

# **EXECUTIVE SUMMARY**

## **General**

It is generally recognised that the development and rehabilitation of the water services sector infrastructure is extremely capital intensive. To maximise the productivity of water services infrastructure assets, a sound understanding of the condition and performance of these assets is needed by those who own or administer them. The ownership or administration of water engineering infrastructure assets in the South African water services sector refers primarily to the following groups of assets:

- state-owned assets administered mainly by the Department of Water Affairs and Forestry
- parastatal assets, owned or administered mainly by water boards and divisional authorities
- municipal/local government assets; and
- community/private assets.

The new water legislation, such as the Water Services and National Water Acts, together with the Municipal Systems Act and Municipal Finance Management Bill, refer to the requirements (i.e. water services and integrated development plans) and obligations of the administrators of engineering assets in the South African water services sector.

During the development of this research project, various new initiatives affecting asset management procedures, as for example the DWAF's Water Services-Sector Support Programme (WS-SSP), were introduced to the South African water services sector. The researchers acknowledged relevant most recent developments related directly to the asset management standard procedures. However the requirements with regard particularly to the new water legislation were fully covered in the research project.

## **The need for research in asset management**

The need for an improved management of assets in the South African water services sector was identified on the background of rapidly expanding water services in both urban and rural areas as well as in parallel with international advancement in asset management planning procedures. It was realised that the subject of water asset management has not been properly attended to in South Africa to date and that the research of appropriate methods and techniques is urgently needed. The Water Research Commission recognised these needs and approved a two year research project with the objective of determining guidelines to improve asset management in the water services industry.

Water services management practices in developing or growing communities are, or will in the near future, be in need of logical and appropriate asset management guidelines to protect their growing assets. The research compiled in this report endorsed a belief that in developing societies more pressing issues receive more attention and that assets are created without an adequate programme for their maintenance and upgrading. The research also highlighted a large shortfall in the existence of asset information systems at all levels of the water services industry. The standard concerns included data collection, storage, retrieval and dissemination.

The diversity between water services systems with regard to the level of services and asset management methods was identified as a serious constraint in the South African water services sector. The introduction of standard asset management procedures and the Impahla Asset Management System software emanating from this research project will enable the establishment of the basic procedures of asset management, particularly facilitating small (or emerging) water services providers.

### **Asset management practices in South Africa and elsewhere**

The change in political and socio-economic circumstances in South Africa in 1994 started a new order in reconstruction and development particularly of formerly disadvantaged communities in peri-urban and rural areas. Along with the political and socio-economic changes came water resources management reforms in the form of new water legislation emphasising the principles of equity in access to water and sustainable provision of services. Two water acts were promulgated setting out the conditions and environment for water resources development and management. The approach to asset management in the SA water services sector was set out primarily through the Water Services Act (Act 108 of 1997) by means of requirements regarding the reportability on the state of water services (i.e. water services assets) particularly at the level of local government (i.e. municipalities and divisional councils).

The Department of Water Affairs and Forestry on behalf of the national government have taken the lead in implementing new legislation and enabling the specific requirements for Water Services Development Plans (WSDP) to be compiled and contribute to the development of the National Water Resources Strategy (NWRS). However, most recently promulgated national legislation, such as the Municipal Systems Act (Act No. 32 of 2000) prescribes a framework for compilation of much wider Integrated Development Plans (IDP) dealing with all designated municipal services (as well as water services, i.e. water supply and sanitation).

Following analysis of available WSDPs, the research team realised that asset management principles are only partially observed and hardly attended to by most water services authorities for which these plans were available. At the same time, it was realised that local governments are obliged to follow the principles of asset management as set out in the Generally Accepted Accounting Practices (GAAP) and the national treasury is developing the Generally Accepted Municipal Accounting Policies (GAMAP), which will be implemented in the Municipal Finance Management Bill which will be promulgated during 2001.

These circumstances altered the research direction which was acknowledged by the Water Research Commission's steering committee. The research project analysis and production focussed on determining a generic model for water services infrastructure asset registers and guidelines for a standard asset management planning procedure. The vast diversity in size and technological levels between emerging and established water services authorities and providers had to be taken into consideration in the execution of the research project. The responsibilities and obligations of the water services authorities/providers in the whole water management cycle also differed and this aspect has to be considered in the asset management planning process with regard to asset base size, type of assets, degree of responsibility and affordability in financing asset management programmes.

Past and current international approaches to asset management, methods and techniques application to basic and advanced Asset Management Plans were carefully studied from the literature and electronic data bases in the UK, Australia and New Zealand and to some extent also from the USA. Personal contacts with regard to current asset management practices were made with experts in the UK, Australia and New Zealand. The New Zealand expertise was found to be particularly interesting as the National Asset Management Steering Group NZ recently published an Advanced Infrastructure Management Manual that also included aspects of asset risk assessment and management practices.

Many international parallels were found, particularly with the Australian approaches to asset management in the water industry, as asset management is being adopted concurrently with water resources management reforms. However, the socio-economic conditions within the water services industry in Australia and New Zealand differ significantly from that of South Africa. The research team took cognisance of the differences and adopted or recommended only the principles coinciding with the conditions and situations for the development of asset management practices suitable to the South Africa water services industry situation.

### **Asset management guidelines**

A great deal of research effort has been devoted to establishing the theoretical aspects of the asset management philosophy and the determination of a standard guideline for transfer of knowledge in this field. A review of the framework for basic, advanced and total asset management planning is provided in the research report. The standard asset management planning approach is detailed in Part B: Chapter 7, and supported by practical examples in the Appendix section.

Infrastructure asset management procedures can be defined as the process of managing the creation, acquisition, maintenance, operation, rehabilitation, extension and disposal of the assets of an organisation in order to provide an acceptable level of service in a sustainable and long-term cost-effective manner. This process can only take place if there is adequate data on which to base decisions. An Asset Register is a database that contains all the relevant data on all the significant infrastructure assets owned by the organisation, and that supports an effective Asset Management Plan (AMP). Guidelines on how to develop a standard generic asset register are presented in Part B, Chapter 6 - Asset Management Practice and Registers.

Although organisations and their asset registers will vary considerably, designing a standard register for a particular industry provides a number of advantages, including:

- Allows consistent comparison between different organisations within the sector
- Simplifies data gathering by central monitoring agencies
- Enhances transparency and public access
- Makes it much easier for institutions that do not yet have an asset register in place to implement one. This is especially useful for smaller institutions that do not have the capacity to design and implement an asset register from the ground up.

From the recommendation of the project's steering committee, an introductory booklet on asset management was produced and the WRC is going to distribute the booklet principally to the managers of small and medium-sized community water services systems.

## Standard Asset Register

In order to achieve these advantages, and yet allow for the differences between organisations, the definition of a standard asset register would have to be very flexible. It should not, for instance, prescribe the hardware or software that is used to support it. It should, however, define the types of output required and the methods used for calculating performance indicators, condition and risk assessment gradings and asset valuations. The standard definition should also recommend the types of data to record, and present a suggested identification system for the assets. Some of the requirements of an asset register are the following:

- It should record the details necessary to clearly identify each asset;
- It should record a basic set of information that is the same for every asset (e.g. identification, location, age, assessments of the value, performance, condition and risk of the asset);
- It should record for each type of asset, any information over and above the basic set of information that is necessary to effectively manage that asset (i.e. any information for which the value of knowing the information is greater than the cost of obtaining the information);
- It must meet the organisation's management, planning, technical and financial needs, as well as any legislative requirements;
- It must be easy to operate and provide quick and accurate access to information, in the form required, to anyone who has a right to that information;
- It should facilitate accurate and confident decision making;
- It must be secure so as to prevent unauthorised changing of data;
- It should define standard methods of evaluating the condition, performance and risk grading for different types of assets;
- It should define a standard method for estimating the value of different types of assets;
- It should define a methodology for evaluating levels of service required from the assets
- It should also define the measure of accuracy of the data recorded for each asset.

In principle, an asset register contains a picture of the infrastructure assets at an instant in time. However, as time passes, the assets will change. In order for the managers of the system to be able to make informed decisions, the information in the database must be kept up-to-date and reflect these changes. This can be done in one of two ways:

- Periodic surveys of the assets
- Ongoing capturing of changes whenever they occur

The advantage of using periodic surveys of assets is that it is not necessary to maintain information about every change that occurs to the asset, but rather the net result of a number of small changes is recorded when the survey is done. The disadvantage is that regular, usually relatively expensive, surveys are required, and that the data in the register is only as current as the date of the last survey.

The reason for managing assets and therefore for having an asset register is to provide a defined level of service. This implies that an understanding of the levels of service that an organisation should be providing is fundamental for any organisation. Ultimately the objective of asset management planning is to match the level of service provided by each

asset, with the level of service that the customer expects and is willing and able to pay for. The level of service provided by an asset is measured by means of one or more performance indicators which are defined for each type of asset.

It is also necessary to measure and record the condition of each asset, as the condition affects the performance and the ability of the asset to provide the defined levels of service.

Condition refers to the structural integrity of the asset, and to start with, should be recorded by means of a simple ranking system. Another item of information that is necessary to record is the level of risk associated with each asset. This involves identifying the possible methods of failure for each type of asset, and estimating the probability and cost of each possible type of failure.

The risk associated with a particular asset is the product of the cost and the probability, and this should also be recorded in the asset register in the form of a ranking.

One of the most important items of information that must be recorded about each asset is the measure of the accuracy of the data that is held on that asset. It is vitally important to ensure that the people who use the asset register have confidence in the data that is stored in it, and this is only possible if the accuracy can be proven. Recording the accuracy of data for individual assets also allows the users to see where the highest need for data verification and improvement should be.

The data should be sufficient to enable benchmarking and maintenance scheduling to be performed.

The asset register must be able to produce output reports that are useful to the organisation. Two key reports are discussed. Asset valuation reports are useful for balance sheets and financial reporting, for accounting and depreciation purposes, and to assist in planning for maintenance, renewal or replacement. Performance and Condition reports are also very useful for planning when and how to upgrade, refurbish or replace assets.

### **The execution of the research project and its products**

Owing to the fact that the subject of water services asset management is in its infancy and considering new water legislation together with all other reforms pressing onto the Water Services Authorities and Providers, the research team received relatively good support on asset management guidelines from all the stakeholders contacted.

Although the responses to the implementation of the infrastructural asset management process in the water industry has been positive, the asset information databases and extent of knowledge were found to be insufficient for direct implementation of standard asset management programmes. In a way, numerous water service authorities/providers will have to go through an evolutionary process in order to develop an adequate Asset Management Plan. A great deal of asset management education in the water services industry will be needed to achieve a reasonable standard amongst all stakeholders.

Overall, this research project identified that the South Africa water services industry is at present without a unitary infrastructure asset management methodology. However, it is more than ready to implement one. It is believed that the standard procedures compiled in this

report and availability of standardised asset register software will add valuable products to the process of implementation of infrastructure asset management in the water services industry.

Key issues identified from the case studies are listed below as an illustration of the situation with regard to asset management procedures of the different levels of water services.

- some small systems are not necessarily electrified, therefore application of electronic technology is limited
- teaching in essential asset management is important
- monitoring and recording skills have to be developed
- need for formal training in financial planning emerged
- no capacity in sorting out and evaluating available asset management data
- inability to establish reliability of available data
- no formal Asset Register procedures and software are available
- no idea of extent of assets usually maintained
- shortage of tests for monitoring asset condition
- appalling state and detail of failure and repair registers
- infrequent recording of water flow records
- no knowledge of assets under depreciation
- limited knowledge of assets insured, etc.
- a lack of training workshops on maintenance policies
- breakdowns of assets insured by the state (i.e. DWAF) and a parastatal (e.g. Bloem Water) not updated
- limited know-how on methods of evaluating the condition and performance of the assets
- issues of critical and non-critical assets
- limited knowledge on appropriate asset management planning methods for investment needs
- non-unitary methods for determining the ability of an asset to perform to its intended function
- the consequence of non-payment for services
- limited community consultation and involvement
- there is no distinction made between created (or purchased) and free of charge assets

### **The key recommendations from this research project**

The diversity between water services with regard to level of services cannot easily be reduced. However, with the introduction of a standard asset management software to the water services sector in South Africa, an environment of discipline and logical processes can be adopted particularly by small water service providers.

All possible authorities with know-how in asset management planning in South Africa should be identified and encouraged to disseminate information and to target particularly the small and medium-sized water services (i.e. water committee and municipalities). Workshops should be held and the simple booklet prepared under this contract disseminated.

A series of workshops introducing the standard approach and newly developed asset management software should be arranged for the managers of small and medium water service providers.

Funding should be allocated to a unit to promote and research suitable asset management methods for the South African water services sector. This unit should provide nation-wide support in asset management to the water services industry and could eventually develop into a fully-fledged Asset Management Institute.

Further research should be conducted in line with asset management theories and methods adopted according to several water services delivery models introduced in public/private and public/public partnerships, particularly through implementation of the BOTT contracts by the DWAF. To date, known contract models are as follows:

- Revised BOTT model (i.e. Public/Private partnerships)
- Local government/district council model (i.e. Public/Public partnerships)
- Partnership/Water Board model (i.e. already existing partnerships)
- Community/NGO model
- Groundwater model (i.e. specific private/community partnerships in the North-West Province)
- Emerging contractor model

Issues still to be researched are related mainly to the methods of evaluating the condition and performance of installed assets, critical and non-critical assets, methods for obtaining investment needs, payment and non-payment of services, and community involvement and consultation.