THE DEVELOPMENT OF A SITE SANITATION PLANNING AND REPORTING AID (SSPRA) FOR THE SELECTION OF APPROPRIATE SANITATION TECHNOLOGIES FOR DEVELOPING COMMUNITIES

USER MANUAL

Compiled by

John Howard, Nevil Quinn, Kathy Eales, Rene Voller

UMGENI WATER

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1. INTRODUCTION

1.1 THE PURPOSE OF THE SSPRA

Local and international experience over several decades has shown that the provision of sanitation facilities is a complex task, dependent on many different variables. These include affordability on the part of both the users and the service providers, willingness of the users to pay for both the capital development and maintenance of systems, technical suitability and responsibilities and capacities for operation and maintenance. Cultural norms and the perceptions and preferences of the users have seldom been integral to decision making with users largely being excluded from the planning and decision making process. Failure to successfully integrate all the variables into the planning of sanitation projects and in selecting sanitation technologies provides the background to many failed attempts at sanitation delivery, which are cited in the local and international literature.

The lack of provision of adequate and appropriate sanitation facilities in developing communities has direct and serious effects on the quality of surface and ground water resources. Another major aspect of the failure of delivery of adequate sanitation facilities is the health of the communities. This is dependent on the above mentioned water resources for drinking and domestic purposes. Surveys[2] undertaken in the early 1990s indicated that up to 95% of people living in the rural areas or in transitional areas adjacent to urban areas, do not have access to adequate sanitation facilities. This situation demonstrates a critically urgent need for successful sanitation delivery in these areas.

Whereas there exists a significant amount of political will to address the inadequacy of supply of sanitation services as rapidly as possible, there is a risk of repeating the mistakes of the past and providing inappropriate facilities in many places due to a lack of consideration of all the relevant variables. Sanitation planning procedures of the past were unable to satisfy these requirements.

The Site Sanitation Planning and Reporting Aid (SSPRA) has been developed to address these needs. The tool integrates all the relevant variables and at the same time provides for transparency and accountability in decision making by documenting the planning process. The SSPRA is intended for the use of planners, supply agencies and others who provide services to developing communities. It is not intended for use directly by communities although the full participation of the end users is a key element of the SSPRA.

Very importantly, the user of the SSPRA should bear in mind that the tool does not take the place of sound decision making and consequently does not provide the user with a decision in the form of a chosen technology. It is merely a mechanism whereby information relevant to planning and technology selection can be formally organised, recorded for immediate and later referral, and used as the basis for informed decision making in sanitation planning and technology selection. The SSPRA provides support for decision making but not the decision itself.

In the process of working through the SSPRA, the user is continually focused on the breadth and complexity of information required for sound decision making in this area, underlining the fact that sanitation planning and the selection of appropriate technology requires careful and meticulous consideration.

1.2 DEVELOPMENT OF THE SSPRA

The SSPRA was developed over a period of three years (1995-1998) and involved:

- discussion and consultation with central, provincial and local government structures, service providers, experts in various related disciplines, planners, engineers and user groups, including two workshops with specialists;
- field visits to successful and less successful sanitation projects;
- a comprehensive literature review of techniques available for technology selection and the context of technology selection within broader sanitation planning;
- design and modification over time of the overall SSPRA structure; and
- development of the software programme for the SSPRA user interface.

Although the application of the SSPRA was focused towards the Umgeni Water Supply Area (UWSA) in KwaZulu/Natal, the methodologies and tools could be applied elsewhere.

1.3 THE SSPRA PROCESS

Figure 1 illustrates the process which makes up the SSPRA. The system comprises four components:

I : composition of a Regional Sanitation Zoning Map
II : a WINDOWS 95-based planning and reporting aid on PC
III : a specialist consultation network recorded on paper
IV : an option of technology design modification.

The four components constitute stages of a **process**. They have been designed to be used sequentially i.e. (I) and (II) concurrently, followed by (III) and (IV) in that order.

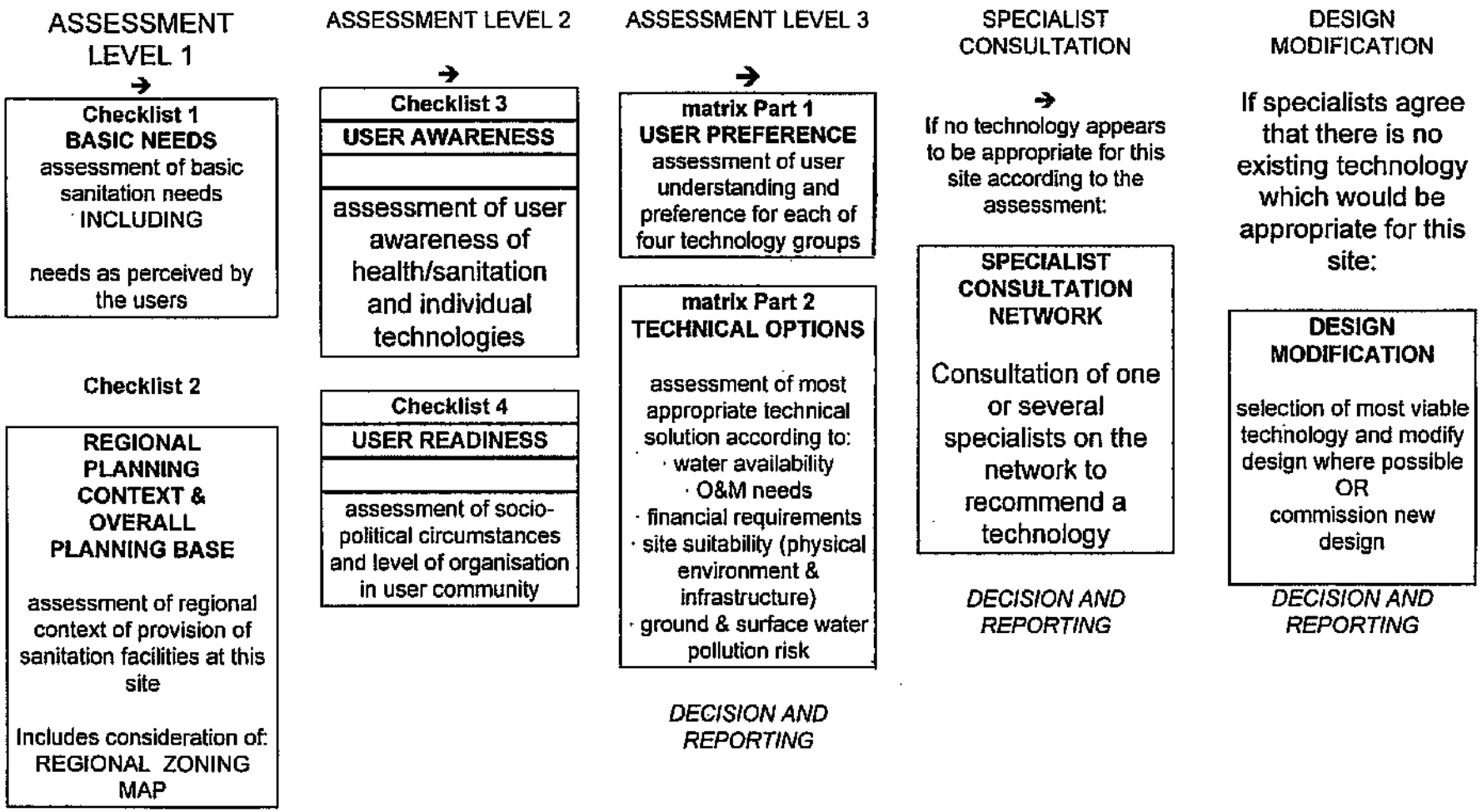

FIGURE 1 : Composition of the SSPRA

1.4 SUPPORTING INFORMATION

A better understanding of issues relating to sanitation technology selection can be gained from the information found in the appendices. Included are the following references:

(i) A list of available guidelines for sanitation planning, technology selection and design (Appendix I).

(ii) A table showing the key features of currently available sanitation technologies (Appendix II).

(iii) A list of key references for further reading / referral (Appendix III).

(iv) A list of useful Internet Web addresses (Appendix IV).

2. SANITATION TECHNOLOGY SELECTION

2.1 SANITATION PLANNING : THE CURRENT CONTEXT

Despite the thrust of the Draft White Paper on Sanitation (DWAF, 1995), which argues for universal access to basic sanitation as a first priority, the debate around sanitation technology choice is polarising rapidly, with one approach for urban and peri-urban areas, and another for rural areas.

The majority of urban local authorities still oppose Ventilated Improved Pit Latrines (VIP) of any description, on public health and political grounds, and view alternatives to water-borne sanitation as problematic interim measures. Wherever they have the means, local authorities are installing water-borne sanitation regardless of residents' ability to meet the cost of servicing it.

2.1.1 Urban Sanitation

Urban municipalities mobilise a number of arguments in support of water-borne sanitation, e.g., that there is an urgent need to de-racialise sanitation provision (given that urban white households have almost universal access to water-borne sanitation), that the public health and environmental costs of pit latrines in dense settlements far outweigh the cost of installing and maintaining water-borne sanitation, and that service payment levels will only improve when there is a significant improvement in the level and standard of service delivery.

Where the supporting infrastructure or funds are available to accommodate full water-borne sanitation, and where users can afford it, these arguments are reasonable. However, what they do not address is the public health costs of system failure in areas where the institutional infrastructure cannot yet provide reliable operation and maintenance support; the long-term cost and sustainability of subsidising services where users' affordability levels are low, and the risk of a far higher debt burden if service payment levels do not improve significantly soon. Expecting people in ultra-low income settlements to pay for improved levels of service without any equivalent increase in their household incomes simply makes their poverty more expensive, rather than raising their standard of living.

2.1.2 Rural sanitation

Water-borne sanitation is simply not an option in most rural settlements for the foreseeable future, given the absence of running water. The development imperative is to provide a reliable source of potable water within 200m of each household by the end of the decade, and in many parts of the country, development agents will be hard-pushed to meet this challenge.

It appears that most rural people are pragmatic in assessing their range of sanitation options. In the absence of running water, let alone bulk treatment works, there is little talk of high level sanitation servicing. Indeed, the probable response to a sanitation initiative is more likely to be disinterest, given

the greater priority assigned to water, roads, electricity, telephones, health and recreational facilities.

In the final instance, sanitation is still perceived by most as an essential private matter. Without community support and commitment, no sanitation upgrading initiative will be successful or sustainable.*Sectoral approaches to sanitation programmingSectoral approaches to sanitation programmingSectoral approaches to sanitation programming*

2.2 PRINCIPLES TO BE APPLIED IN SANITATION PLANNING AND IMPLEMENTATION

Bearing in mind the above comments on the current context of sanitation delivery, there are a number of broad principles which apply to the planning of all sanitation projects whether these be situated in rural, urban or transitional (peri-urban) environments. The following list of principles is provided as a guide to planners about to embark on the planning of new or upgrading of existing sanitation facilities. It is hoped that the application of these principles will guide planners and service providers with their part in the provision of appropriate sanitation facilities.

The list of principles was formulated in consultation with a wide range of specialists and/or people with expertise and experience in the field of sanitation provision.

- ***Integrated Development /Service Supply***:- Planning for sanitation delivery must be integrated with planning for other services (e.g. water supply, solid waste disposal, stormwater control).

- ***Demand/User Participation***:- The sanitation planning process should be demand driven and community based. Potential users should therefore steer the planning process and be the primary decision makers.

- ***Support Structures***:- Sanitation projects must be supported by an education, training and capacity building programme. This will include basic health education, training of users in operation and maintenance and training of local construction contractors.

- ***Accountability***:- Service organisations/others providing assistance or advice to potential users for sanitation planning and technology selection, must be held accountable.

- ***Equitable Supply of Services***:- Sanitation planning should strive for the provision of adequate sanitation facilities for as many people as possible rather than sophisticated systems for only a few.

- ***Appropriate Technology/Community Development***:- Sanitation planning should be aimed at providing sanitation facilities which are safe to use at the lowest capital cost affordable to users, which are easy to operate and maintain and have minimal environmental impact. Provision of facilities should be labour based and locally available materials should be used to ensure revenue

being returned to the community.

- ***Technology Selection***:- Technology selection should be based on a comprehensive consideration of all relevant technical, environmental, socio-economic, practical and aesthetic factors.

- The current status of sanitation facilities must form the basis of planning of new/upgraded facilities.

- The potential for upgrading of sanitation facilities in the future must be considered during sanitation planning and technology selection.

- Different sanitation options/alternative solutions must be generated and considered in every project.

- Practical and cost implications of the operation and maintenance of systems after installation must be accounted for during sanitation planning and technology selection.

- Sustainable financing possibilities and the implications of each system must be considered.

- Affordability by potential users must be considered to be a key factor in sanitation planning since users should contribute to costs.

- The potential negative environmental impact of the different technologies being considered must be identified and minimised, especially where these relate to water resources. Where positive environmental impacts may occur, these should be maximised.

- Legal limitations to development with regard to human and environmental health must be complied with.

- ***Project Monitoring and Evaluation***:- Projects/sanitation delivery should be monitored and evaluated to measure the success of project execution and the performance of the technologies applied.

2.3 THE CONTEXT OF THE SSPRA

The planning and provision of sanitation facilities in developing communities is a complex and multifaceted process. No single tool can hope to address all the issues which need to be taken into account in such a complex process, particularly where decision making is always to some extent based on the subjective judgement of several different parties and on incomplete information. In addition, there are several players in sanitation development projects, whose goals in sanitation

provision may be vastly different. The SSPRA has been developed for a very specific purpose, which is to assist service organisations, development agencies, local authorities and the like, in formalising their contribution to the process of appropriate and acceptable sanitation technology selection, for particular development projects within their jurisdictional areas or to which they may be contributing in some way.

The primary purpose of the SSPRA is therefore to provide the above mentioned agencies with a framework within which information can be recorded in a consistent manner for the purposes of decision making. Since the tool is focused on assisting with technology selection, it makes a limited but important contribution to the overall sanitation planning process.

The SSPRA must not be seen as a decisions making tool, nor as a replacement of the much broader sanitation planning process.

It must also be borne in mind that the four technology groups used in the SSPRA have been used for illustrative purposes, i.e. they represent permutations of the types of sewage treatment (wet or dry, on-site or off-site) that are possible rather than specific technologies (e.g. VIP's, urine diversion systems, waterborne sewerage). The tool thus provides a foundation upon which further discussion and investigation must take place to reach decisions about specific technologies for specific sites.

The SSPRA may be seen as merely one tool to undertake a specific task within the broader planning process or, more specifically, within particular projects for the provision of sanitation. Sound sanitation planning, requires that there is continuity between planning at a regional level (catchment), through to planning at a project level and within projects, planning at a site specific level. The essential link between the two primary components of the SSPRA (*viz.* the Regional Zoning Map and the user interface which provides support for technology selection) is the approach taken to managing the planning and implementation of sanitation upgrades in user communities. It is proposed that this link be made by using the Project Cycle Management (PCM) approach and positioning the use of the SSPRA computer-based tool within this process, as one of a range of tasks and inputs which contribute to the overall implementation of a sanitation project. Users are referred in the first instance to the research report documenting the development of the SSPRA (WRC Report no. 586/1/98[3]) for further detail on the use of the PCM approach to contextualise the SSPRA.

PCM places the implementing agent (local authority, development agency, service organisation) in a supporting role to community led sanitation development projects. The SSPRA can be used within this context by the implementing agent to provide organised information to user communities, on technology options and the implications of each, to facilitate their decision making. There are a number of different project management approaches which could be used for the planning and implementation of sanitation projects and to which the SSPRA could contribute. The PHAST approach is probably the most appropriate in the context of the SSPRA. An outline of the main

elements of the PHAST Programme is given in the Literature Review which is documented in the same research report referred to above.

The ultimate goal of the upgrading of sanitation in developing communities is to provide barriers to contamination pathways for the purposes of protecting or improving public and environmental health. Only by examining sanitation technology choice as part of an integrated planning and implementation process which takes place from regional through to local level, will it be possible to realise this goal.

For the SSPRA to contribute to improvements in public and environmental health, it must also be contextualised within the broader planning process (the regional planning base and the project management approach) providing a mechanism for the SSPRA to contribute to an improvement in public and environmental health. The SSPRA provides information and therefore promotes understanding that can contribute to informed decision making within the broader planning process.

2.4 THE SSPRA METHODOLOGY

The first step in the SSPRA process is the compilation of a Regional Sanitation Zoning Map (RZM). The map is intended to provide a regional context to the planned sanitation project whereas all other components of the SSPRA are used for site based sanitation planning.

The purpose of compiling the RZM is to establish at a regional scale whether a particular area is suitable or unsuitable for a particular technology group. The zoning map performs a screening function and is intended to focus the procedure of the user through the rest of the SSPRA.

2.4.1 Identification of key determinants of relative suitability

There are a great number of variables which are traditionally considered in development planning at a regional scale. Many of these could be used in the production of a RZM. However, in line with the principles underlying the structure and contents of the SSPRA as well as the purpose of the SSPRA in assisting with the selection of an appropriate technology, only key determinants should be used in the compilation of the RZM to ensure that the map will effectively identify areas of differential suitability for different technologies.

A list of recommended determinants to use in the compilation of the RZM is given in Table 1 below.

TABLE 1: KEY DETERMINANTS OF RELATIVE SUITABILITY OF GEOGRAPHICAL AREAS WITH REFERENCE TO DIFFERENT SANITATION TYPES

KEY DETERMINANT / DATA FIELD	REASONS FOR SELECTION

1 PROXIMITY TO EXISTING RECONSTRUCTION AND DEVELOPMENT PROGRAMME (RDP) AND RURAL AREAS WATER AND SANITATION PROGRAMME (RAWSP) SITES	The aim of projects within the RDP and RAWSP programmes is the provision of adequate water and sanitation to disadvantaged or developing communities. The proximity to existing RDP initiatives is likely to pre-empt the provision of sanitation in other areas. *(Digital GIS data were made available by Umgeni Water and the Department of Local Government and Housing).*
2 POPULATION DENSITY	The provision of sanitation is only viable if there exists a possibility of good cost recovery. Population density of an area reflects the ability of the community to sustain the cost of a sanitation project. Below this limiting density the cost of delivery may become prohibitive. Conversely, precautions need to be taken with the provision of on-site sanitation systems where population densities are high. *(Digital GIS data were made available by the Human Sciences Research Council)*
3 MEAN MONTHLY PER CAPITA INCOME	Per capita income within a specified area can limit the choices available to the user community. Although the DSS requires more specific data on the income of users at the site, it is possible to gain a general perspective on socio-economic structure at a regional scale as part of screening. *(Digital GIS data were made available by the Human Sciences Research Council).*
4 SUSCEPTIBILITY TO GROUNDWATER CONTAMINATION	Many communities rely on boreholes as their sole source of water. The proximity to boreholes used for domestic purposes must strongly influence the siting of a sanitation system. The Directorate of Geohydrology, Department of Water Affairs and Forestry has defined a protocol to manage the potential for groundwater contamination from on-site sanitation. *(Digital GIS data were made available by the Directorate of Geohydrology, Department of Water Affairs and Forestry)*
5 PROXIMITY TO EXISTING PIPED WATER SUPPLY	Proximity to a piped potable water supply implies that users' water use and therefore need for sanitation facilities may increase. The proximity of such a supply also allows for the comprehensive consideration of wet systems i.e. technologies requiring water for flushing. *(Digital GIS data were made available by Umgeni Water).*
6 AREAS EXCLUDED FROM ANY FORM OF RESIDENTIAL SETTLEMENT · dams and rivers · formally protected conservation areas · environmentally sensitive areas	Dams and rivers - self evident *(Digital data were made available by Umgeni Water and the Department of Water Affairs and Forestry).* Conservation areas - These areas could be excluded from the RZM since they are not likely to be the subject of formal residential development plans. Environmentally sensitive areas - These areas should be excluded from formal residential development and should informal settlement occur, this should be actively discouraged rather than formalised by the supply of services. *(Digital data were made available by the KwaZulu/Natal Nature Conservation Service.)*

7 SLOPE	Gradient has a significant influence on the technology selection for a specific area. Specific design criteria for a sanitation technology are dependent on slope. Although this is less important for waterborne systems, the location of VIP's and LOFLOS systems will be influenced by slope. *(Digital data were made available by the Surveyor General, Cape Town and Umgeni Water).*
8 LOCAL AUTHORITY BOUNDARIES	Local authorities may have bylaws which preclude the use of certain technologies within their jurisdictional areas. *(Digital data were made available by the Department of Local Government and Housing).*
9 SOIL CHARACTERISTICS	The ability to successfully implement a technology choice in an area is dependent on the soil characteristics. Soil depth and soil texture will in turn affect the installation of LOFLOS, Septic tanks and VIP's. *(Digital data were made available by the Institute for Soil, Climate and Water and the School of Bioresources Engineering, University of Natal, Pietermaritzburg).*

2.5 DEFINITION OF CRITERIA

The manner in which each determinant contributes to the analysis of suitability of the region for the different technologies, depends on defined criteria or limiting values for each sanitation technology. An example of the criteria defined for each determinant used in the composition of a RZM for the Mgeni catchment area (KwaZulu-Natal Province), are given in Table 2 below:

TABLE 2: SUITABILITY CRITERIA FOR EACH OF THREE SANITATION TECHNOLOGY GROUPS

DETERMINANT	Waterborne Sewerage	Septic Tanks	VIPs
1. PROXIMITY TO RDP AND RAWSP SITES	No direct influence	Potential direct influence	Definite direct influence - therefore include in RZM
2. POPULATION DENSITY	> 2000 people /km2	< 2000 people /km^2	< 30 000 people /km^2
3. MEAN MONTHLY PER CAPITA INCOME	> R4 000	> R4 000	<R4 000
4. SUSCEPTIBILITY TO GROUNDWATER CONTAMINATION	No direct influence	50m buffer around boreholes 50m buffer around high loading sites, e.g. schools, clinics	50m buffer around boreholes 50m buffer around high loading sites, e.g.schools, clinics
5. PROXIMITY TO	Directly influence	Potential direct	No direct influence

EXISTING PIPED WATER SUPPLY		influence	
6. AREAS EXCLUDED FROM ANY FORM OF RESIDENTIAL SETTLEMENT · dams and rivers · formally protected conservation areas · environmentally sensitive areas	Exclude dams rivers conservation areas conservation sites from RZM	Exclude dams rivers conservation areas conservation sites from RZM	Exclude dams rivers conservation areas conservation sites from RZM
7. SLOPE	$3\text{-}20^{0}$	$0\text{-}16^{0}$	$<25^{0}$
8. LOCAL AUTHORITY BOUNDARIES	Include Transitional Local Authority boundaries in RZM	Include Transitional Local Authority boundaries in RZM	Exclude Transitional Local Authority boundaries from RZM
9. SOIL CHARACTERISTICS	Soil Depth > 0.2m	Soil Depth > 0.2m	Soil Depth > 0.2m

Criteria should be defined for each determinant and the data classified for **each sanitation technology option being considered**. The RZM thus results in a separate suitability map for each technology.

2.6 COMPOSITION OF THE RZM

A composite RZM should be compiled for each sanitation technology under consideration or at least those technologies which represent the major technology groupings *viz.*

Full waterborne sanitation	(wet, treatment off-site)
Septic tank system with soakaway	(wet, treatment on-site)
VIP	(dry, treatment on-site)

Once suitability criteria have been accurately determined for each technology, and the required base maps produced as a result, the RZM for each sanitation technology can be compiled by means of a overlay of all determinants. To generate the overlay, a geographic information system (GIS) was used. A GIS is a suite of tools that can be used to manipulate geographical data. A GIS has the capability of combining many layers of information and produce a result, as long as the layers can be geographically referenced. In this instance, each determinant is represented as a single geographical layer for each of the 3 different types of sanitation technologies. As a wealth of GIS data existed for the Mgeni catchment, it was fairly simple to create the layers and generate the overlay. The results of the overlay can be viewed in Figures 2a to 2c.

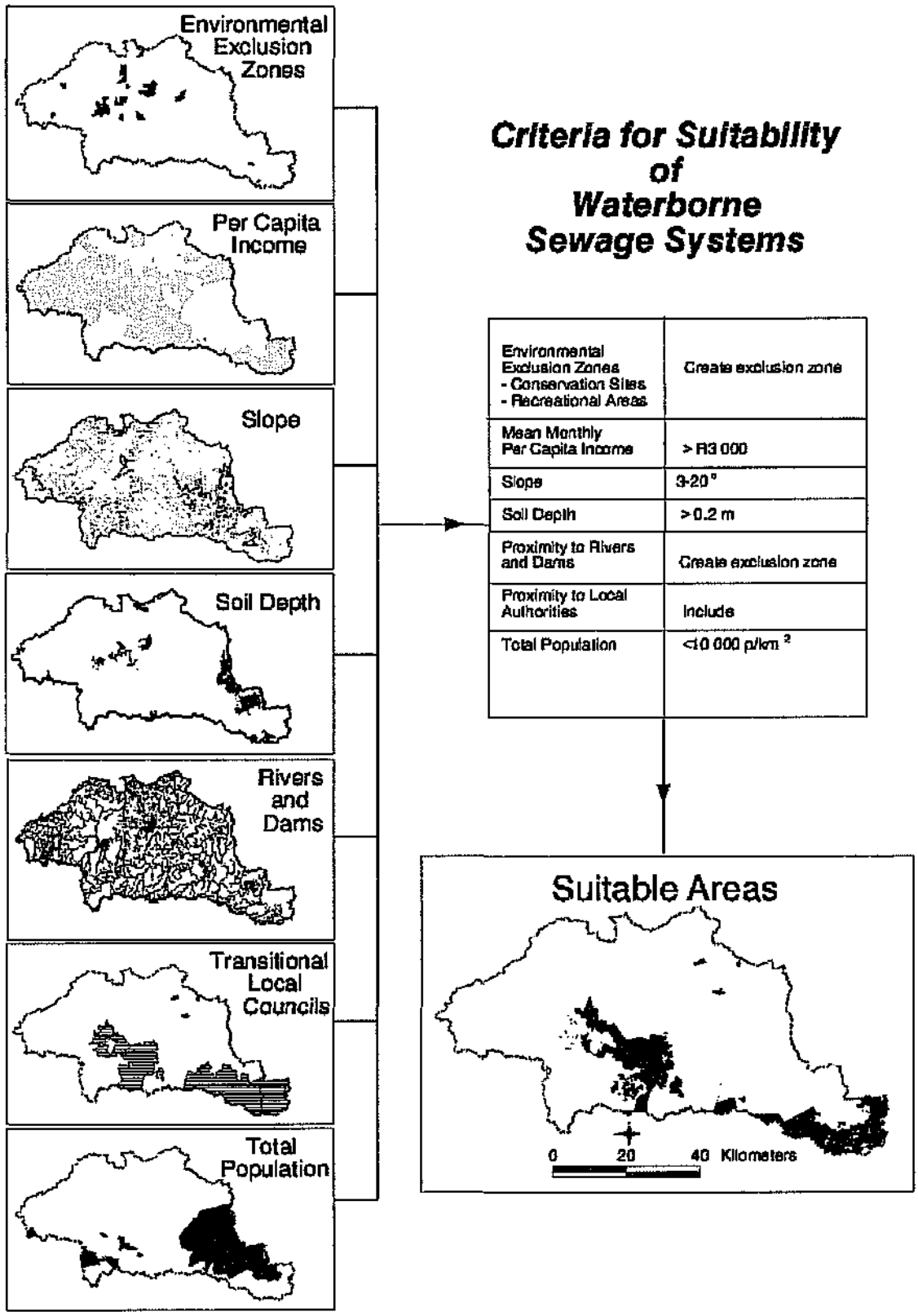

FIGURE 2a: Regional Zoning Map for planning of the provision of Waterborne Sanitation in the Mgeni Catchment

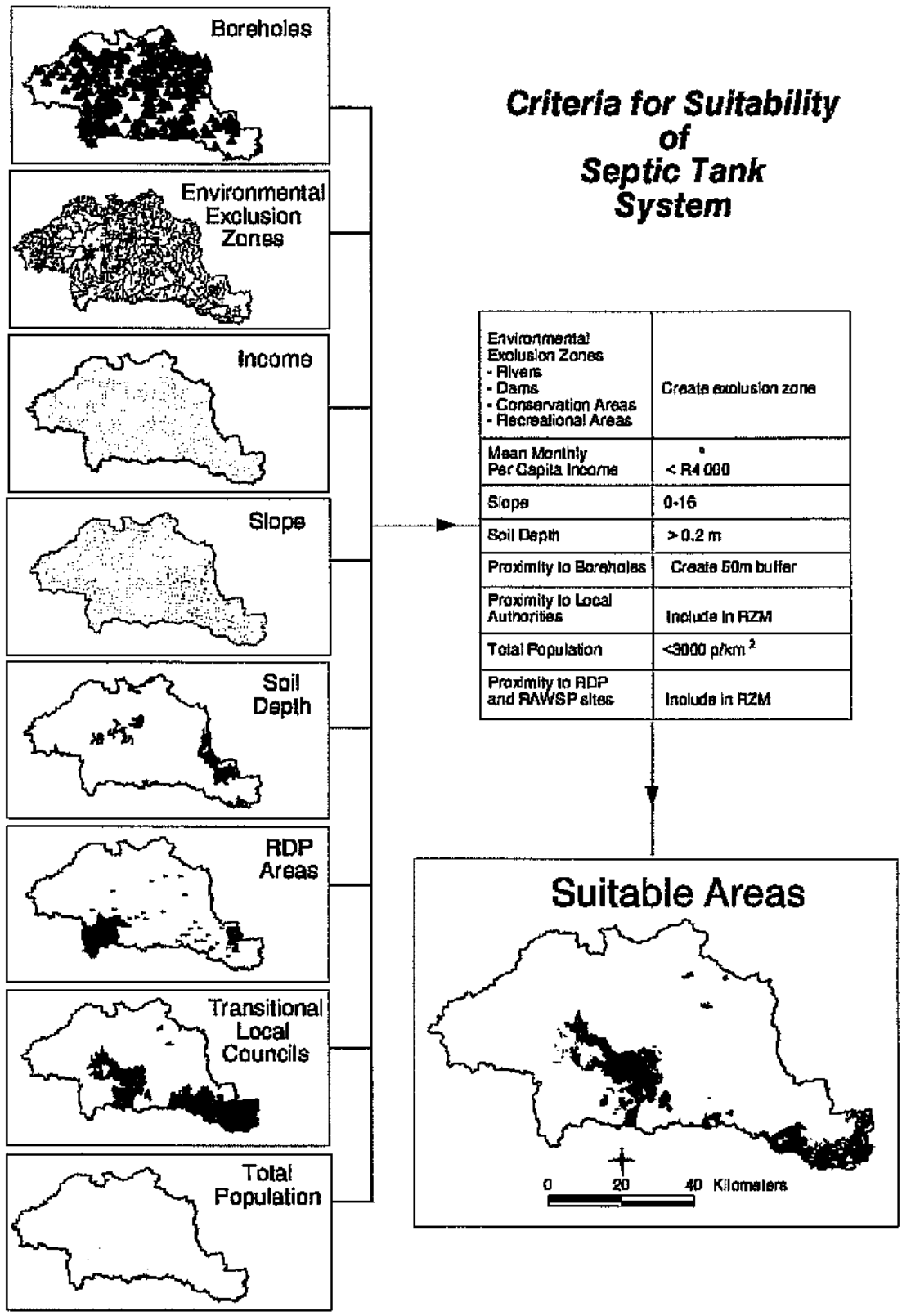

FIGURE 2b: Regional Zoning Map for planning of the provision of Septic Tank sanitation in the Mgeni Catchment

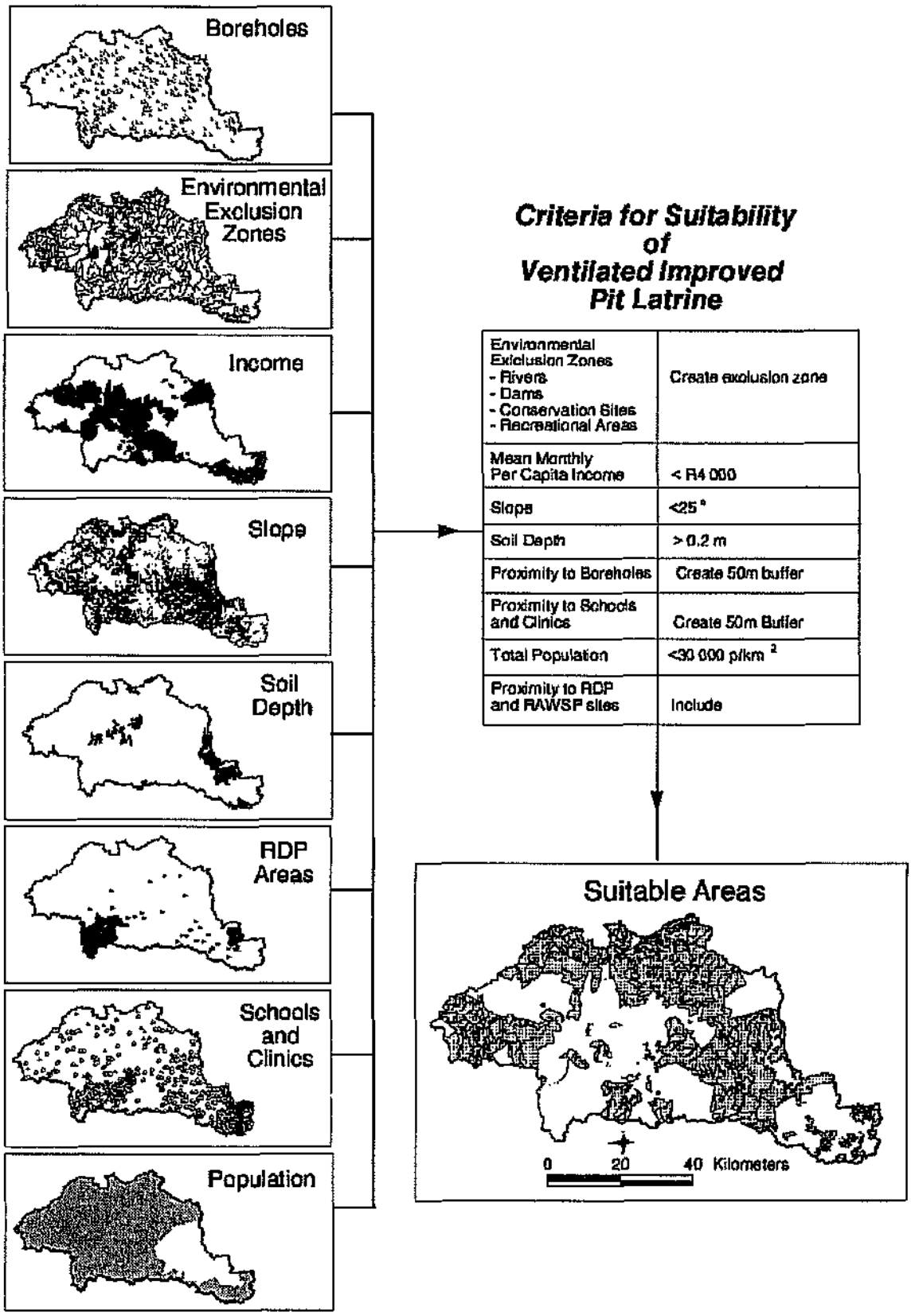

FIGURE 2c: **Regional Zoning Map for planning of the provision of Ventilated Improved Pit Latrine sanitation in the Mgeni Catchment.**

3. THE SSPRA USER INTERFACE

3.1 TECHNICAL PLATFORM AND SYSTEM REQUIREMENTS

This version of the SSPRA has been developed using Visual Basic 5 and the Windows '95 Operating System. The basic system requirements to run this program are a 486 computer, 16 Mb of RAM, the Windows '95 Operating System and approximately 5Mb free hard drive space.

3.2 INSTALLATION

Insert the disk in either your A or B drive. Go to START and click on RUN. In the new window click the '*Browse*' button and the operating system will find the installation (setup.exe) program on the disk in either your A or B drive. Follow the instructions on the screen. Do not select a different directory (c:\ Program Files\ SSPRA)

3.3 STRUCTURE OF THE SSPRA USER INTERFACE

The primary purpose of the SSPRA is to provide an objective means of providing guidance in the process of sanitation technology selection. To do this the program assesses the status of the information base being used and provides guidance through recommendations of what should be undertaken in the next step. The system also provides a means to record the information available at the time. The structure of the SSPRA user interface is shown in Figure 1 and described briefly below.

3.3.1 Introductory screen

This is the screen (Figure 3) which is displayed on start-up of the SSPRA. It shows some examples of the construction of Ventilated Improved Pit Latrines (VIP) and a particular type of VIP referred to as a 'Phungalutho'. At the top of the screen, Select '*File*' and '*New scenario*' if you wish to enter data or '*Open existing scenario*' if you wish to work with a scenario which has already been saved. The *About* button provides information on who developed this program and the Version number of the software you are using.

FIGURE 3 : Introductory SSPRA User Interface screen.

3.3.2 Basic information screen

This screen requests basic information about the software user and background information about the particular site the user is about to generate report for (Figure 4). All this information is included in the final report.

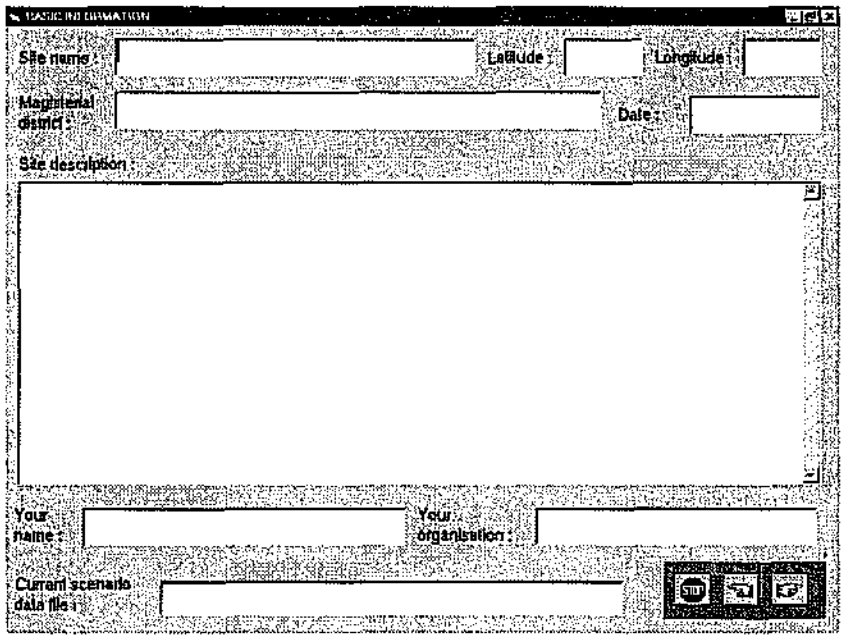

FIGURE 4 : Basic Information Screen

3.3.3 Assessment Level 1

(i) Preliminary Checklist

The purpose of the four preliminary checklists is to determine the extent to which the various fundamental requirements for sanitation planning have been met. Working through the four checklists

will assist in determining whether it is advisable to move to a more advanced stage of planning or not (***Assessment Level 2***) . In addition the results of completing the checklists will provide an indication of which areas require further attention. Each of the checklists is described in further detail below:

(ii) Basic Needs Checklist

The purpose of the basic needs checklist (Figure 5) is to determine the urgency of a sanitation upgrade. Questions asked include whether a reliable source of safe drinking water is available within 200m; if the current form of sanitation technology is on-site, whether residents obtain drinking water from a natural source within 50m, and the frequency of occurrence of gastro-intestinal diseases. The final set of questions establish what proportion of the community use each of a list of different types of technology, and to what extent these types of system work. Urgency of need is graded from '*Urgent need*' to '*Low priority*'. Using the Basic Needs Checklist for several sites on a regional basis may provide the user with an indication of regional priorities.

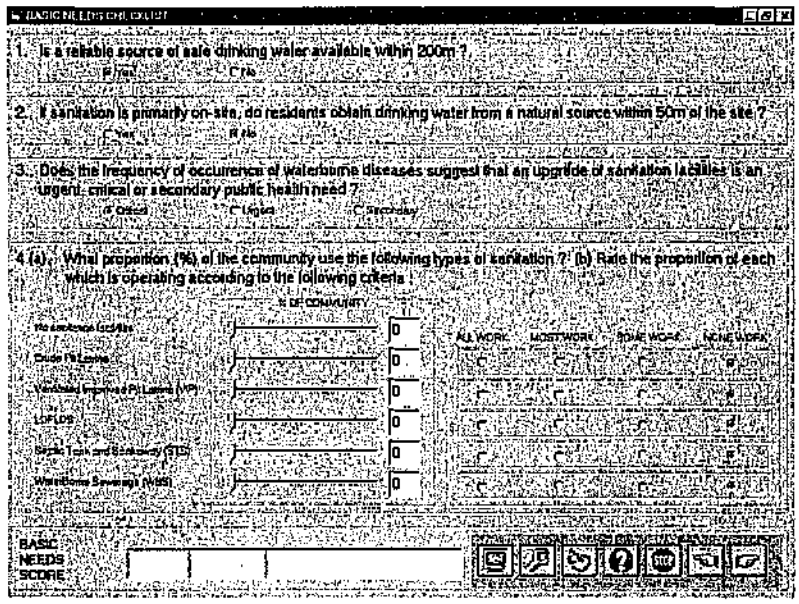

FIGURE 5 : Basic Needs Checklist screen

(iii) User Awareness Checklist

The purpose of this checklist (Figure 6) is to establish whether residents have been exposed to various types of technology, and have a basic awareness of their operation and maintenance. Questions asked include the level of public health education with regard to the operation and maintenance of a variety of systems, and whether residents are aware of the link between public health and adequate hygiene. Residents are requested to indicate to which of several systems they have been exposed, and whether the system was broken or in working order. A final question asks if residents are aware of the reasons for the breakdowns in these systems. A low score on this checklist would suggest that an education programme is essential and should precede any community decision making about sanitation. Higher scores would indicate that users are well informed and are in a position to make a decision about sanitation options.

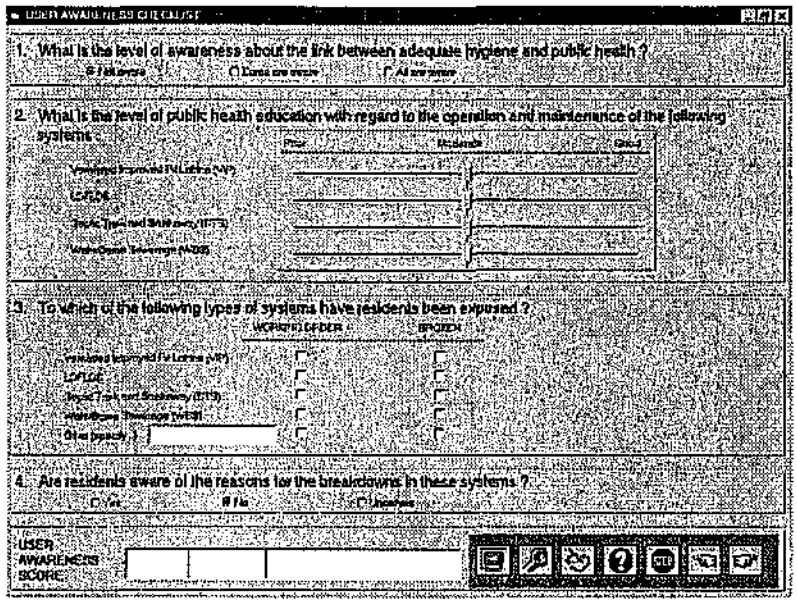

FIGURE 6 : User Awareness Checklist screen

(iv) Institutional Readiness Checklist

The purpose of the Institutional Readiness Checklist (Figure 7) is to establish whether the user community is sufficiently organised in order for a representative decision to be made, and to establish the extent to which the user community has been part of the planning process. Institutional readiness is graded from 'Very low institutional readiness' to 'Very high institutional readiness'. Low scores in this checklist would suggest that any sanitation provision has a low probability of successful implementation due to insufficient participation of the user community. Low scores would also suggest that the participation and expertise of Community Development Organisations should be sought.

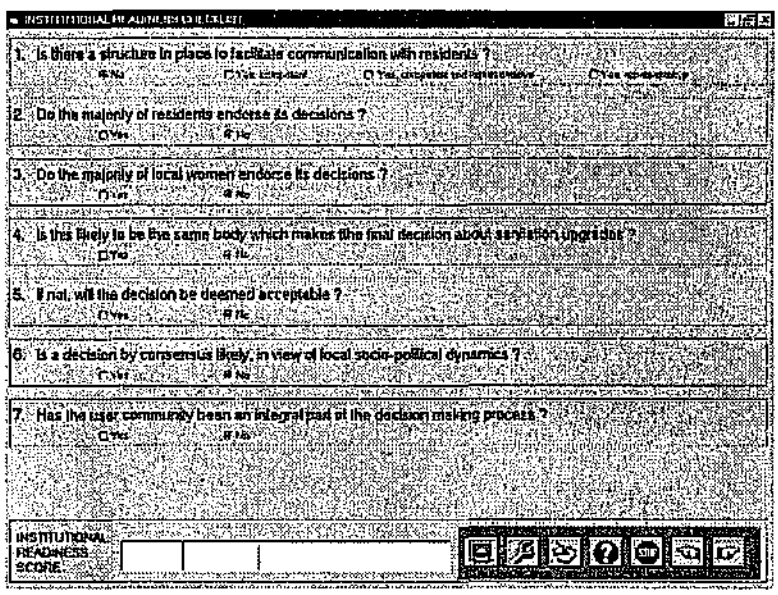

FIGURE 7 : Institutional Readiness Checklist screen

(v) Regional Planning Checklist

The regional planning checklist (Figure 8) attempts to ensure consistency between regional and local

scale planning by requesting information from the Regional Zoning Map (See Section "Regional Sanitation Zoning Map" above). In addition the permanence of the community is evaluated as is the likelihood of additional funding or infrastructural development. The purpose of this is to ensure that technology selection does not foreclose on an upgrade path. The output from this checklist suggests the most likely planning horizon and warns the user if the likelihood of the community requesting a sanitation upgrade in the near future.

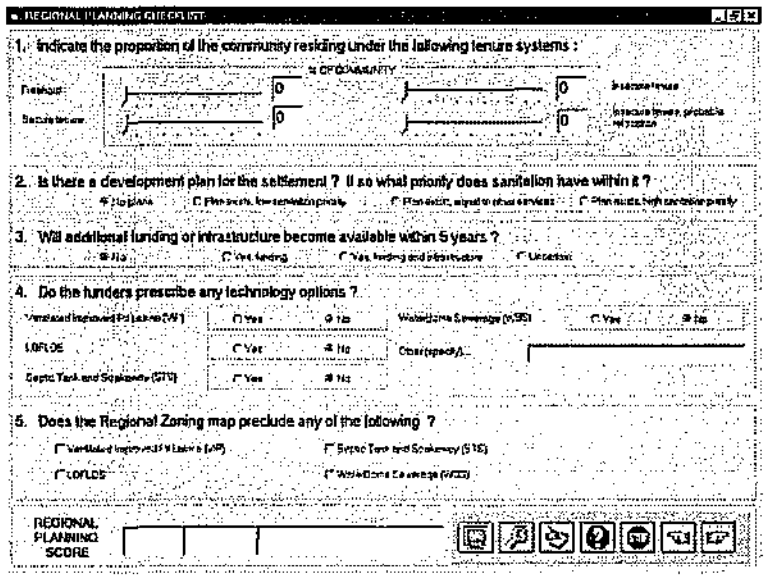

FIGURE 8 : Regional Planning Checklist Screen

(vi) Summary of checklist results

The results of each of the checklists are displayed on a single page (Figure 9), and the accompanying recommendations should bring into focus the extent to which the user can proceed to the next phase of sanitation planning with confidence.

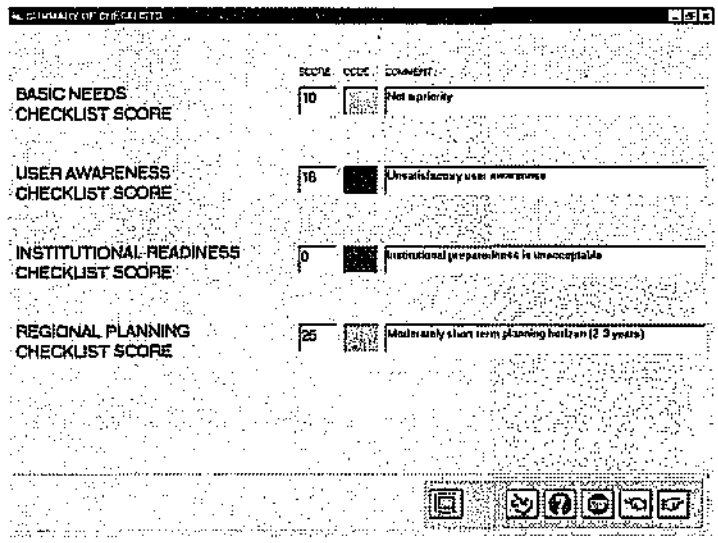

FIGURE 9 : Summary of Checklist Results screen

3.3.4 Assessment Level 2

(i) User Preference Index

The User Preference Index (Figure 10) provides an opportunity for the SSPRA user to input the desirability of each of the systems as indicated by the residents. It is essential that the scores entered in this section are a true reflection of the opinions of the majority of the potential users of the system. Additional questions relating to the users awareness of the full implications of each of the technology options are also included to determine whether the preferences are based on an informed understanding or not.

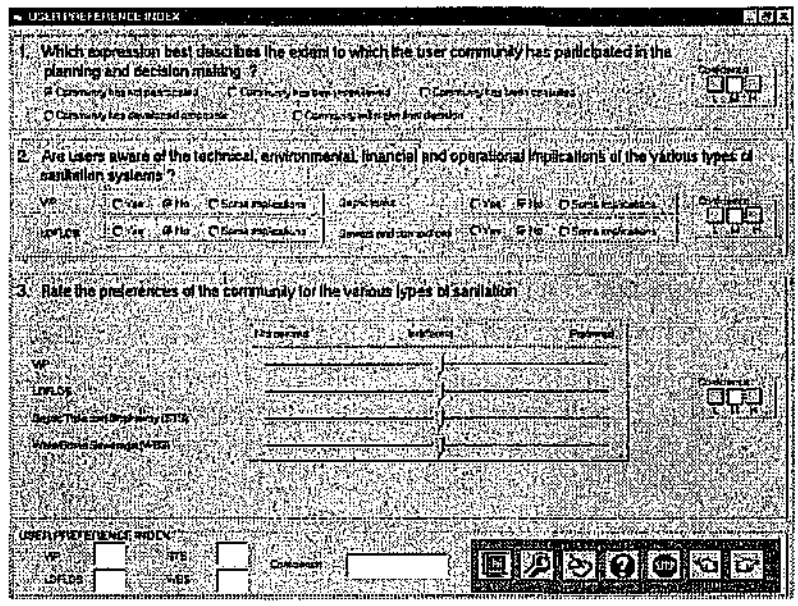

FIGURE 10 : User Preference Index

(ii) Technical indices

The six technical indices are designed to identify the constraints which may be associated with each of the four generic sanitation technologies. The resultant scores should be used as a guideline rather than an absolute, and will also provide a basis for the selection of technologies with specific design modifications. Each of the technical indices are described in further detail below :

- Water Availability Index

The Water Availability Index (Figure 11) determines the reliability of sufficient supply in relation to the operational requirements of the four generic sanitation systems. Low per capita daily water use and low reliability of supply would indicate that only dry systems are feasible whereas greater assuredness of supply and a household connection would indicate that waterborne and septic tank systems are possible.

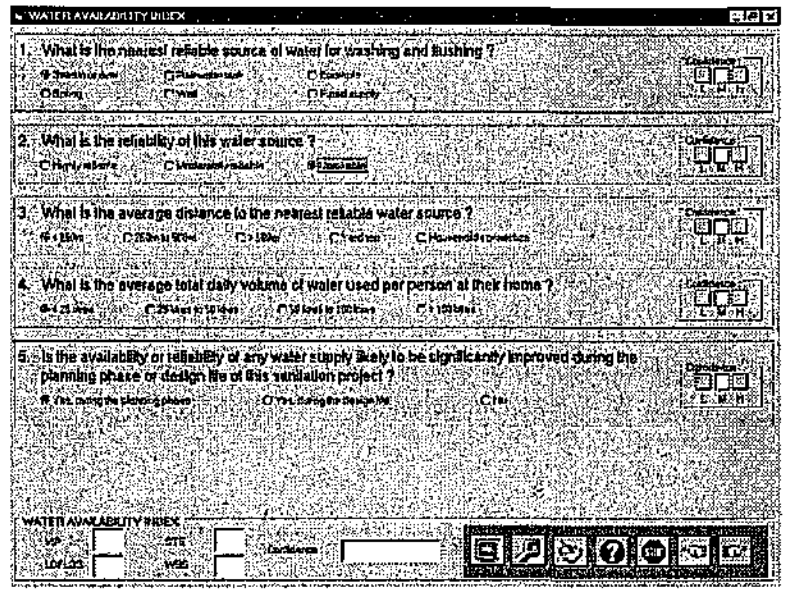

FIGURE 11 : Water Availability Index screen

- Operation and Maintenance Index

The Operation and Maintenance Index (Figure 12) gauges the capacity of the local authority to manage and maintain the system, as well as the availability of local skills for maintenance and repair. Other questions relate to the likelihood of frequent blockages due to the use of unsuitable materials (i.e. other than soft paper). Low scores would favour systems with simpler operating requirements.

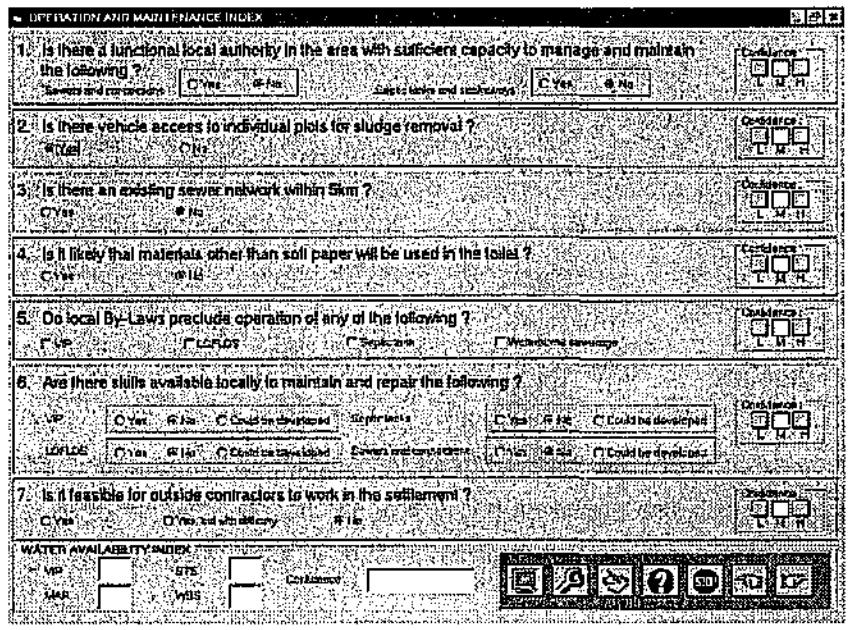

FIGURE 12 : Operation and Maintenance Index screen

- Financial Planning Index

In this index (Figure 13) the affordability of each sanitation system is evaluated from the perspective of the subsidy which may be available for each system and the percentage of the capital costs which residents are willing to pay. A cross check is made between the amount residents are prepared to pay, the average monthly household income of the user group and the availability of financing for any

of the systems. The current means of charging for water is used as an indicator of the extent to which residents have been exposed to service tariffs.

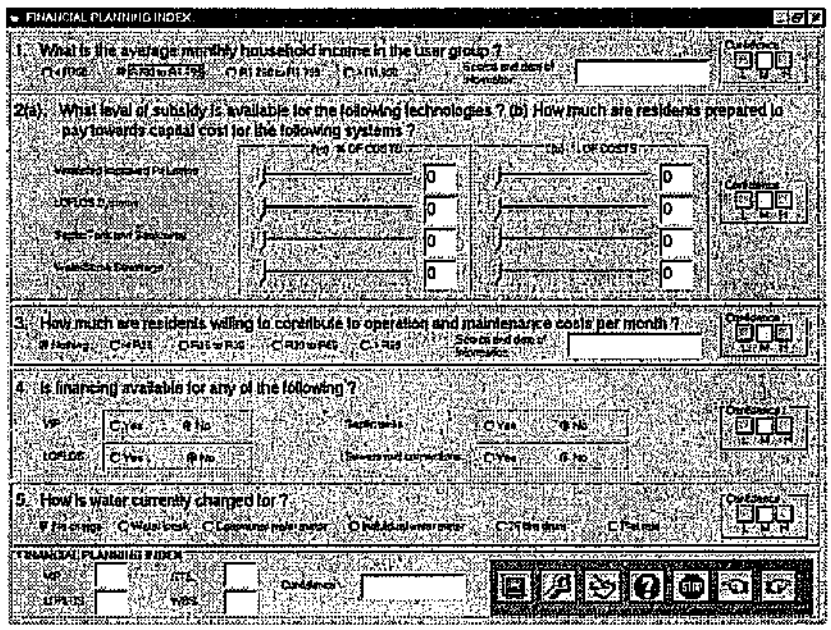

FIGURE 13 : Financial Planning Index

- Soil Suitability Index

The Soil Suitability Index (Figure 14) provides for input of soil factors via one of three options; either percolation rates if available, or a field estimation of soil texture, or by knowing the soil form. The index is weighted according to the relative depths of the topsoil and subsoil and is calculated on the basis of the drainage characteristics of each.

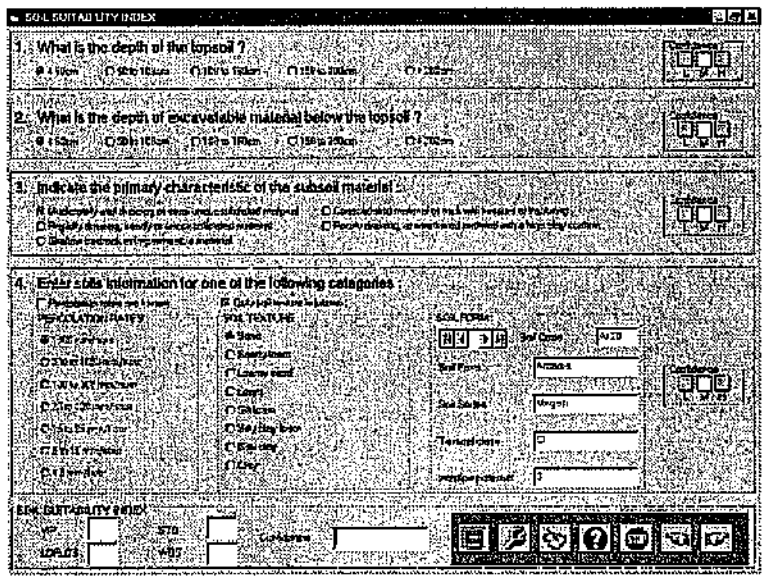

FIGURE 14 : Soil Suitability Index screen

- Site Sustainability Index

The purpose of the Site Suitability Index (Figure 15) is to determine whether there are any additional

factors specific to the site in question, which may have a bearing on the selection of a particular sanitation technology. The site suitability index assesses factors such as plot size, access, slope and flooding risk in relation to each of the four generic sanitation types.

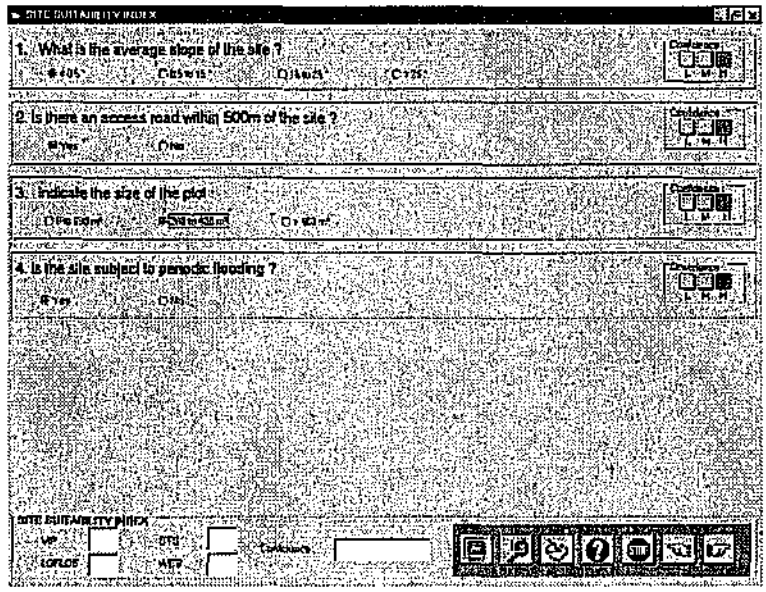

FIGURE 15 : Site Suitability Index screen

- Ground and Surface Water Pollution Index

In this index (Figure 16) the potential for ground and surface water pollution is evaluated on the basis of the average slope of the landform, the depth of the water table, the distance to the nearest open water surface and the dependence on groundwater resources within a 10km radius. If a WASP Assessment has been undertaken, a greater weighting is placed on the WASP results than on the above mentioned factors.

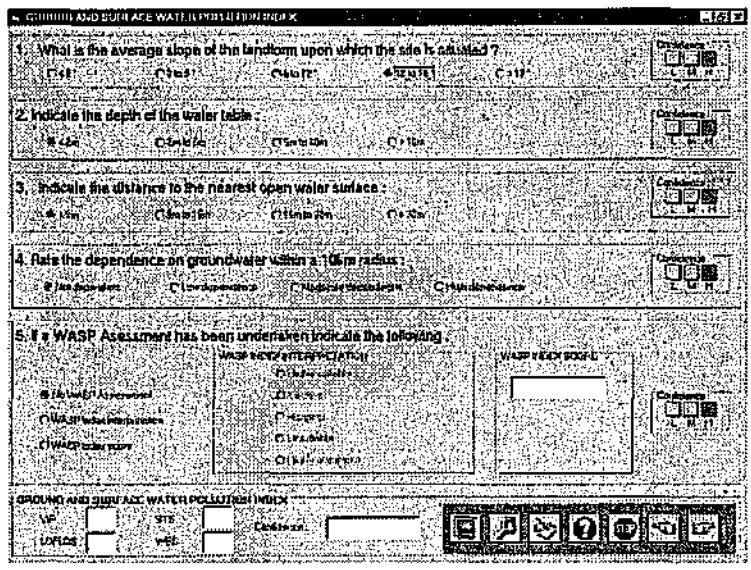

FIGURE 16 : Ground and Surface Water Pollution Index screen

3.3.5 Summary of checklist results and technical indices

The final screen (Figure 17) of the SSPRA summarises the results of the four planning checklists, the

User Preference Index and the six technical indices. It is envisaged that this screen would be used in a workshop setting in a discussion of the various technology options.

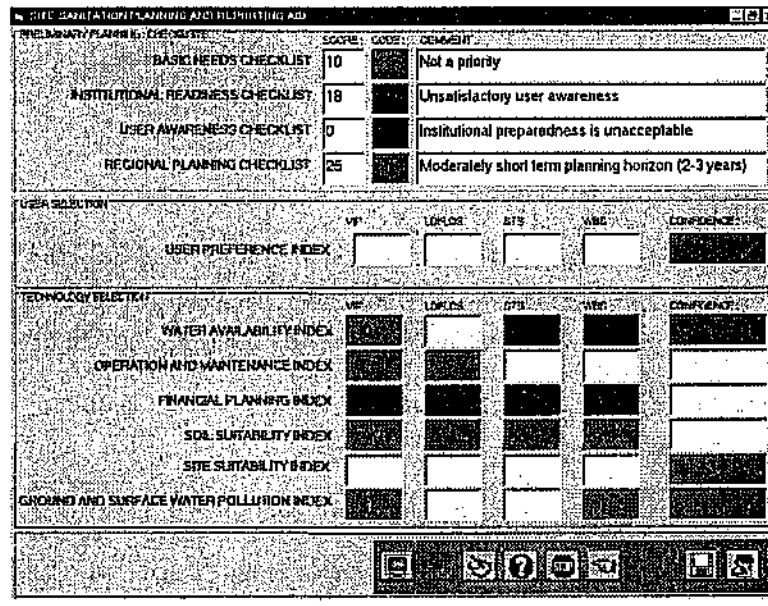

FIGURE 17 : Summary of checklist results and technical indices screen

3.3.6 Print report

Having completed the checklists and user input screens, the print feature allows all captured information and results to be saved to a text file. This file can be subsequently imported into any word processing package and formatted as a written report.

3.4 USING THE SSPRA

3.4.1 Entering information into the SSPRA

The SSPRA is designed to permit the rapid input of available information through several means, summarised below :

(i) Option buttons

Option buttons are usually grouped together on a frame in which only one option at a time can be valid. For example clicking one of three buttons will highlight results in the option button acquiring a back centre. Clicking on either of the other buttons will automatically highlight the new selection and unselect the previous selection.

(ii) Check box

Clicking on a check box will place a cross in the box selected. Unlike the Option buttons, any or all check boxes within a frame can be selected at the same time. Clicking on a selected check box will unselect the box.

(iii) Slider bar

The Slider bar provides an easy means of entering a specific value within a given range. The intervals and limits are marked on the bar, and the user clicks on the slider and moves the mouse holding down the left mouse button to obtain a specific value. The resulting value is sometimes displayed in an adjacent text box. Clicking to the left or right of the slider will move the slider to the left or right in discrete jumps (e.g. 5 or 10), while using the left or right arrow keys on the keyboard will change the value by one.

(iv) Text boxes

Text boxes permit the entry of word or sentences. Although these are not used in the calculation of any indices, they are outputted in the final report.

(v) Database control

Soils information in the Soil Suitability Index can be obtained if the soil form of the site is known. The user scrolls through the database using the arrows to the left and right of the text box which shows the soil form which is currently selected. Using the arrows on the edge of the text box will result in either the first (left button) or last (right button) record of the database being selected.

3.4.2 Specific buttons and features of the system

Figure 18 below shows the key buttons and features of the system :

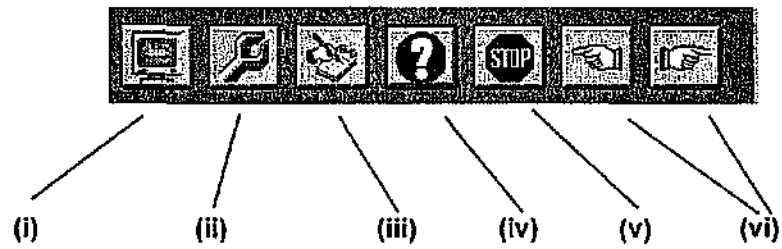

FIGURE 18 : Buttons and features of the system

(i) Print screen

Provides a screen dump of the current screen only

(ii) Calculate

Once the user has finalised the selection of options and values, the Calculate button will display the score and recommendations associated with the checklists, or the score and confidence limits if the screen is a index screen. Different options can be re-selected and then clicking on the calculate button will re-calculate and re-display the results.

(iii) Notepad

The report button brings up a new window which allows the user to add any additional comments which may be pertinent. If the intention of any of the questions is unclear, or the questions do not address a specific concern the user should indicate so using the Notepad. All text entered here forms part of the final report.

(iv) Help

The Help button provides context sensitive help. The rationale and purpose for asking the various questions on the screen is explained with a view to minimising misinterpretation of the intention of each page of questions (screen).

v) Stop

This button ends the program.

(vi) Back and Forwards

These navigational buttons permit the user to move backwards and forwards in through the user screens. Prior to moving forward the 'calculate' button must be clicked.

(vii) Confidence buttons

The Confidence buttons (Figure 19) are located to the left of each question in the User Preference and Technical Indices pages. The buttons are marked H (high), M (moderate) and L (low) indicating the certainty of the information you provide. If the user is more than 75% sure of a particular question the

"H" button should be pressed (less than 50% certain, L button; for anything else the M button should be used). Pressing the "H" button will change its colour to green, the "M" button to yellow and the "L" button to red. This allows the user to obtain a visual impression of the certainty of the information provided for the screen. In the User Preference and Technical Indices pages, a summary confidence score is obtained by weighting the component confidence estimates in the same manner as the questions are weighted.

FIGURE 19 : Confidence Buttons

(viii) Save button

This button is only present on the find screen and allows a scenario to be saved to file (Figure 20).

(ix) Report button

This button is also only present on the final screen and writes all selections, options and text input to a file. The file is a quote delimited file to permit importation into a spreadsheet or word processor. The user can then format this basic text into any desired report format (Figure 20).

FIGURE 20 : The "Save" and "Report" Button

3.5 DATA COLLECTION

3.5.1 Introduction

The SSPRA can only be as useful as the information it is based on. The more current and reliable the information it draws on, the more likely the SSPRA is to support a balanced and carefully considered

decision.

3.5.2 The importance of the process of information gathering

Data gathering should not be regarded simply as an end in itself. It should be approached as a means to promote interaction between the planning agent and future users, and afford future users a credible opportunity to influence the decision-making process.

The SSPRA is designed essentially as a tool to be used by planning agents. However, where local institutional capacity permits, the local representative body - the sanitation committee, rural development structure or village committee - may lead the process of data gathering. This may prove valuable in raising the profile of the local representative structure, and ensure that where it takes responsibility for the final decision about technology choice, the implications of that responsibility are fully understood throughout the user community.

While maximum participation by future users is desirable, it is important to keep the task of information gathering manageable. For example, attempting to establish what "the community" wants is complex, and there may be no single answer. Even the most cohesive communities have fault lines, and differences emerge in relation to gender, generation, income and opportunity. Where the opinions of representatives are canvassed, whose views will be regarded as significant, and who will decide this? What weighting will be assigned to the views of the local traditional leader, where there is one? Who has the information needed to participate in decisions about choices, and what adjunct processes may be needed to provide a platform of information to assist future users to make informed decisions?

Equally, planning agents need to be frank about constraints which limit technology choice. Most choices are not open-ended, and clear horizons must be set for the parameters of the selection procedure. Some of the data requirements for the SSPRA and the RZM are not easy to satisfy.

SSPRA users are encouraged to obtain assistance in collection of the data for non-technical fields from adequately trained practitioners in this field. The participatory tools developed in WATSAN community based methodologies (PHAST in particular), readily allow for data input as they are based on matrices, ladders and diagrams. Degrees of health awareness, prioritisation of sanitation issues, organisational readiness and available resources may consequently be clearly expressed. The PHAST approach has developed tools based on Adult Education principles that encourage households to take responsibility for the reduction of the disease burden and improvements in community health, by improving their sanitation situation.

3.5.3 Sources of information

Different information gathering processes will be required for different types of information. Many of the questions in the SSPRA can be answered readily with a desk study which draws on available 'grey' documents, demographic data, the records of health and planning professionals, and so on. Others

will require comprehensive discussions with future users. Here great care will be required to ensure that local protocols are observed, that informants' views are representative, and that the process of information gathering is managed responsibly.

Local authorities are the obvious source of base line data about demographics, growth trends, planning horizons and infrastructure. Where they do not have the data themselves, they can frequently recommend consultants equipped to provide assistance.

In rural areas, local government is in its infancy, and it may prove unrealistic to assume that newly established local authorities have the information the SSPRA require. However, even where it is unlikely that the local authority can assist with data, it is important to begin the information gathering process at the office of the local authority, as a point of protocol. Particular care should be taken to brief the councillor elected to represent the settlement concerned on the SSPRA's objectives and its information requirements.

Rural planning officers - or individuals performing a comparable function - are usually best placed to lead the process of soliciting information from community representatives. Ideally, they should work through the water or sanitation committee, where this exists, through the local RDP forum, Rural Development Committee, village development structure or tribal authority. Local power struggles may prompt controversy about which structure is approached; where this happens, the services of an experienced community facilitator should be retained.

A community-led demand-driven project is more likely to have an elected representative body which is motivated to assist with the process of information gathering; where demand for sanitation still has to be mobilised, and where the process is being led by other stakeholders - a water utility, public health agency, local government or other body - the process of information gathering is likely to be more cumbersome, to evoke more suspicious and the results may be less credible.

3.5.4Community mapping

Depending on the resources available to planning agents, it may prove desirable to convene some form of community mapping and participative appraisal exercise, where local people conduct a general assessment of their own situation, and record their problems and resources in both written and graphic form. Trained facilitators should be on hand to support this process.

3.5.5The value of women's perspectives

It is imperative that women's views and experiences are recorded when gathering data. CBOs tend to be dominated by men; even where women are represented on them, their views are often not acknowledged or reflected in the record of discussions. Women's role in water and sanitation management is central. Women are generally assigned responsibility for collecting water and disposing of waste water, cleaning the toilet, toilet-training children, caring for the aged, invalids and

the sick (including those whose ailments are attributable to poor sanitation) and often undertake the actual building of on-site sanitation infrastructure; consequently it is imperative that every effort is made to assess their needs and particular perspectives.

Where women are given an opportunity to undertake an independent assessment of their needs, it can provide a forum for them to articulate and prioritise concerns that may not have been raised elsewhere, and which may prove crucial to the success and sustainability of the envisaged sanitation project.

Such an activity may draw attention to the need for effective sullage disposal in the vicinity of laundry facilities, or for the siting and design of outbuildings which offer adequate privacy.

3.5.6 Supporting informed decision-making

Future users must be provided with the information they need to make an informed decision when stating their preferences about sanitation technologies. The local representative structure should be fully briefed about the nature of each technology option and the implications of choosing it, and should be requested to disseminate this information to the broader community. Ideally, this should be followed up with a public meeting where future users are given an opportunity to explore additional questions.

3.5.7 Checking priorities

It is essential that the information gathering process clarifies what priority is assigned to formalising or upgrading existing sanitation arrangements. If sanitation is a assigned a lower priority than improving roads, schools, clinics, electrification or recreational facilities, the upgrading process is likely to encounter numerous difficulties. Here special attention should be given to the respective priorities of men and women; where they differ, this should be drawn tactfully to the attention of local decision-making structures.

If there are pressing health reasons for going ahead with a sanitation project in the face of low community support, considerable attention must be given to a public education campaign to mobilise greater support for and awareness of the sanitation upgrade.

3.5.8 Timing and phasing

Some questions in the SSPRA user interface can only be answered with confidence after comprehensive discussion with future users. For example, questions relating to future users' willingness to contribute to the capital and operating costs of the system can only be answered with confidence at the end of a long process of public consultation.

It may prove useful to attempt to fill in responses to the socio-economic sections of the SSPRA at the very beginning and the very end of the information gathering exercise. Several factors support this.

Firstly, it may be useful to double check responses to certain questions. Secondly, local perceptions and opinions may change once future users are given an opportunity to consider or debate their responses. For example, it is likely that a public education campaign would influence local perceptions to some extent about the importance of adequate sanitation and the implications of various sanitation choices. The SSPRA could provide a useful record of any shift in public perceptions.

3.6 RESPONDING TO THE SSPRA QUESTIONS

A range of informants will be required to answer the different aspects of the SSPRA questionnaire. The local authority or planning agent will be equipped to answer some questions but not others, while the local community representative structure may be the only body able to provide information on particular aspects of the planning process. Data gatherers will need to prepare carefully before interviewing their respective informants, to ensure that they ask the appropriate person / structure the appropriate question at the appropriate time.

Possible informants are listed in order of likely ability to respond to the question; local circumstances may affect the order, and the data gatherers should use their own discretion.

(i) Basic Needs Checklist

1. Water and Sanitation Committee [WC], Local Representative Structure [LRS]
2. WC, LRS
3. Public health authority (clinic, hospital, district nurse or Health Department)
4. WC, LRS

(ii) User Awareness Checklist

1. Subjective assessment of the public health authority.
2. Subjective assessment of the public health authority, WC, LRS.
3. WC, LRS
4. WC, LRS

(iii) Institutional Readiness Checklist

Responses here will be rely on the RPO's subjective assessment, informed by discussions with all the local stakeholders - the local authority, tribal authority, WC, LRS etc.

(iv) Regional Planning Checklist

1. Local authority; planning agent; tribal authority; LRC
3. Local authority; planning agent; tribal authority; LRC
4. Local authority; planning agent;
5. Implementing agency

(v) User Preference Index

These questions can only be completed in the final round of assessment, once the information gathering process is complete. They presuppose extensive discussion at community level around the various technology options available, buttressed with a campaign of public education. Responses to Question 3 should ideally be canvassed at a public meeting, once future users have had an opportunity to consider fully their options and the implications of their choice. This question refers to disposal of grey water, which may pose problems for drainage. WC, LRS.

(vi) Water Availability Index

1. RPO's assessment/observation, supported by discusssion with local authority and community.
2. Planning agent/implimenting agent.
3. RPO's assessment/observation, supported by discussion with local authority and WC and LRS.
4. RPO's assessment/observation, supported by discussion with local aurthority and WC and LRS.
5. RPO's assessment/observation, supported by discussion with localauthority and WC and LRS.

(vii) Operation and Maintenance

1. RPO's assessment, based on discussions with the local authority or its agents.
2. RPO's assessment, supported by discussion with local authority.

Local authority or planning agent.

. RPO's assessment, based on discussions with WC and LRS.

5. Local authority or planning agent.
6. RPO's assessment, informed by discussion with the local authority, WC and LRS.
7. RPO's assessment, based on local political dynamics. Must be discussed with the local authority, planning agent, WC and LRS.

(viii) Financial Planning Index

1. WC and LRS.

2a Implementing agent

2b WC, mandated to advise on the basis of responses at a public meeting

3. WC, mandated to advise on the basis of responses at a public meeting
4. Implementing agent
5. WC, local authority.

(ix) Soil suitability index

1. Planning agent / implementing agent
2. Planning agent / implementing agent
3. Planning agent / implementing agent
4. Planning agent / implementing agent

(x) Site suitability index

1. Planning agent / implementing agent
2. Planning agent / implementing agent
3. Planning agent / implementing agent
4. Planning agent / implementing agent

(xi) Ground and surface water pollution index

1. Planning agent / implementing agent
2. Planning agent / implementing agent
3. Planning agent / implementing agent
4. Planning agent / implementing agent
5. Planning agent / implementing agent

3.7 SPECIALIST CONSULTATION

The SSPRA user should be aware that due to the complexities of sanitation technology choice and sanitation planning in general, there will be occasions when it may still be difficult to reach a decision based on the information input into the SSPRA up to this point. Particular circumstances at the site may appear to preclude any sanitation option. In such cases the user is referred to a network of specialists who may be able to assist planners and service providers in the process of decision making based on the information gathered and input thus far and the unique circumstances at the site.

Appendix V is a *selection* of names of people who have had useful applied experience in the field of sanitation planning (mainly rural). The list does not necessarily include all who might qualify to appear on it, nor have those who appear on it been consulted as to their desire to appear on such a list.

3.8 MITIGATORY DESIGN

Should the user have applied the SSPRA to the particular site and the results are not of such a nature as to provide a sound basis for decision making, and has in addition consulted with specialists listed on the Specialist Consultation Network, and it still remains impossible to select a particular technology above any other, it is recommended that design modifications be made to the most suitable technology for the site. The purpose of such modification would be to address the unique conditions at the site.

Most engineering consultants who have staff specialised in human-scale development work (as opposed to large-scale infrastructure work such as highways, multi-storey office blocks, tunnels, large dams and so on) will have a good knowledge of the basic elements of sanitation. And could assist

planners and service providers in appropriate modifications to technology design for unique conditions.

A p p e n d i c e sA p p e n d i c e sAPPENDIX I : A list of available guidelines for sanitation planning, technology selection and design

1 Guidelines for the Provision of Engineering Services and Amenities in Residential Townships (The Red Book), by BOUTEK, CSIR.

2 Management Companion for the Red Book, by BOUTEK, CSIR

3 Septic Tank Effluent Drainage Systems, by BOUTEK, CSIR

4 Guidelines for the Operation and Maintenance of Septic Tank Effluent Drainage Systems, by BOUTEK CSIR for the Water Research Commission

5 Guidelines for Ventilated Improved Pit Latrines in South Africa for Design Professionals, by BOUTEK, CSIR for Water Research Commission.

6 Guidelines for Ventilated Improved Pit Latrines in South Africa for Communities, BOUTEK, CSIR for Water Research Commission.

7 Guidelines for Sanitary Landfill in Municipal Areas, by WATERTEK, CSIR for the Water Research Commission.

8 Engineering Guidelines for Artificial Wetlands for Wastewater Treatment, by WATERTEK, CSIR for Water Research Commission

9 Guidelines on Appropriate Water supply and Sanitation in Developing Communities, by WATERTEK, CSIR for Water Research Commission

10 Guidelines for the use of Septic Tank Systems in the South African Coastal Zone, by WATERTEK, CSIR for Water Research Commission.

11 Sanitation for Rural Communities - A Handbook for Community Leaders, by WATERTEK, CSIR for Water Research Commission.

12 Water and Sanitation Handbook - for Community Leaders (Urban and Peri-Urban Areas), by Palmer Development Group for Water Research Commission.

13 Guidelines for Low Flow On-site Sanitation Systems (LOFLOS), by Palmer Development Group for Water Research Commission.

14 A Guideline for the Groundwater Protection for the Community Water Supply and Sanitation Programme (First Edition 1995), by Department of Water Affairs and Forestry.

15 Planning and Implementation of Water and Sanitation Services to Urban Communities in South Africa - Guideline for Local Authorities and Other Supply Agencies, First Draft January 1995, by Palmer Development Group.

16 Planning and Implementation of Water and Sanitation Services to Urban Communities in South Africa - Guideline for Developers, First Draft January 1995, by Palmer Development Group.

17 A Guide to Sanitation for Rural Areas - for Community Development Agencies, by WATERTEK, CSIR

APPENDIX II : Key Features of currently available sanitation technologies (1998).

SANITATION TECHNOLOGY OPTIONS REQUIRING: 1. NO CONVEYANCE AND NO WATER				
CHEMICAL TOILETS	R2 200- R5 000	·Manufactured product. ·Distance to nearest service centre. ·Quality of units.	·Service intervals are determined by usage. ·Requires trained operators . ·Suits commercial ventures	·Suitable for short periods on hire, eg. Construction sites, community functions. ·Temporary solution for informal settlements.
BUCKET LATRINE SYSTEMS	R500- R1 100	·Manufactures products. ·Tankers service	·Daily removal and cleaning of buckets. ·Disposal of night-soil.	·Unpopular. ·Difficult to manage. ·Expensive to operate ·Temporary solution for sanitation
SANITATION TECHNOLOGY OPTIONS REQUIRING: 1. NO CONVEYANCE BUT ON-SITE TREATMENT				
BASIC PIT LATRINE	R400- R1 500	·Ground conditions. ·Labour employed. ·Type of superstructure.	·Keep surrounding area clean. ·Relocate pit when full.	·< 20 persons per ha ·generally smell and attract flies ·Potential to upgrade to VIPs
VENTILATED IMPROVED PIT (VIP) LATRINE	R600- R3 000	·Ground conditions. ·Labour employed. ·Type of superstructure.	·Keep surrounding area clean. ·Relocate pit when full	·< 250 person per ha ·Reduces smell and flies ·Potential for ·construction using local materials and labour ·Potential to upgrade
VENTILATED IMPROVED DOUBLE PIT (VIPD) LATRINE	R1 000- R3 400	·Ground conditions. ·Double pit. ·Superstructure.	·Keep surrounding area clean. ·Swop pits alternatively when full (3 years)	·< 400 persons per ha ·Suitable for schools & public toilets. ·Potential to upgraded to septic tank .

VENTILATED VAULT (VV) LATRINE (CONSERVANCY TANK)	R1 200- R3 600	·Ground conditions. ·Excavation and lining of vault. ·Super structure.	·Requires regular emptying by tanker to sewage treatment works	·300-600 persons per ha ·High water table, or impermeable ground. ·Potential to upgrade to septic tank or small-bore
SANITATION TECHNOLOGY OPTIONS REQUIRING CONVEYANCE WATER IS ADDED				
WATER BORNE SEWERAGE SYSTEMS CONSISTING OF ONE OF THE FOLLOWING ELEMENTS:	R100 - R900	·Complexity of systems. ·Population density	·Closed drainage systems should operate relatively maintenance free. ·Public education programmes would help.	·Suitable for high density populations where economies of scale apply and water supply is adequate
A)WC OR IN COMMUNITY BUILDING	R700 - R2 300	·Material for plumbing, fixtures and superstructures	·Regular cleaning. ·Maintenance of plumbing fittings. ·Provision of paper.	
B)BUILDING DRAINS	R600 - R2 500	·Depth and hardness of ground. ·Length of drain	·Cleaning of gulleys. ·Clearing of blockages. ·Replacement of broken covers.	
C)SEWER RETICULATION	R100 - R1 000	·Density of dwellings. ·Slopes. ·Township layout.	·Periodic inspection and flushing. ·Removal of debris. ·Replacement of broken covers.	
D)TRUNK SEWERS		·Length, size ground conditions.	·Periodic inspection and flushing.	

		·Nature of terrain	·Removal of debris. ·Replacement of broken covers	
EFFLUENT SYSTEMS, INCLUDING SMALL-BORE SEWERS	R200- R2 000	·Installation of pipelines and control structures	·Removes effluent from septic tanks, aqua privies etc where ground conditions preclude the use of soakaways	·Advisory service ·Funding up to subsidy level ·Individual projects to eliminate health hazards ·Training programmes
SANITATION TECHNOLOGY OPTIONS REQUIRING: 1. CONVEYANCE, BUT TREATMENT IS ON-SITE				
BASIC AQUA-PRIVY	R600- R2 600	·Excavation and lining of tank. Super structure. ·Soakaway or filter-beds.soil permeability	·User must fetch water seal. ·Periodic removal of sludge by hand or vacuum pump.	·<300 persons per ha ·Absorptive soils or suitable area for soakaway. ·Some water nearby.
LOW FLUSH ON SITE AQUA-PRIVY SYSTEM (LOFLOS)	R800- R3 100	·Excavation and lining of tank. ·Super structure. ·Soakaway. ·Water supply. Soil permeability	·Periodic removal of sludge by hand or vacuum pump. ·Maintain soakaway.	·< 300 persons per ha. ·Absorptive soils. ·On-site water supply for low water consumption needs
SEPTIC TANK (CONVENTIONAL)	R1 200- R3 100	·Excavation and lining of tank. ·Superstructure. ·Soakaway. ·Water supply. ·Soil permeability.	·Periodic removal of sludge by hand or vacuum pump. ·Maintain soakaway.	·< 200 persons per ha. ·Suitable for use in areas with adequate water supply and absorptive soils
BIOGAS DIGESTORS	R5 000 R10 000	·Digesters size. ·Soakaway. ·Ground conditions.	·20% human waste ·60% animal manure ·20% vegetable matter ·Regular removal of sludge.	·Suitable for labour intensive construction. ·Purpose-built digesters for use in areas where suitable feedstock is available.
OTHER TYPES OF SANITATION TECHNOLOGY OPTIONS				

SEWERAGE TREATMENT: A)OXIDATION POND B)ACTIVATED SLUDGE C)BIO-FILTERS	R300-R1 500	·Population served. Plant capacity.	·Skilled operating and maintenance staff required	·Necessary in urban areas with large populations, or where no other technology is suitable.
SEWAGE TREATMENT: WETLANDS-ARTIFICIAL AND NATURAL		·Area and depth of filter media. ·Pretreatment tanks. Type and source of vegetation. ·Inlet - outlet structures.	·Low maintenance. ·Control of stormwater. ·Trimming of vegetation, weed control. ·Monitoring of wetland performance.	·Can be coupled with anaerobic digesters as ·effective means of effluent treatment. ·Suitable site needed away from habitable areas.

Acknowledgements:

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APPENDIX III : A list of key reference for further reading/referral

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7. Sandy Cairncross and Richard Feachem. *Environmental Health Engineering in the Tropics. An Introductory Text. 1983.*

8. Dan B Campbell. 'Applied research networks in water and sanitation', pp. 90-92, in Water, sanitation, development and environment, 19th WEDC Conference, Accra, Ghana, September 1993: Conference Pre-prints.

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Module 4: Case Studies. Elim Care Group, Northern Transvaal. August 1994.

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APPENDIX IV : LIST OF USEFUL WEBSITES

1. INTERWATER: Gateway to Water and Sanitation Information Info
   www.oneworld.org/ircwater/
   This replaces the guide to secondary sources of information on low cost rural sanitation, previously managed by WATSAN-IRC.

2. WEDC
www.lboro.ac.uk/departments/cv/wedc/wssdc/contents.htmTwo documents on on-plot sanitation are available, on technology options and a literature review.

3. SIDA
www.sida.se/eng/bistand/water/sanitation

4. GARNET
http://info.lot.ac.uk/departments/cv/wedc/garnet.html

5. WORLDBANK SOURCEBOOK
www.worldbank.org/html/edi/sourcebook.htm

6. INFORMATION SERVER ON WATER AND SANITATION IN DEVELOPING COUNTRIES
pan.cedar.univie.ac.at/arch/eia/95jul/msg00021

7. WATER AND SANITATION IN DEVELOPING COUNTRIES (SANDEC)
www.eawag.ch/dept/san/index.html

8. UNDP - WORLD BANK WATER AND SANITATION PROGRAMME
www.wsp.org/English/png.html

9. Information on PROWWESS is available on png-prowwess.html.

10. WORLD BANK WATER AND SANITATION
www.worldbank.org/html/oed/watertxt.htm

11. INTERNATIONAL DEVELOPMENT NETWORK
www.idn.org

12. UNICEF
www.unicef.org/pon97/p10a.htm

13. WEDC - GARNET ON PLOT SANITATION AND PIT LATRINE NETWORKS
www.lboro.ac.uk/departments/cv/wedc/garnet/sankit.html
www.lboro.ac.uk/departments/cv/wedc/garnet/onplot/onplot.html

14. GTZ Division on Water Resources, Water Supply Sanitation and Waste Water Management:
www.dianet.de/gtz/divengl/div414e.htm

15. PARTICIPATION IN INTERNATIONAL DEVELOPMENT
    trochim.human.cornell.edu/.../shuzo.htm

16. ZOPP AND PROJECT CYCLE MANAGEMENT
    www.und.ac.za/.../clarke/zopp/instrum.htm
    www.berlin2000.de/change/pcm.htm

APPENDIX V : List of Specialist Consultation Network

PROV.	ORGANISATION	NAME	TEL	FAX	ADDRESS	CAPACITY
EC	ACETE	Nomsa Mkaza	(0431) 28524	(0431) 28524	P.O.Box 18363, Quigney, E.London, 5211	Trainer
EC	Dev. And HR Consultants	Roman Roberts	(0433) 33947	(0433) 25747	P.O.Box 179, King Williams Town,	Project Support Agent
EC	Mvula Trust	Ken Jeenes/ Jamie de Jager	(0401) 91240	(0401) 951151	P.O.Box 462, Kokstad, 4700	Implementing agent
EC	Rural Support Services	Ntombentle Zungula	(0431) 430051	(0431) 432503	5 St. Micheals Road, Belgravia, E. London	Trainer
EC	Rural Support Serv	Pierre Makabir	(0431) 430051	(0431) 432503		Trainer
GT	Independent	Thabo Ramokgopa	(011) 706 7954	(011)706 7952	P.O.Box 5787, Johannesburg, 2000	Consultant
KZN	CROP	Clive Pantman	(035) 572 2043	(035) 572 2043	Private Bag X546,Mkhuze,3966	Project Support Agent
KZN	CROP	Jonty Ndlani	(035) 572 2042	(035) 572 2042	Private Bag X546,Mkhuze,3965	Project Support Agent
KZN	CROP	Zeph Nyathi	(035) 572 2044	(035) 572 2044	Private Bag X546,Mkhuze,3967	Project Support Agent
KZN	CSIR	Dave Rimmer	(031) 261 8161	(031) 812508	P.O.Box 17001,Congella,4013	Project Support Agent
KZN	Primary Health Care	Steve Knight	(032) 453 0039	(032) 453 0058	Amatikulu Center, P. Bag X2113,	Primary Health Care

					Nyoni, 3800	
KZN	Health	Veeran Chetty	(031) 301 3205	(031) 301 3255	P.O.Box 9017, Pietermaritzburg, 3200	EHO
KZN	Health	Vimla Moodley	(031) 3046381			Health Promotion
KZN	INR	C.L.L. Louw	(0353)401973	(0353) 401811	P.O.Box 227,Mtunzini,3867	Project Support Agent
KZN	Isizwe Development Facilitators	Zaba Dube	(031)307 3229/ 503 8559	(031)307 3215	P.O.Box 62510,Bishopsgate,4008	Project Support Agent
KZN	Libuyile Development	Spehephelo Nomvele	(031) 306-5126	(031) 306-2180	P.O.Box 4377,Durban,4000	Project Support Agent
KZN	Mosveld Hospital	Andrew Ross	(035) 5910122	(035) 5910122	Private Bag x2211, Ingwavuma, 3968	Project Support Agent
KZN	Mvula	Thoko Sigwaza	(031) 3013205	(031)3013255	P.O.Box 61301, Bishops Gate, 4008	Implementing agent
KZN	Mvula	Richard Cross	(031) 3013205	(031)3013255	P.O.Box 61301, Bishops Gate, 4008	Implementing agent
KZN	NaSCO	Ashusta Alem	(031) 336-2783	(031)307-7279	P.O. Box 1018, Durban, 4000	Co-ordinator
KZN	Northern KwaZulu Water Development Trust	Eugene Mthiyane	0358 310802	0358 310802	P.O.Box 2140, Nongoma, 3950	
KZN	Operation Hunger	Andrew Mkhize	(031) 303 4174	(031) 303 4178	P.O.Box 37352,Overport,4067	Project Support Agent
KZN	Partners in	Dave Still	(0331) 442154	(0331) 442914	32 Cowens Crecsent,	Project Support Agent

	Development				Blackridge, 3201	
KZN	Philisisizwe	Ben Zungu	(031)307-5857	(031)307-2444	301 General Building,Field Str,Durban,4001	Project Support Agent
KZN	Sikhona	Mayu Sosibu	()31) 5613852	(0331) 423409		Project Support Agent
KZN	Sikhona	Ms. Mayusosido	(031) 5613236	(031) 5613852		Project Support Agent
KZN	Siyabona	Gordon Biley	(0323)611632	(0323)611661	P.O.Box 65,Scottburg,4180	Project Support Agent
KZN	The Bridge Foundation	Nunu Ngubane	(0331)431517	(0331)431757	2 Ridgeview Office,Cnr Bergview&Ridgeview,Hilton,3245	Project Support Agent
KZN	The Bridge Foundation	Rebecca Trissler	(0331)431516	(0331)431756	1 Ridgeview Office,Cnr Bergview&Ridgeview,Hilton,3245	Project Support Agent
KZN	Thuthuka	Robin Husban	(0353)401216	(0353)401227	P.O.Box 159,Mtunzini,3887	Project Support Agent
KZN	Thuthuka	Tim Mthembu	(0331) 425092	(0331) 425097	P.O.Box 1801,Pietermaritzburg	Project Support Agent
KZN	Turn Table Trust	Hazel Smith	(0336)320088	(0336)320088	P.O.Box 67,Bulwer,3244	Project Support Agent
KZN	Valley Trust	Craig Mowat	(031) 777 1955	(031) 777 1114	P.O.Box 33, Botha's Hill, 3660	
KZN	Hodge and Associates	Hugh Hodge	(031) 7672929		P.O.Box 2239, Hillcrest,	Project Support Agent

					3650	
MP	Danie Joubert& Assoc	Carin/Danie Joubert	(012)5431886	(012)5431868	P.O.Box 15283, Sinoville, 0129	Project Support Agent
MP	JLH Project cc	Jean-Louis Haye	(013)781 2052	(013)781 2052	P.O.Box 1552, Shongwe, 1331	Project Support Agent
MP	Leon Foundation	Phillip Walker / Malcolm Whyte	(01528) 33991	(01528) 33992	Private Bag x483, Acornhoek, 1360	Implementing agent
MP	Mvula Trust	Eric Harvey	(013) 755 1726	(013) 752 7780	P.O.Box 3023, Mpumalanga, 1200	Implementing agent
MP	Mvula Trust	Niki Mononyane	(013) 755 1727	(013) 752 7781	P.O.Box 3023, Mpumalanga, 1200	Implementing agent
MP	NaSCO	Mosabala Lipholo	(013) 7524183	(013) 7524185	Private Bag x11259, Nelspruit, 1200	Co-ordinator
NAS	Council for Geoscience	Colin Forbes	(012)841-1174	(012)841-1221	Private Bag X 112, Pretoria, 0001	Groundwater Cons.
NAS	CSIR	Ausie Austin/ Julia du Pisane	(012) 841-2568 /6	(012) 841-3400	P.O.Box 395, Pretoria, 0001	Technical advisor
NAS	CSIR	Ian Pearson	(012) 841 2254	(012) 841 2689	P.O.Box 395, Pretoria, 0002	
NAS	Independent	Jeff Jolly	(021) 762-2538	(021) 762-0811	P.O.Box 328, Plumstead, 7801	Groundwater Cons.
NAS	Counterpoint Development	Kathy Eales	0824583638	(011) 726 2195	PO Box 91649 Auckland Park, 2006	Consultant
NAS	Clacherty & Assocs	Alistair Clacherty	(011) 482-4083	(011) 726-3633	P.O.Box 613, Auckland Park, 2006	Materials Developers

NAS	Independent (GW)	Roger Parsons	(021) 851-4991 /2	(021) 851-5311	P.O. Box 2606, Somerset West, 7129	Groundwater Cons.
NAS	Makhetha Development Consultants	Seetella Makhetha	011 706 7954	011 706 7952	16 Tongani Street, Bryanston	Consulting Engineer
NAS	Mvula Trust	Ned Breslin	082 441 3308	011 706 7952	P.O.Box 32351, Braamfontein, 2017	Implementing agent
NAS	Mvula Trust	Nomfundo Mgadi	(011) 403 3425	(011) 403-1260	P.O.Box 32351, Braamfontein, 2017	Implementing agent
NAS	Mvula Trust	Richard Holden	(011) 403-3425	(011) 403-1260	P.O.Box 32351, Braamfontein, 2017	Implementing agent
NAS	Ninham Shand	Kevin Wall	(011) 787-5906	(011)789 4635	P.O.Box 1399, Randburg, 2125	Engineering consultant
NAS	Palmer Development Group	Guy Pegram, Ian Palmer	(021) 797 3660		P.O.Box 53123, Kennilworth, 7745	Consultant
NAS	RDC	Jeff Zingel	(011) 441-1134	(011) 441-1135	P.O.Box 787248, santon, 2146	Sosial Consultant
NAS	Stewart Scott	Leon van Genderen	(012) 347-1620	(012) 347-1621	P.O.Box 25302, Monument Park, 0105	Consulting Engineer
NC	Africon	Elna Francke	(0531) 816858	(0531) 816859	P.O.Box 416, Kimberley, 8299	Implementing agent
NC	Africon	Jochie Prinsloo	(0531) 816858	(0531) 816859	P.O.Box 416, Kimberley, 8300	Implementing agent
NC	MBB	Johan Murray	(021) 887 1026	(021)883 8514	P.O.Box 3011, Matieland, 7602	
NC	Operation Hunger	Deborah Cousins	(021) 797-3667	(021) 762-1850	P.O.Box 18542,	

					Wynberg, 6824	
NC	Publicon	Aletta van Sittert	(021) 9753245	(021) 9753245	P.O.Box 1699, Durbanville,7550	Program manager
NC	Rural Foundation	Barry Cronje	(05333) 5401	(05333) 5088	P.O.Box 434, Warrenton, 8530	Implementing agent
NC	Scott Wilson	Nic Boersma	(011) 803-6844	(011) 803-7272	P.O.Box 2921, Rivonia, 2128	Implementing agent
NC	Toens & Partners	Ben Benade	(0531) 827232	(0531) 827232	19 Angel Street, Kimberley,8300	Program manager
NP	Development Focus	Brian Ndou	(015) 2954690	(015) 2954840	P.O.Box 15453, Pietersburg, 0699	Project Support Agent
NP	EDA Trust	Khaugelo Lekalakala	(015) 295 4330	(015)291 4860	Suite 152, Postnet X 9307, Pietersburg, 0700	Project Support Agent
NP	In Touch	Mr. P.H. Ramoshaba	(015) 3071825	(015) 3075609	P.O.Box 3619, Tzaneen,0850	Project Support Agent
NP	Mvula	Kate Roper	(015) 291 5595	(015)295 1270	P.O.Box 4538, Pietersburg, 0700	Implementing agent
NP	Mvula	S.L Dau	(015) 291 5595	(015)295 1270	P.O.Box 4538, Pietersburg, 0700	Project Support Agent
NP	N. Tvl Water Board	Grace Nkambule	(0152276) 4200			Trainer
NP	NCWSTI	Dr Shaker	(015) 268 3270	(015) 268 3263	Private Bag x 1106,Sovenga,0727	Training Institute
NP	Tsogang	John Kings	(015) 307 2673	(015) 307 5299	P.O.Box 1111, Tzaneen, 0850	Project Support Agent

NP	V3 Cons. Eng.	Chris Cronje	(015) 2972546/7	(015) 2972521	P.O.Box 5633, Pietersburg North, 0750	Project Support Agent
NW	Appraisal Dev	Gary Mackay	(01211) 530808	(01211) 31796	P.O.Box 186, Kosmos,0261	Consultant
NW	Copad Engineers cc	Tselane Pheto	(0140) 863362	(0140) 862731	P.O.Box 2395, Mafikeng, 2745	Project Support Agent
NW	Corbett Dev Serv	Bruce Corbett	(012) 2535094	(012)2535095	P.O.Box 241, Kosmos,0261	Project Support Agent
NW	Impala Platinum	Pat Mapyane	(01466)82149	(01466)82149	P.O.Box 5683, Rustenburg, 0300	Project Support Agent
NW	Rand Water Board	Chandu Patal	(011) 496 2180		P.O. Box 1126, Johannesburg, 2000	Implementing agent
NW	Magalies Water Board	Van Ryn Oppel	(01465)56721	(01465)55230	Private Bag X 1033, Mogwase, 0314	Implementing agent
NW	Goudveld Water Board	John Cawood	(053) 4740142	(053)47403341	P.O.Box 1014, Hartswater, 8570	Implementing agent
NW	Van Renssen & Fortuin	Maarten van Renssen	(012)362-0991	(012)362-0992	P.O.Box 13776, Hatfield, 0028	Consulting Engineer
NW	Operation Hunger	Thebe Mohatle	(0140)810350	(0140)810331	P.O.Box 4929, Mmabatho, 2735	Project Support Agent
NW	Stewart Scott	Eddie van der Heiden	(0140)810350	(0140)810331	PO Box 4929, Mmabatho, 2735	Project Manager
NW	Stewart Scott	Pricilla Mapila	(0140) 813702	(0140) 810334	P.O.Box 3065,Mmabhtho,2735	Co-ordinator
WC	Independent	Shirlane Douglas	021 472 348	021 448 0496	19 Salisbury Road,	Project Support Agent

					Woodstock, 7915	