades, operation and maintenance, links, and detailed design. 6

Collective utility points primarily serving higher-order collective utility points. 12

THE GUIDELINES - A CAUTIONARY REMARK 14

CONCLUSION. 14

BIBLIOGRAPHY 16

LIST OF TABLES

Table 5.7.1 Quantitative guidelines for lower-order public collective utility points 7

LIST OF FIGURES

Figure 5.7.1 Conceptual diagram of key spatial relationships relating to collective utilities within greenfield projects 4

Figure 5.7.2 Conceptual diagram of key spatial relationships relating to collective utilities within upgrade projects 5

PUBLIC UTILITIES

The purpose of this sub-chapter is to describe guidelines for the planning of public utilities. Utilities are, for the purposes of this sub-chapter, defined as engineering services including water, sanitation, roads, stormwater drainage, energy supply, solid-waste removal, communications in the form of telephones, and postal collection and delivery.

Collective utilities and residential utilities are defined as follows:

- Collective services (utilities) are those services consumed off-site, to satisfy either community or domestic service needs. Community service needs relate to movement, drainage, public safety, outdoor manufacturing, market trading and social interaction. In the case of domestic needs, the service is transported to the household site for consumption within the dwelling or on the site. In the case of community needs the service is used within the public environment. Collective services include water supply in the form of public standpipes, sanitation in the form of public toilets, roads and stormwater drainage, energy supply in the form of metered electricity dispensers in public markets, the lighting of public places (including street lighting), solid waste removal in the form of rubbish collection points, and communications in the form of public telephones and post-collection points.

- Residential services (utilities) are those services consumed on-site, to satisfy domestic household service needs. The service is used either in the individual dwelling, or on the site. Residential services include water supply in the form of house or yard taps, sanitation in the form of in-house or out-house toilets, energy supply in the form of electricity or gas, solid waste removal in the form of kerbside rubbish collection, and communications in the form of private telephones and postal delivery (Behrens and Watson 1996, p 81).

Many forms of collective utilities are described in the available literature. But, invariably, these are designed and built for single utilities, e.g. as water points, communal ablution blocks, or as post-delivery points. The purpose of this sub-chapter is to go beyond these single-utility views, and show how multi-utility collective points can provide convenience, be attractive in their own right, and go a long way to resolving the health threats presented by the litter, poor drainage and physical danger so prevalent in communities, especially where large numbers of people gather every day (e.g. taxi ranks and informal markets).

FOCUS AREAS

The sub-chapter has four focus areas, as follows:

- Utilities in settlements are only a means to an end.

- The provision of utilities cannot be divorced from site-specific and community-specific characteristics.

- Link and internal infrastructure (utility) provision, the process of settlement formation, and the planning and design of collective utility systems.

- The processes of planning and design, construction, operation and maintenance, and the upgrading and eventual replacement of utility systems.

Utilities: A means to an end

Utilities in settlements, whether collective or to households, are only a means to an end. The "end" can be variously defined but it certainly includes, for the households living in that settlement, greater health and safety and greater access to income-earning opportunities and amenities. Understanding of this is essential in

- addressing the end by the most appropriate means (which may not be an engineering service, but education, or institutional change);

- integrating the utility with other means to the same end; and

- selecting levels of service and standards.

The decision to provide utilities in a settlement, and what utilities, how and when, must be part of an integrated decision-making and (particularly) prioritisation process; then the investment in a utility must be part of a package of interventions.

Site- and community-specific characteristics

The provision of utilities, whether collective or to households, cannot be divorced from site-specific characteristics (e.g. topography) or from community-specific characteristics (e.g. institutional structure, affordability). For example, one community may have no need for collective utilities, whereas another may be unable to afford (in the financial sense) anything but collective services.

No one should have difficulty with the concept that site-specific characteristics such as topography are fundamental to the provision of utilities. It may, however, be of value to consider why and how community-specific characteristics would affect the provision of utilities. For example, the assumption

that certain health- and safety-related ends will be achieved if certain levels of service of utility infrastructure are provided, and that, if complementary services are also provided, it will constitute a sufficient holistic package of health and safety, might be true for more affluent South Africans.

The assumptions are, however, probably not true for the less affluent. In a total public sector budget for health and safety services, for example, too much emphasis on only one aspect (say, water and sanitation) could - for the less affluent - reduce the resources available for other services. There is an evident need for a holistic view of the range of urban services (including utilities) before decisions are made on basic need levels, and before investments are made.

Linkages

This focus is on the relationship between link and internal infrastructure (utility) provision on the one hand and the process of settlement formation on the other, as well as on the planning and design of collective public utility systems.

These links, together with the fourth focus area, lie at the heart of this sub-chapter. These two foci lead directly to the development of appropriate guidelines on: (1) the integration of issues relating to the provision of utility infrastructure, and issues relating to land-use planning and settlement formation; and (2) the planning and design of collective public utility systems - indicating key functional interrelationships with other planned elements.

Process

The focus concerns the process of planning and design, the construction, operation and maintenance process, and the upgrading and eventual replacement of utility systems, whether collective or to households.

It must be noted that selection of utilities and their levels of service, and the planning and design of the selected utilities, are, wittingly or (often) unwittingly, made in the context of a set of planning, design, construction, operation, maintenance and upgrading assumptions. These assumptions relate to the following questions:

- How will the utility, its level of service, and the chosen technology suit conditions expected in practice? Examples of these conditions are
  - geotechnical and groundwater conditions;
  - type of housing and its density; and
  - frequency of use of the utility (for example: how many persons per utility, and how much of each day are they using the utility?).
- How will the utility be constructed (i.e. workmanship)?
- How will the utility be operated and maintained?
  - by the individual users; or
  - by the corporate agency (community, NGO, private company, local government)?
- Other elements upon which the success of alternatives is dependent (principally, assumptions as to institutional capacity, enforcement of regulation, monitoring of use, adequacy of funding for operation and maintenance, and so on).
- What complementary services are required? For example, if a collective water service is provided, will sanitation also be provided, or at least a means of dealing with sullage, and vice versa?

It must further be noted that the (majority) reported experience of operation of collective utilities in South Africa is that incorrect use of these facilities, abuse and vandalism are widespread; also that maintenance often ranges from insufficient to non-existent. This should heavily influence design and construction decisions, and should also require that the process of collective utility provision, including that of utility management, be done with greater care.

QUALITATIVE GUIDELINES

Hierarchy of collective utility points

A hierarchy of collective utility points ranges over a continuum from

- lower-order collective utility points within primarily residential areas, mostly used on single-purpose trips from the house to the utility point and back; to
- higher-order collective utility points at public gathering points such as at modal interchanges, public markets or community centres, often used on the way to or from home or to (in addition to patronising the utility point) work, school, recreation, shopping or some other destination(s).

In practice, it is found that the following differ greatly from the one end of the hierarchy to the other:

- thresholds and catchments;
- space standards;
- numbers of users at any one time;
- distribution of use through the day and through the week; and

- the type of utility needed, and the combinations of these with each other and with other facilities.

As an example, consider the lowest-order end of the hierarchy. The great majority of the usership of a facility in a residential area is often that resident within a catchment defined by a walking distance within (depending on the facility) a number of minutes of the facility. If the population within that walking distance is large enough (i.e. above the threshold), the facility is potentially sustainable. However, the usership of a facility at a public gathering point - for example a modal interchange - is less dependent on the walking distance to that facility, and thus on its catchment, than it is dependent on the numbers of people who change modes at that interchange, the attractiveness of other facilities (e.g. the market) there, and so on. An example at the higher-order end of the hierarchy would be a modal interchange at a major road intersection at the edge of an urban area - few people have their homes close by, but many people spend time there waiting for transport - and thus need and would probably make use of the utilities there.

A significant implication of Chapters 2 and 3 is that, as new settlements are planned and existing settlements are grown in terms of these concepts of settlement formation, land uses will mix to a far greater degree than at present. Given that, there will be more public gathering points at lower levels and thus more need for collective utility points that serve both residences and public gathering.

Where a full range of residential utilities cannot for various reasons (of which affordability is often one) be supplied to each residential site, it may be worthwhile to supply some of these at an accessible, collective point. If these utilities could also satisfy the collective needs of a taxi rank or a market, that would be more efficient - but such a situation would be the exception. However, it is very likely that, at even a lower-order collective utility point, a couple of small entrepreneurs will set up - selling food, or providing a repair service, for example. This emphasises both the hierarchical nature of the demand for utilities and the need to provide a hierarchy of collective utility points.

The design of any collective utility point will be simplified by an assessment of the design demand separately by the extent to which it concerns both lower-order and higher-order collective utility demand, and then by their aggregation. This distinction is important in terms of design elements such as the location and utility mix of the collective point. Thus the following section deals primarily with lower-order collective public utility points, and the section after that with higher-order collective utility points.

Planning of utilities to optimise fulfilment of entrepreneurial, social, recreation and other needs

In Chapter 3, the planning of settlements to create favourable spatial conditions for entrepreneurs has been laid down as a primary determinant of settlement-planning. In addition, how collective utility points can be located to reinforce these entrepreneurial conditions and maximise their access to users has been specified as a very significant contribution that this sub-chapter can make to successful settlement-planning. However, how collective utility points can be located to support and enhance social, recreation, education, safety and other needs in a settlement, is of equal importance.

Several mutually reinforcing means are described whereby conditions can be optimised to fulfil entrepreneurial, social, recreation, education, safety and other needs. Principally these are

(1) concentrate local through-movement on stop-start activity routes;

(2) provide accessible public spaces which create opportunities for collective activity;

(3) incorporate public markets as an element of essential public infrastructure;

(4) cluster facilities (including utilities) to enable resource-sharing;

(5) integrate open spaces with utility services; and

(6) align trunk utilities to important routes.

(1) - (4) Location of collective utility points to maximise their access to users

Collective utility points (e.g. public standpipes, public telephones, post collection points, solid-waste collection points, metered electricity dispensers, and public toilets) should be clustered around public markets and hard open spaces, to create favourable small-scale manufacturing and trading conditions. Also, in cases where these utilities perform residential functions as well, they enable local residents to satisfy several needs in a single trip. The clustering of utility points provides the utilities necessary for small trading operations, and attracts potential consumers to specific points in space.

Public facilities are intensively used by large numbers of people, and, through the creation of “load centres”, can generate a large demand for utilities. As a result they can be used to “pull” service mains economically through a settlement, with facilities and the public spaces they abut,

accommodating a range of utilities often not supplied to individual residential erven (e.g. telecommunications, solid-waste collection, postal delivery).

Settlement layouts should locate public markets and squares, and their associated collective utility points, to ensure that all households have convenient pedestrian as well as motorist access and that a single trip can satisfy a number of needs - entrepreneurial, social, recreation, education, safety and other needs. In order to achieve this, planners and engineers require an understanding of the range and threshold requirements of, and functional relationships between, the different collective utilities.

(5) Integrate open spaces with utilities

The design of public open space networks should be integrated with the design of utility infrastructure networks. In particular, interconnected soft open space systems should be integrated with major stormwater management systems (i.e. open stormwater channels, retention and retarding ponds, etc.). Open spaces and clusters of playing fields, should take up low-lying land subject to periodic flooding, acting as overflow facilities in the event of severe storms, while stormwater outfall and storage facilities should be used as landscaping features within the amenity network (See Sub-chapter 5.4 on Soft Open Spaces).

(6) Align trunk utilities to important routes

Where possible, trunk utility lines should be aligned to more intensive movement routes which link public facilities and non-residential land uses, and electricity sub-stations (which transform high-voltage current into low-voltage current for the purpose of residential reticulation) should be located close to public facility clusters (i.e. "load centres").

In this way, full water, sewerage, electricity, public lighting and telecommunication connections can, from the beginning of the infrastructure-provision process, be made to commercial services, small-scale manufacturers, and public facilities like schools and health clinics. Similarly, in cases where adequate road surfacing is not affordable on all roads, public facilities should be connected by a network of surfaced roads to ensure the effective provision of regular road-based services.

In situations where water reticulation to residential areas is not designed for additional fire fighting flows, water supply ring mains with greatest capacity and pressure should, where possible, be aligned to intensive activity routes. This will ensure that, at the very least, public facilities like schools and community centres are adequately covered by fire hydrants and associated fire-fighting services (See Sub-chapter 5.8.3 on Fire Considerations).

Figure 5.7.1 and Figure 5.7.2 illustrate the above.

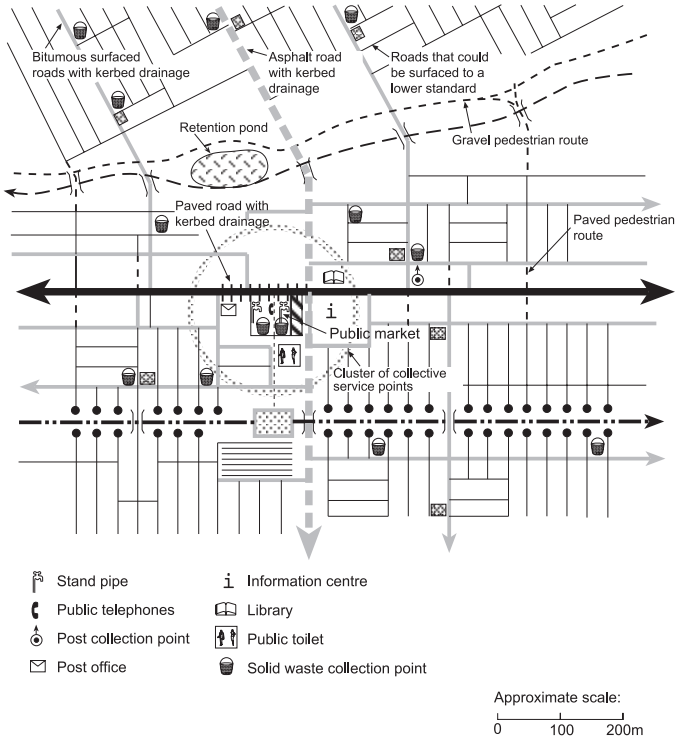

Figure 5.7.1 Conceptual diagram of key spatial relationships relating to collective utilities within greenfield projects

Source: Behrens and Watson 1996, p 103

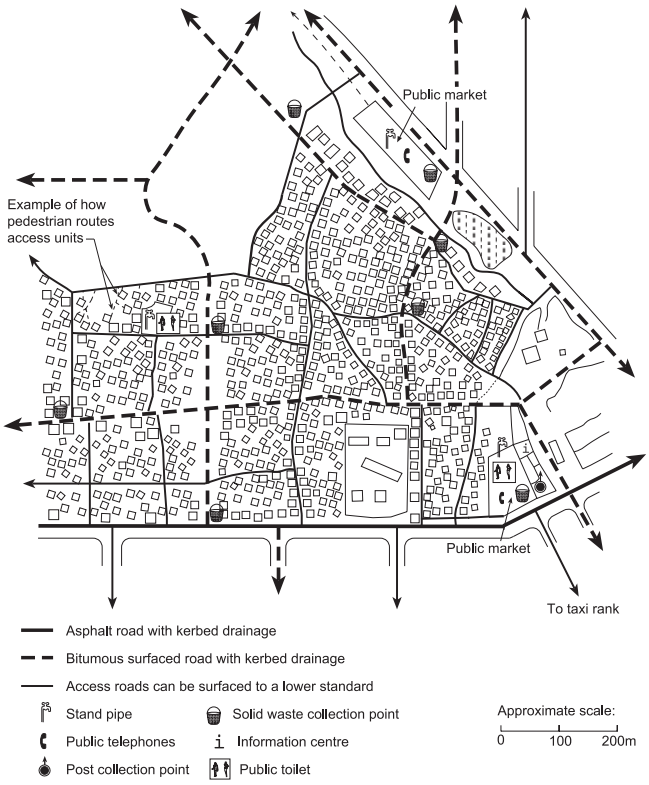

Figure 5.7.2 Conceptual diagram of key spatial relationships relating to collective utilities within upgrade projects
Source: Behrens and Watson 1996, p 111

They indicate the spatial relationships of utilities within, respectively, a "greenfield" and an "upgrade" project.

QUANTITATIVE GUIDELINES

Collective utility points primarily serving lower-order collective public utility points

Densities, alternatives and hierarchies

The effect of two contextual factors needs to be made clear in respect of any standards for lower-order collective public utility points.

The density of the area

For example, in densely populated areas, 15-25 dwelling units per standpipe (a rough guide of the threshhold for a standpipe) can be achieved by placing a standpipe at the end of each street, and at a maximum distance of 100 m. In more sparsely populated areas, a walking distance greater than the Redistribution and Development Programme standard of 250 m should not be exceeded, almost irrespective of the threshhold. The walking distance will probably prevail over threshhold criteria.

The availability of residential utilities

For example, in an area which (say) lacks a door-to-door postal service and solid-waste collection service, but where residential sites each have a toilet and a standpipe, the need for collective toilets and standpipes will be much lower than where these are not provided on residential sites. However, at a residential area collective utility point where say solid waste, postal and telephone facilities are provided, collective toilets and standpipes will nevertheless have to be provided for the users of the telephones, nearby entrepreneurs and their customers, and passers-by.

Table 5.7.1 provides only a rough guideline, and the context of the specific area being served must be investigated, particularly with respect to densities and alternative options to the collective utility.

In addition, the place on the hierarchy of the collective points being designed must be borne in mind. For example, if a lowest-order point, to serve 20 dwelling units, includes one water standpipe, a second-order point centred around solid-waste collection, public telephones and post boxes could adequately also have only one standpipe. Although the other utilities here may be serving 200 or more dwelling units, the standpipe is not also serving 200 dwelling units,

but is the standpipe for only its immediate area of 20 dwelling units - and for passers-by, etc, as described above.

Thresholds and time and distance standards

Design decisions regarding public utilities relate mainly to (i) the population catchments they serve (conversely the thresholds that they require in order to be sustainable), and hence the numbers of each facility required in any given area, and (ii) the distance that user households have to travel to gain access to them.

The specific demographic and socio-economic profile of each community should be used to plan and provide its public utilities, as indeed it should be used for any other public facilities, especially those serving primarily residential areas. For example, it is possible that a greater proportion of investment would be required for pre-school facilities within the first five years of a new settlement than for secondary and tertiary education.

Behrens and Watson (1996) point out that standards for individual facilities and amenities are conventionally assessed by considering their "optimal" spatial requirements in isolation of each other. This leads to a number of problems. For example, formulating space standards in isolation restricts the potential of resource sharing and multi-functional use to reduce land requirements. In conditions of resource scarcity this is essential - in cases where neither the local authority nor the relevant government department can afford to develop the planned facilities or maintain public open spaces, land remains vacant and unattended.

Planning, space and engineering considerations

In the absence of detailed information regarding utility performance standards, Table 5.7.1 provides rough guidelines on location, time and distance, size and dimensions and user threshold standards. When used in conjunction with user threshold standards, the set of time and distance standards can act as benchmarks to check the accessibility of utility locations. For these utility points, which are accessed primarily by pedestrians, the standards assume an average walking speed of 3 km/h, or 50 m/min.

Depending on the supporting threshold population, some facilities should be sited in locations accessible to pedestrians, while others should be sited in locations accessible to public-transport users, as well as to a limited number of pedestrians in the local area. Time and distance standards are therefore more applicable to lower-order, pedestrian-orientated facilities - the locations of higher order facilities are determined more by the public transport system, or by other reasons for the public to gather, than by time and distance ranges.

Upgrades, operation and maintenance, links, and detailed design

Provision for upgrading

- The assumption up to now is that public water standpipes (for example) are needed because the residential stands do not have their own standpipes, or that these are over-used (e.g. several families on each stand, sharing one tap). In another example, there has been the assumption that postal delivery boxes are needed because there is no door-to-door delivery service. This situation may change if the services are upgraded - the need for collective utility points would reduce to the extent that each household now received a service at its door or to its site. The design guidelines for these higher levels of service may be found in Chapter 6 onwards (the postal service is not addressed).

- The conversion of collective to on-site household services should take place through incremental in-situ upgrading projects as the community circumstances improve. The need for communal toilets, ablution facilities, laundry centres and standpipes placed at walkable distances from houses would fall away as on-site (residential) services are provided. The public spaces on which these stand could then be rezoned for residential, business or institutional purposes. The prevailing circumstances would dictate.

- With respect to piped services, the design of the link mains, trunk mains and the pipe network for formal townships should allow for upgrading to individual site connections, leading directly to greatly increased water demand in the future. This design philosophy, together with the phased construction/provision of water mains and pipelines only along important movement routes and to collective water utility points, will provide ample capacity to satisfy the peak demand at the public standpipes.

- The design approach of pipe networks for informal settlements should take cognisance of the permanent or temporary nature of the settlement, and the final layout if the settlement is to be upgraded. If a settlement is temporary, the pipe network should be designed to satisfy the minimum (RDP 1994) levels for walking distances and consumption.

Table 5.7.1: Quantitative guidelines for lower-order public collective utility points

UTILITY	LOCATION	ACCESS	SIZE AND DIMENSIONS	USE CAPACITIES AND THRESHOLDS
Collective water standpipes	• Collective standpipes are planned at positions in residential areas to satisfy the minimum service levels, but should also be informed by community needs. • For maintenance considerations it might be preferable to place collective standpipes on private residential sites (maintenance responsibility on owner - see Chapter 9). • Alternatively, the standpipes could be constructed on public open space adjacent to a residential site whose owner would take on the maintenance task.	• In densely populated areas a maximum distance of 100 m and a walking time of two minutes are preferable. • In more sparsely populated areas, a walking distance of 250 m (DWAF 1994, p 15) should not be exceeded.	• Water standpipe and structure should be customised to suit the community needs. • Considerations include acceptable lifting heights, animal watering, whether containers are washed at standpipes, whether hosepipes are used to fill narrow-mouthed containers, need for bulk filling, etc.. • Consider provision of seating or at least an area for queuing or waiting (the area around the standpipes is often used for socialising).	• In densely populated areas a norm of 15-25 dwelling units per standpipe is acceptable.

Table 5.7.1: Quantitative guidelines for lower-order public collective utility points (continued)

UTILITY	LOCATION	ACCESS	SIZE AND DIMENSIONS	USE CAPACITIES AND THRESHOLDS
Communal bath houses	• Sites should primarily be chosen for convenience of access to their catchment area in terms of potential users. • Siting should take account of adaptation and re-use, and whether improved utilities should be provided to residential sites (e.g. conversion to change rooms for sportsfields). • Security considerations are extremely important (see Sub-chapter 5.8.1 on Environmental Design For Safer Communities).	• Walking distance and time of 200 m and four minutes respectively.	• Bath houses require sites with areas in the order of 200-300 m^2. • Public bath houses could have showers and laundry facilities, and also toilets. The laundry basins could be provided inside or outside. • These can be built as part of the same structure as, but with a separate entrance from, other public buildings, so as to share supervisory staff. • A waiting area can be provided under a lean-to outside rather than inside the building.	• One communal bath house could service a maximum of 50 dwelling units or 280 people.

Table 5.7.1: Quantitative guidelines for lower-order public collective utility points (continued)

UTILITY	LOCATION	ACCESS	SIZE AND DIMENSIONS	USE CAPACITIES AND THRESHOLDS
Communal toilets	• Sites should primarily be chosen for convenience of access to their catchment area in terms of potential users. • Sites on which communal toilets are placed could be converted to residential or business sites when upgrading of utilities takes place. • Where possible they should be located next to facilities like schools, clinics and libraries, so that when (if) individualised sanitation is provided, they can simply be incorporated into the public facilities. In this way redundant service provision can be avoided.	• Walking distance and time of 75 m and 1,5 minutes respectively.	• Various sanitation technologies are described in Chapter 10. The factors which influence the choice of each of the particular sanitation systems are detailed. • Subject to the constraints influencing the choice, most, if not all, of these sanitation systems can be used for communal toilets.	• If residential sites do not have their own toilets, it is proposed that a reasonable level of convenience for the users of public toilets can be attained if the ratio is a maximum of two households (12 people) per toilet. • If the communal toilets are supplementary to toilets on residential sites, their number can be reduced accordingly.

Table 5.7.1: Quantitative guidelines for lower-order public collective utility points (continued)

UTILITY	LOCATION	ACCESS	SIZE AND DIMENSIONS	USE CAPACITIES AND THRESHOLDS
Solid-waste collection points	• Sites should primarily be chosen for convenience of access to their catchment area in terms of potential users. • Small containers can be placed on sidewalks, whereas larger skips require larger sites. (See also Chapter 11)	• Walking distance and time of 100 m and two minutes respectively (skip).	• Hard-standing areas need ± 24 m^2 for the trucks loading and off-loading the containers. • Size of containers vary from 85 ℓ to 6 m^3 capacity • Smaller containers (up to 210 ℓ container) are mounted on an axle/pivot shaft mounted on two supporting pillars to prevent dogs overturning them.	• A maximum of 100-150 dwelling units should be serviced by one solid-waste collection point (skip). • Average solid waste generated by low-income urban households is 0,2 m^3/capita/ year at an average density of 300 kg/m^3 - and for middle-income households 0,75 m^3/ capita/ year with density of 215 kg/m^3. • Example: If low-income households (average of 5,6 persons/ household) generate 22 ℓ per week (1,12 m^3/year), the number of households served by a container serviced weekly would be: - 4 per 85 ℓ container - 9 per 210 ℓ container - 270 per 6 m^3 container (skip). (See also Chapter 11)

Table 5.7.1: Quantitative guidelines for lower-order public collective utility points (continued)

UTILITY	LOCATION	ACCESS	SIZE AND DIMENSIONS	USE CAPACITIES AND THRESHOLDS
Postal collection and delivery points	• Preferable to have smaller postal collection and delivery points evenly spaced throughout the residential area. • Need to be highly visible and accessible to the population serviced. • Should be located along activity routes within easy walking distance.	• Walking distance and time of respectively 250 m and five minutes.	• Appropriate dimension of a 50 box structure is 0,6 m wide x 0,9 m long on plan. • Pillar-type post boxes are usually provided for posting letters, but parcels, insured mail, etc, need to be handed in a post offices (see Sub-chapter 5.5, Table 5.5.7).	• One post collection point (one collection/ delivery box per subscriber) could serve 200-1000 dwelling units.
Public telephones	• Need to be highly visible and accessible to the population served. • Should be located along activity routes within easy walking distance.	• Walking distance of 200 m.	• Telkom SA provides public telephones after a needs analysis and projected future demand exercise has been done to confirm the viability of the specific installation.	

Sources of information: WHO 1979; CSIR 1994; Behrens and Watson 1996; Kerr 1989; Kerr 1990; Ninham Shand 1997; various person communications)

- The opportunities for upgrading the technology of sanitation, in the form of descriptions of each of the sanitation alternatives, are dealt with in Chapter 10. Should the upgrade be to toilets on each residential site, the need for public toilets will fall away and the site on which these have been erected can be transferred to private ownership.

- As informal areas are upgraded and developed into formal settlements, the transportable post box structures can "move" with the users and can be made a permanent structure.

- The upgrading of refuse collection services, to collection from the sidewalk outside individual sites, would make redundant the facilities provided at solid-waste collection points. These could either be relocated to other areas still in need of such facilities, or removed, and the service would cease.

Operation and maintenance

Correct operation and maintenance, to enable the utility to provide at all times at least a minimum level of the intended service, is extremely important. However, the operation and maintenance of the collective utility point can often be a problem.

To reduce the incidence of utilities being out of action, and hence reduce construction, operation and maintenance costs, as well as inconvenience to users, public participation should attempt to ensure "ownership" and identified responsibility of individuals or households for the operation, maintenance and cleaning of the utility that they will directly depend upon. The likely effectiveness will be increased if training of local inhabitants in the operation and maintenance of the utility accompanies the infrastructure development. Conversely, design of the utility should take cognisance of the capacity and resources of local inhabitants to facilitate this local operation and maintenance. With respect to operation and maintenance, there are thus two issues:

- it must be established who is to be responsible; and

- design the components for easy operation and maintenance.

Even more important than training in maintenance of the collective utility point, because it must involve all users, must be training in the use of the area. It must be inculcated that good operational practices and maintenance are the responsibility of everyone who comes to the utility point. Thus everybody must see it as their duty to (for example):

- turn taps off after use;

- clean up the area - remove rubbish;

- remove sediment from the standpipe apron, and ensure that the outlet to the soakaway is unblocked at all times; and

- notice when taps are dripping even after having been turned off, and to notify (and to know whom to notify) those responsible for routine maintenance, so that they can replace the washer or other faulty component.

Despite all precautions, however, problems frequently arise in practice. A periodically out-of-order collective utility can lead to the users calling for its replacement by an on-site service, whether this option is affordable or not, or undesirable for any other reason. This is despite there being nothing intrinsically unacceptable about the level of service provided by the collective point, but its operational record has given it (and, often, other collective utilities) a bad reputation.

Personal safety is an important issue in respect of some collective utility points, especially bath houses and communal toilets. There are many reported instances of users feeling unsafe at the utility point and/or on the walk there and back. It is because users have been attacked (the bath houses even became the hiding places of criminals) that some of the few bath houses of the past were demolished (Huchzermeyer 1996, pp 26, 27) (See Sub-chapter 5.8.3).

Link infrastructure

For load capacities of link infrastructure, the appropriate chapters from Chapter 6 onwards should be referred to.

Detailed design

The detailed design of collective utility points is beyond the scope of these guidelines. (Refer, for example, to Ninham Shand (1997), for a recent discussion of more detailed issues on collective water points.)

Collective utility points primarily serving higher-order collective utility points

Design considerations

Opportunities for trading, small-scale manufacturing, repairs and servicing, and other economic activities exist at places where large numbers of people

gather or through which large numbers of pedestrians move.

Reference in this section is thus to guidelines for collective utility points primarily serving public gathering places such as at modal interchanges, bus and taxi ranks, areas of high-volume pedestrian traffic (inner city), major vehicle-entry points to residential areas, along major pedestrian routes to railway stations, etc, public markets or community centres. These utility points are, often, also used on the way to or from home or to (in addition to patronising the utility point) work, school, recreation, shopping or other destination(s).

Design decisions regarding these relate mainly to

- planning considerations, particularly the location of one component relative to another (e.g. high-use utilities at a rail station should be as close as possible to the main pedestrian route between the platform exit and the taxi rank);
- space standards, particularly related to the numbers of users at any one time, and the distribution of use through the day and through the week;
- engineering considerations;
- provision for upgrading;
- operation and maintenance; and
- link infrastructure.

Whereas the guidelines of the previous sections would obviously not be of value in determining the location of collective utility points at public gathering places, they are of value in determining the number of each at the various gathering places.

The forms and functions of public gathering places will vary enormously from one location to another, and each resultant physical form of the collective facility must vary accordingly.

In the planning of new local mixed-use areas, provision should be made for space for sites for trading, but nothing should be designed and built until trading has begun on the site and potential shoppers are living in the vicinity.

With respect to the planning of space for and the design of utilities, there are major differences between public gathering places, including trading centres, in outlying settlements and those in the more established parts of the city, including the inner city. The inner city collective utility need is mostly for management of what is already there, and its upgrading, whereas in outlying settlements the need is to facilitate economic development.

Engineering considerations for the inner city and outlying areas are also different. The extensive presence of underground services below sidewalks, which calls for care in the excavation of foundations for stalls, is one example. The outlying areas, on the other hand, are often without engineering services. There is often thus a need to bring utilities to the outlying market areas but in such a way that these also cater for local residents. In another example, there are space constraints in the inner city - thus it might not be acceptable to place a refuse skip on a sidewalk in the inner city.

The planning of the market areas, taxi and bus ranks, public toilets, access for service and emergency vehicles, pedestrian routes and circulation areas lies within the field of urban design and architectural disciplines. In existing trading areas, railway stations, bus and taxi ranks, information can be gathered by means of vehicle and pedestrian movement counts, which will assist in the planning process.

Planning, space and engineering considerations

Utilities for the public gathering places must be designed in accordance with the engineering guidelines contained in Chapter 6 onwards. To take public toilets in modal interchanges areas as an example, provision of these should be linked to the number of people passing through, gathering or trading, etc. Thus large pedestrian stands require more utilities. For information on determining the numbers of toilets, SABS 400:1990 is of value.

Small-scale manufacturing, repair services and cooking activities require electricity (or other alternative energy sources). Electricity supply can be provided through pre-paid card or code-operated dispensers, which are mounted under cover in lock-up stalls hired by the entrepreneurs.

In other respects, the comments in Table 5.7.1 apply here as well.

Provision for upgrading, operation and maintenance, links, and detailed design

Certain facilities/services fulfil a need of the community even as the opportunities for improvement present themselves. Markets would always be a need, if the locality generates income for the beneficiaries. Similarly, sanitation facilities at public open spaces or taxi ranks would not necessarily fall into disuse were there upgrading or improved circumstances for the community.

In other respects, the comments of the previous section under the same heading apply here as well.

THE GUIDELINES - A CAUTIONARY REMARK

Much of the preceding, it has to be admitted, is to some or other extent "unproven". With few exceptions, each provision of collective utility points in South Africa has tended to share one or more of the following characteristics:

- provision as an ad hoc reaction by the authorities to a land invasion, or gradual overcrowding of a settlement (and overloading of existing services) - as a stopgap which is not improved upon until the next health scare, bout of political unrest, or population influx;

- as a single-utility provision (e.g. collective water in one place, collective sanitation elsewhere, and postal delivery in a third place), with no attempt being made to co-ordinate provision for the greater convenience of the users; and

- a few years after construction, the utility is poorly maintained, vandalised, and/or abused - and often as a consequence avoided by those who, it had been planned, would use the utility.

The last couple of years has seen a dramatic increase in the number of attempts to provide collective utilities in the manner described in this sub-chapter, and in the effort and skill devoted to these attempts. This is especially in respect of those places where large numbers of people gather every day (the modal interchange with informal market, for example). Every situation is so very different from any other that design guidelines must necessarily be broad. These situational differences arise in terms of size, in-town or suburban or outlying area location, type and intensity of activity, history, socio-economic groups using the place, presence (or absence) and state of existing utilities, and juxtaposition of magnets (the markets, public transport boarding points, office or shop destinations, etc).

It should, however, be noted that, understandably in the current situation of financially-strapped local authorities (who are usually the developers of these collective utilities), the available resources have had to be given to the worst situations, which usually has meant those affecting the largest numbers of users. Thus the projects available for study, whether projects being planned or already built, are generally at places where large numbers of people gather each day

- to break their commuting journey (i.e. interchange between some combination of walk-taxi-bus-train (less frequently, car or truck; even less frequently, cycle));

- to shop; or

- (often) to do both.

Even in respect of these public-gathering types of use, the available effort is thus going mostly into situations with the largest concentrations of people, rather than into the planning and design of collective utility points to serve smaller-scale taxi stops or trading areas.

Very little of the current effort is going into higher-order collective utility points designed for use by residents of the immediate vicinity. Even the Manenberg bath house, built to cater for a development where the houses were initially not fitted with hot water cylinders, is one of the few exceptions (and it is more than ten years old).

Thus many of the collective utility points presently being designed (certainly, almost all of those above the lowest order) are for the upgrading of already planned situations. Already planned in this context includes

- existing situations where pressure of users, and often the congested and polluted circumstances that have arisen, have to be addressed urgently; and

- situations in townships already built and settled, which may not yet have become problems, but are in an early stage of growth and obviously need to have collective utilities provided before unhygienic or otherwise undesirable circumstances arise.

CONCLUSION

Extensive enquiries failed to find in a single example in South Africa the application of most, let alone all, of the principles set out in these guidelines - which is not in the least surprising. One of the purposes of this document is to modify key aspects of the planning philosophy that has governed the development of our cities - especially to free them from rigid adherence to concepts of the inward-looking neighbourhood unit and from a road hierarchy that is unfriendly to public transport.

Thus no suitable examples were found of planning layouts that specifically allowed for collective utility points, accommodating multiple utilities in a designed relationship with public transport (especially taxis), informal marketing and the nearby residential area. Such forms of development have never before been advocated by the authorities - and, if they have been

built at all, have not been built and operated for long enough for lessons to be learnt. All stakeholders are unfamiliar with the concept - land-owners, residents, taxi associations, informal traders and professionals alike. If there are existing situations that are now being replanned with some of this sub-chapter's principles in mind, they are each unique experiments not just in planning and engineering design, but also in processes of social understanding, small business development, negotiation and, not least, political dynamics.

Even the examples found of collective utility points within residential areas are inadequate in that none were designed as multi-utility clusters. All are primarily single-purpose, with some other uses perhaps added as an afterthought. Their locations are often not satisfactory, even for that single purpose. Their integration into the needs of the community they serve, and especially their surveillance by that community (let alone their operation and maintenance - if any - by that community) have not been thought through.

Nevertheless, despite the untried nature of much of the planning and engineering philosophy underlying this sub-chapter, the shortage of touchable case studies, and the fact that the jury is still out on nearly all of them, it is believed that this sub-chapter is a significant step forward in a desirable planning direction, to the great advantage of the users (residents, taxi drivers and passengers, traders and others) that will have the convenience of collective utilities.

BIBLIOGRAPHY

African National Congress (ANC) (1994). *The Reconstruction and Development Programme*. Umanyano, Johannesburg.

Bartone, C et al (1994). *Toward environmental strategies for cities.* Urban Management Programme Report No. 18. UNCHS (Habitat) / The World Bank / UNDP. Washington.

Behrens, R and Watson, V (1996). *Making urban places: principles and guidelines for layout planning.* Urban Problems Research Unit, University of Cape Town.

Cairncross, S and Feachem, R G (1993). *Environmental health engineering in the tropics*. (2nd ed.) John Wiley, Chichester.

City of Cape Town (1996). *Nyanga Station precinct development framework*. Report by City Planner's Department to Urban Planning Committee. 22 November.

City of Cape Town (1997). *Nyanga Station precinct development: Urban, landscaping and architectural design brief*. Draft: City Planner's Department.

CSIR (1994). *Guidelines for the provision of engineering services and amenities in residential township development.* Revised edition, National Housing Board. Pretoria.

Development Bank of Southern Africa (1993a). *Socio-economic enhancement of development projects.* Construction and development series: No. 1. DBSA. Midrand.

Development Bank of Southern Africa (1993b). *Interim guidelines for labour-based construction projects*. Construction and development series: No. 2. DBSA. Midrand.

Feachem, R G, Bradley, D J, Garelick, H and Mara, D D (1983). *Sanitation and disease: Health aspects of excreta and wastewater management.* Published for the World Bank. John Wiley. Washington DC.

Genthe, B and Seager, J (1997). *The effect of water supply, handling and usage on water quality in relation to health indices in developing communities.* Water Research Commission Report Nr. 562/1/96. Water Commission. Pretoria.

Greater Johannesburg Transitional Metropolitan Council (1997). *Greater Johannesburg economic development study tour of Cape Town, Port Elizabeth and Durban.* GJTMC. Johannesburg.

Greater Johannesburg Transitional Metropolitan Council, Southern MLC (1997a). *Development and management of street trading markets: A procedural guide for the Southern Metropolitan Local Council.* Southern MLC. Johannesburg.

Greater Johannesburg Transitional Metropolitan Council, Southern MLC (1997b). I*nformal trading projects within the outlying areas and the informal settlements 97/98.* Local Economic Development Department. Southern MLC. Johannesburg.

Huchzermeyer, M (1994). *Public obligation versus individual liberty: Considerations in the provision of living environments for the lowest income sector on well-located land in Cape Town, with reference to the Wingfield site*. Project report for Master's Degree in City Planning and Urban Development, University of Cape Town, October.

Huchzermeyer, M (1996). *Nyanga: Interviewing of residents and roleplayers*. Project report for ODA. Draft, May.

Kalbermatten, J M, Julius, D S and Gunnerson, C G (1980a). *Appropriate technology for water supply and sanitation.* Vol 1: Technical and economic options. World Bank. Washington DC.

Keep South Africa clean organisation (1997). *One man contract.*

Kerr, C (Ed) (1989). *Community water development.* Intermediate Technology Publications. London.

Kerr, C (Ed) (1990). *Community health and sanitation.* Intermediate Technology Publications. London.

Mayet, M A G (1994). *Domestic waste generation in the urban core of the DFR.* MSc dissertation, University of Natal.

Milne, C (1994). *Guidelines for emerging contractor development.* Construction and development series: No. 5. DBSA. Midrand.

Ninham Shand (1997): *Design of water delivery to reduce health risks.* Report for NaSCO of DWAF. Draft. October 1997.

Ninham Shand (1998). *Appropriate guidelines on the planning and design of collective public utility systems, as a planned element of settlement systems.* Unpublished report prepared for the CSIR, Pretoria.

Okun, D A and Ernst, W R (1987). *Community piped water supply systems in developing countries: A planning manual.* World Bank Technical Paper No. 60. World Bank, Washington DC.

Palmer Development Group (1996). *Evaluation of solid waste practice in developing urban areas of South Africa.* WRC report No. 629/1/96. Pretoria.

SABS 400:1990. *Code of practice for the application of the National Building Regulations.* South African Bureau of Standards, Pretoria.

South Africa, Department of Constitutional Development (1997). *Municipal service options: a guideline for local authorities*. Government Printers. Pretoria.

South Africa, Department of Water Affairs (1994). Water supply and sanitation policy: *White Paper: Water - an indivisible national asset*. Government Printer. Cape Town.

South Africa, Department of Water Affairs (1996). *White Paper: National sanitation policy*. National Sanitation Task Team. Draft. Government Printer. Pretoria.

South Africa: Department of Water Affairs (1997). *White Paper on a national water policy for South Africa.* Government Printer. Pretoria.

Sulabh International Social Service Organisation (nd). *Sulabh public toilets and bath complexes*. New Delhi.

Wates Meiring and Barnard (1997). *Report on waste generation sub-project.* Report to Department of Water Affairs, No. 3064/1505/4/S. Pretoria.

Wegelin-Schuringa, M and Kodo, T (1997). *Tenancy and sanitation provision in informal settlements in Nairobi: Revisiting the public latrine option*. Environment and urbanisation. October, pp 181-190.

WHO International Reference Centre for Community Water Supply (1979). *Public standpost water supplies - a design manual.* Technical paper 14. The Hague, December.