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DEPARTMENT OF WATER AFFAIRS AND FORESTRY

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NATIONAL WATER ACT (ACT No. 36 OF 1998)

ESTABLISHMENT OF A PRICING STRATEGY FOR WATER USE CHARGES IN TERMS OF SECTION 56(1) OF THE NATIONAL WATER ACT, 1998

I, Ronald Kasrils, MP, Minister of Water Affairs and Forestry, with the concurrence of the Minister of Finance, hereby in terms of section 56(1) of the National Water Act (Act No. 36 of 1998), establish a pricing strategy for raw water use, as contained in the schedule hereto.

SCHEDULE

A PRICING STRATEGY FOR RAW WATER USE CHARGES

PREFACE

The National Water Act, 1998 (Act no. 36 of 1998) has provided for fundamental reform of the law relating to the protection, use, development, conservation, management and control of water resources on the basis of equity and sustainability as central guiding principles. These guiding principles also recognise the need to promote social and economic development through the use of water and the need to establish suitable water management institutions in order to achieve the purpose of the Act.

The Act also provides the broad policy framework for measures to finance the provision of water resource management services and the development of water resources, as well as financial and economic measures to support the implementation of strategies aimed at water resource protection, conservation and the beneficial use of water.

This document provides a strategy for implementing the pricing of the use of raw water within the mentioned policy framework. It is the result of a wide consultation process as prescribed in the Act. Interested parties contributed to the final form of this document through their comments, which were duly considered and the essence of which was incorporated into the document where value was added.

This raw water pricing strategy has been designed by South Africans for South African conditions, recognising that water is a scarce and unevenly distributed national resource. I am satisfied that the measures adopted will result in equitable treatment of all sectoral interests, while promoting efficiency, and will also redress the imbalances in access to water as a result of past laws.

Ronald Kasrils, MP
Minister of Water Affairs and Forestry

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1 INTRODUCTION

The broad principles underlying the new approach to the pricing of water use are already reflected in the *White Paper on a National Water Policy for South Africa, 1997,* and in Chapter 5 of the *National Water Act, 1998* (the Act). This document expands on those broad principles, in a manner consistent with the provisions of the Act, and provides a framework for implementing the new pricing strategy for water use.

This strategy refers to pricing the use of water from South Africa's **water resources,** and not to the pricing of **water services**. Water services, including the pricing thereof, have been dealt with separately in the Water Services Act, 1997. In other words, the new approach deals with first tier water, i.e. the use of raw water from the water resource. It does not deal directly with second and third tier water, i.e. water supplied in bulk (often by water boards) and distributed to households (usually via a water services authority), except for water supplied by Government water schemes. The strategy deals with all first tier water as reflected in the use of ground and surface water resources and covers the setting of prices by the Department of Water Affairs and Forestry (DWAF) as well as by water management institutions as defined in the Act.

2 WATER SUPPLY AND DEMAND

In formulating such a new water pricing strategy, it will be necessary to meet the challenges presented by the existing and growing imbalances between the availability, supply and demand for water in South Africa. The increasing gap between supply and demand has been confirmed by studies carried out by the DWAF, which indicate that the quantity of remaining surface water resources available to meet South Africa's needs within the most important water catchments will be adequate only until the year 2030 if the present usage patterns are maintained. Some catchments are already over-allocated and the water resources are highly degraded and non-sustainable.

2.1 Factors influencing Supply

There are a number of factors that influence the **supply** of water in South Africa. These include the fact that:

- much of the country is semi-arid with relatively low rainfall;
- rainfall patterns are erratic, i.e. not consistent in terms of the parts of the country or the time of year in which it falls;
- regions of high runoff are often situated away from areas of maximum water demand;

- the country's groundwater - which is often the main source of supply of water in rural areas - is limited and often of poor quality;
- catchments have been infested by invader vegetation which uses more water than the natural vegetation; and
- decreasing water quality has an impact on the availability of water of an appropriate quality for use.

2.2 Factors Influencing Demand

On the other hand, the **demand** for water in South Africa is growing. Factors that contribute to this growth are:

- the high population growth rate;
- rapid urbanisation;
- economic development;
- demands for basic services and higher levels of service (such as in-house water rather than communal standpipes);
- the need to sustain and rehabilitate ecological systems;
- the drive to provide accessible, drinkable water for everyone in the country; and
- ineffective mechanisms, including pricing structures to reduce demand.

3 ADDRESSING THE PROBLEM

3.1 Supply-side versus Demand-side Management

In the past, the growing demand for water was accommodated by increases in supply. New dams and transfer schemes have been built to make these increases possible. However, the most easily accessible water sources will soon all have been fully utilised, and it will be necessary to go ever further afield to find new ones. In the future, unless demand patterns are dramatically altered, it will become necessary to import water from neighbouring countries if they are agreeable, or to resort to the desalinisation of sea water. These new supplies will be expensive, and their rising costs will have to be borne by all water users.

There are essentially two ways in which the increasing gap between the demand for and supply of water can be closed. The first involves **supply-side** management, which simply means continuing to expand supply to meet ever-increasing demand. We have suggested above, however, that this would result in significant increases in the cost of water as less favourable sources further afield have to be developed. These rising costs would ultimately have to fall on all water users.

Before these costs are incurred, it is important to make sure that the water that is already available is used efficiently and not wasted. This is best achieved by introducing **demand-side** measures to manage our water resources. By encouraging all water sectors to use water more efficiently, demand management provides a more sustainable long-term solution to the problem of water scarcity than do supply-side measures, because it takes into account the value of water in relation to its cost of provision, thereby treating it more like a commodity.

It is important to note that the focus on water demand management does not imply that important supply-side initiatives, such as catchment management (and dealing with unaccounted-for-water), will be neglected in the new approach to water resources management. It also does not imply that infrastructure options will not be considered, where necessary. The optimal solution to address the problem is to apply integrated water resource management, involving supply-side as well as demand-side measures. Both demand and supply-side options need to be compared on the basis of cost per option.

4 THE OBJECTIVES THAT SHAPE THE NEW PRICING STRATEGY

The following objectives are of equal importance in formulating the new pricing strategy:

- Social equity[1]
- Ecological sustainability
- Financial sustainability
- Economic efficiency

Each of these are elaborated upon below. These objectives are incorporated into the implementation of the new pricing strategy, which is discussed in part **5**.

4.1 Social Equity

Apartheid policies distorted the provision of water supply services, so that in 1994 an estimated 12 million people did not have adequate supplies of potable water. Apartheid also generated a biased approach to water resource management, and allocation was never merely an economic matter, but a socio-political one. Government water policy, and in particular the provision of subsidies (including those associated with the provision of irrigation water), resulted in considerable advantages to large, mainly white commercial farmers at the expense of emerging black farmers and

1 Technical and other terms are explained in the glossary at the end of this report.

smallholders. The pricing strategy for water use charges coupled to the granting of financial assistance, will achieve social equity by redressing the imbalances of the past, both with respect to equitable access to water supply services and with respect to direct access to first tier water.

4.2 Ecological Sustainability

South Africa is committed to following a path of development that is environmentally sustainable. In the case of water, this requires that the availability and quality of water resources inherited by future generations should be adequate to ensure human well-being and the maintenance of ecosystems. As part of overall water resource management, this means that we need to ensure that our levels of water consumption, use, and pollution, as well as the associated infrastructure to impound, supply, treat and dispose of the water, do not cause either unacceptable or irreversible impacts on the population or ecosystems.

The following principles underlie ecological sustainability in the water pricing strategy:

- In terms of Chapter 3 of the National Water Act, 1998, the water needs for the effective functioning of all ecosystems must be protected. The water required for this purpose refers to both the quantity and quality of water in the resource and is called the **ecological reserve**. It must be safeguarded and not used for other purposes.
- There is a cost associated with the ecological **management** of the catchment, and this should be paid for by all the users of the resource [**S 56(2)(a)(iv)**].
- To preserve water quality, point and diffuse sources of **pollution** should be discouraged through identification of control methods that are more effective than those presently in use. This requires the adoption of instruments such as a "polluter pays" approach to the generation of pollution. The underlying philosophy of the 'polluter pays' principle is to get the polluter to internalise the environmental cost of pollution.

As indicated in **5.2** and **7.1**, the "polluter pays principle" does not form part of this pricing strategy and will be introduced at a later stage together with waste discharge charges.

4.3 Financial Sustainability

The methods that have been used by DWAF to finance major bulk raw (i.e. first tier) water schemes in the past are not financially sustainable for a number of reasons. First, inflation was not taken into account, resulting in a decline in the value of tariffs over time in real terms. Second, no provision was made for refurbishment. And third, no provision was made for asset replacement.

A new financial framework is required to accommodate the water sector's increased need to be financially autonomous, to attract greater contributions to its development from the private sector, and to be financially accountable and sustainable.

In the new approach to water pricing, it is proposed that the **full** financial cost of supplying water should be recovered from water users, including the cost of capital. The new approach would however, be phased in by taking account of the constraints within various user sectors to adapt quickly to price increases.

4.4 Economic Efficiency

Section **56 (2) (c)** of the National Water Act, 1998, provides for setting a water use charge for achieving the equitable and efficient allocation of water. Economics is concerned with the optimum allocation of scarce resources between competing uses. This applies equally to the capital resources used in the development of water infrastructure (i.e. dams, reservoirs, pipelines, etc.), and to natural resources such as water. In theory, meeting the goal of optimum resource allocation requires that goods be priced at their **opportunity cost**, which is simply the value of goods forgone (including environmental goods and services), when a scarce resource is used for one purpose instead of for its best alternative use.

If South Africa's water resources were abundant, there would be no need to consider attaching a price to the water resource itself. However, the need for water conservation and management of demand in conditions of growing scarcity is an important and increasing focus for water policy.

Ensuring an efficient allocation of the country's scarce water resources requires that the price of the resource be set to reflect its scarcity value. Failing to price water at its scarcity value can result in two kinds of misallocation of water:

- an inadequate incentive to conserve water. The resultant over-use necessitates the expansion of infrastructure prematurely, tying up the country's limited capital resources when they could be better utilised for other purposes.
- some water being used for low-value purposes. This imposes an **opportunity cost** in that this same water cannot be used for alternative, high-value purposes. Without an economic charge, there is no basis for competition for water supplies between low- and high-value uses, and thus no incentive to shift available supplies from the former to the latter.

In the context of water scarcity, an argument can be made for the introduction of **economic incentives** in water-stressed catchments to encourage the conservation of water and its shift from low to higher value use. This can be done administratively or by using market-related mechanisms.

5 IMPLEMENTATION OF THE NEW PRICING STRATEGY

5.1 Water subject to pricing

The pricing strategy follows from the four objectives already discussed. It aims to achieve the efficient and cost-effective allocation of water, equity and fairness in the allocation mechanism, and long term sustainability of the natural environment.

The starting point for the pricing strategy is the water management area as defined in section 1 of the Act, and as defined in the Government Notice no. 1160, published in the Gazette on 1 October 1999. It begins with an estimate of the utilisable water available in the area, which will be contained in the national water resource strategy (section **6** of the Act). This will be derived from geohydrological assessments and hydrological models of the rainfall/run-off/storage relationships for the relevant catchments within the water management area. From this amount five claims on water will be deducted.

The five claims are as follows:

- **Use allocatable under Schedule 1 to the Act**. This represents reasonable use, for domestic, gardening, stock and animal watering, emergency and waste discharge purposes for individuals having access to surface and underground resources and sewerage systems such as in rural and within local government areas.
- **Basic human needs.** This represents the first component of the Reserve as defined in section 1 of the Act, and provides for the essential current and future (10 year horizon) needs of individuals served by the water resource concerned and includes water for drinking, for food preparation and for personal hygiene. The free use demarcated under Schedule 1 to the Act already contains a basic human needs component for certain individuals who access the water resources directly. Since water for basic human needs constitutes a small portion of water demand, and storage dams are built mainly to provide water for economic use, it is appropriate that the DWAF makes the first tranche of 1st tier water (equivalent to that portion required to meet basic human needs, defined as 25 liters per capita per day) also available free of charge to water services authorities. This applies to water abstracted by local government by means of own works as well as supplied to them from public storage dams. The objective of providing a portion of the 1st tier water free of charge would be to promote the application of lifeline tariffs at the 3rd tier, which would ensure that all South Africans can achieve fair access to basic services (Section **56 (6) (c)** of the Act).

  The cost of raw water for meeting basic human needs from the source of supply in the areas of water services authorities should thus be borne by

all the economic users within the water management area and those supplied from a storage dam or system. It is important to note that the subsidisation of the resource cost of 1st tier water (as it travels through to the 3rd tier) should not be considered as a subsidisation of the distribution costs of the 3rd tier provider of potable water supplies. Third tier costs must be borne in full by the relevant water services provider.

Therefore, even if the responsible authority makes the first tranche of 1st tier water available free of charge to the 3rd tier water supplier, it does not imply that such water will be free to the consumer. It is however intended that the DWAF will, through the proposed regulations in terms of the Water Services Act, require local government to set the charge to basic water supply at the lowest amount possible.
The prescribed procedure of how water services authorities can access free raw water supplies is contained in **7.2** of this strategy.

- **Long-run ecological sustainability.** This represents the second component of the Reserve, and refers to the water (quantity and quality) required to protect the aquatic ecosystems of the water resource. The DWAF will determine what these needs are, using appropriate models. In some catchments it may be necessary to reduce existing lawful uses of water below their present levels in order to provide the required ecological reserve. It may even be necessary to construct a new storage dam to provide for the ecological reserve in an over-allocated water resource. The recovery of cost of such a dam would not automatically form part of this raw water pricing strategy and subsidies may be considered on a socio-economic basis. It is important to note that this claim does not include environmental purposes beyond the ecological reserve. For example, environmental "needs" which simply enhance the real estate value of a property (e.g. a private dam) will not be considered as necessary for long-run ecological sustainability and will not, therefore, be exempt from the pricing strategy.

- **International obligations.** The water requirements to meet South Africa's commitments regarding international waters will receive similar priority, save where specific agreements have been reached concerning the pricing and supply of water to neighbouring countries.
- **Inter-basin transfers.** The national water resource strategy (**S6 of the Act**) will identify and quantify water to be taken out of a water management area to augment water supplies in another area.

The water that is available once these claims have been met can be allocated within water management areas between competing water users. It can also include water imported from another water management area by means of an inter-basin transfer scheme. This water will be classified as economic use of water and is subject to pricing.

5.2 Definitions of Water Use

Section 56 of the National Water Act instructs the Minister to establish a Pricing Strategy for charges for any water use described in Section 21:

(a) taking water from a water resource;
(b) storing water;
(c) impeding or diverting the flow in a watercourse;
(d) engaging in a stream flow reduction activity (i.e. land-based activities which significantly reduce streamflow);
(e) engaging in a controlled activity (i.e. activities having a detrimental impact on water resources);
(f) discharging waste or water containing waste into a water resource;
(g) disposing of waste in a manner which may detrimentally impact on a water resource;
(h) disposing of water which contains waste from any industrial or power generation process;
(i) altering the bed, banks, course or characteristics of a watercourse;
(j) removing, discharging or disposing of water found underground;
(k) using water for recreational purposes;

It is important to note that the long term objective of the Department of Water Affairs and Forestry is to systematically consider each of the 11 water uses defined above and to decide if and how each one should be priced and charged for. It is acknowledged, however, that it is not feasible to consider developing a pricing strategy for all water uses in a short period of time. For example, while the management of diffuse sources of water pollution and the development of a comprehensive waste disposal charge system are likely to be important components of a future pricing strategy, they cannot realistically be fully implemented in this "first round" of pricing strategy initiatives. The pricing strategy must therefore be seen as a process that evolves over time; it begins by prioritising those uses of water that are likely to generate the most significant and long-lasting impact on South Africa's scarce water resources.

The intention is to include the establishment of charges only for those water uses which are consumptive uses and can be expressed in volumetric terms regarding annual quantities abstracted, stored or reducing streamflow in the initial pricing strategy. This relates to the uses specified in section 21 in the following way:

- Use (a) as far as abstraction from surface and underground water resources is concerned.
- Use (b) as far as the volume of water stored is concerned, subject to the following considerations:
    - Where water from the storage dam is abstracted for use, the volume annually abstracted will constitute the use;
    - Where storage dams are built only for recreational purposes or to enhance the real estate value of a property, and the dam derives water from a water-course having an assured low flow, or is fed by a scheme owned by the DWAF or a water management institution, the

initial filling in the case of a new dam and the annual refilling in the case of an existing dam, will determine the annual quantity used. The use due to annual refilling will be based on the estimated nett annual evaporation losses from the full supply surface area of the dam under average climatic and rainfall conditions.

- Use (d) with reference to the quantified average annual use of forestry plantations for commercial purposes (Section 36 of the Act).
- Uses (f), (g) and (h) will not be covered under the initial pricing strategy. A pricing strategy is being developed for waste and waste water discharge and will form the subject of a separate future publication and consultation process in terms of section 56 of the National Water Act. The initial pricing strategy will, however, address the implementation of a charge to recover the administrative cost of water quality management.
- The other water uses mentioned in Section 21 will not be covered under this general pricing strategy, but such uses are subject to authorisation, which may include conditions for payment for the use of water in terms of this strategy, or other conditions to be adhered to.

5.3 Pricing Strategy for Water Use

In terms of the Act, the Minister may, with the concurrence of the Minister of Finance, from time to time by notice in the *Gazette*, establish a pricing strategy for charges for any water use **(S 56 (1))**. This pricing strategy may contain a strategy for setting water use charges-

- for funding water resource management **(S 56 (2) (a));**
- for funding water resource development and use of waterworks **(S 56 (2) (b))**; and
- for achieving the equitable and efficient allocation of water **(S 56 (2) (c))**.

Each of these are discussed in more detail below. The pricing strategy can only be applied to water management areas or schemes where annual water use has been registered or licensed. In the process of registration an assessment will be made of the average annual volumetric use of all water users. The database of registered or licensed annual volumetric use, as well as the estimated annual growth in demand of authorised water users supplied from Government waterworks, will form the basis on which unit sectoral charges will be calculated for each water management area, scheme or system. The end user sectors for which unit sectoral charges for 1st tier water will be calculated and announced annually on a water management area basis are the following:

- water services authorities
- industrial, mining and energy
- irrigation
- stream flow reduction activities

The charge for storage dams from which no abstraction takes place (excluding dams storing waste water), as defined under **5.2**, will be dealt with

under the industrial / mining / energy sector. The determination of annual estimated water use by means of the registration process for the irrigation and stream flow reduction sectors is set out in part **7** of this document.

5.3.1 Funding water resource management

Resource management expenditure relates to those activities that are required to regulate, manage and maintain the water resource or catchment. These costs differ from overheads in that they are not related to water sold from individual schemes but are rather the costs related to the management of all water within a water management area as defined in terms of the national water resource strategy (Chapter 2, Part 1 of the Act). These can include the costs of the following functions to be performed by the Department and/or water management institutions exercising delegated or assigned powers under the National Water Act:

- Planning and implementation of catchment management strategies in terms of Chapter 2, part 2 of the Act.
- Monitoring and assessment of water resource availability, quality and use.
- Water quantity management, including flood and drought management, water distribution, control over water abstraction, storage and steam flow reduction, and to promote the beneficial use of water.
- The evaluation and processing of water use licensing and registration applications.
- Water resource protection, water quality management and water pollution control.
- Water conservation and demand management.

Initially, water resource management will continue to be the task of the Department of Water Affairs and Forestry. However, the National Water Act clearly states that the intention is to create Catchment Management Agencies (CMAs) in a staged and progressive manner and to delegate or assign significant water resource management functions to these bodies. Where CMAs do not exist, the DWAF will function as the CMA. The activities of the CMAs will be funded from the water resource management charges, which may be made by and are payable to the relevant CMA.[2] In water management areas where not all catchment management functions have been delegated to CMAs, the relevant CMA will collect charges, and funds due to the DWAF will be passed on to the Department. If the CMA exists, but lacks capacity, this can be done by the DWAF and the relevant portion passed on to the CMA.

2 CMAs may also receive funding from funds appropriated by Parliament, and from other sources.

To deal with the determination of charges for water resource management, the DWAF's budget has been restructured to contain an Integrated Catchment Management Trading Account providing for the allocation of departmental costs and collection of revenue with regard to the following main activities, under which headings the functions mentioned above can be grouped:

- Functional support (from regional offices), involving indirect costs or overheads.
- Planning and implementation of catchment management strategies. This activity includes the cost of establishing CMAs and the development of a catchment management strategy for a particular catchment within a water management area.
- Dam safety control. These activities are defined in the National Water Act and are conducted to ensure the safeguarding of human beings and their material belongings against the failure of storage dams.
- Water quality management. This activity entails the water quality protection of aquatic ecosystems and the management of return flows and the receiving water quality of all users to enable the sustainable fitness of use thereof.
- Water utilisation. This activity entails water quantity management, allocations and hydrological and geohydrological assessment and monitoring.
- Water conservation (including the Working for Water programme). This activity also includes demand management, which comprises measures to reduce the user demand for water, and the assessment and monitoring of sectoral demands. The Working for Water programme entails the eradication of water consuming invasive vegetation in water catchments, with the view of enhancing the in-stream water availability for relevant water users and the Reserve, and thus the postponement of the creation of additional storage for meeting increasing water demands.

The annual budgets for the listed activities can include the costs of the DWAF regional and / or CMA operational personnel and administrative expenditure, consulting services and work performed by contractors.

Implementing a charge to fund water resource management

The determination of water resource management charges by initially DWAF and later CMAs, will proceed in the following manner:

- Cognisance will be taken of water management areas established in terms of the national water resource strategy, within which the DWAF and/or CMAs will conduct integrated water resource management.

- Water resource management activities to be conducted in each water management area in line with the restructured budget, will be determined.

- Costs will be allocated during the budgetary process to water resource management activities in each water management area.

- All user sectors as defined in **5.3**, to which activities apply, will be identified per water management area.

- The total estimated annual water use of each user sector, as well as the quantity of water to be supplied to another water management area via an inter-basin transfer scheme, will be determined per water management area. This will be done over a period of time, until a water use allocation plan has been prepared in terms of section **9(e)** of the Act, on the basis of individual registered and licensed water uses and the utilisable water available for an as yet underutilised water management area. This could mean an initial over-estimate of actual sectoral use which will be phased out. An assessment will also be made of the basic human needs requirement for the water services authority sector, which will not be subject to first tier pricing (see **7.2**).

- The inter-basin transfer of water from one water management area to another will result in a reduction in the quantity of water available for use in the donor area. Consequently, the potential for generating funds from water use charges for water resource management activities will be reduced in the donor area. Conversely, the receiving area will be able to raise additional water resource mangement charges on the use of the transferred water. Under these circumstances some of the charges raised in the receiving water management area will be transferred to the donor area for water resource management purposes. The amount to be transferred will be based on the product of the budget for water resource management in the donor water management area and the ratio of the transferred water quantity to the total utilisable water available in the donor area. DWAF will facilitate the transfer of costs between the relevant CMAs.

- The costs of water resource management activities and any input cost related to the inter-basin transfer of water will be allocated to user sectors. Cost allocation will differentiate between activities in that the cost of certain activities will only be borne by some, and not all, user sectors, taking into account the relative benefits accruing to the various sectors by executing the activities.
  The apportionment of activity costs will be done pro rata to the average registered, licensed or estimated annual water use of sectors benefiting from the activity. In determining average annual volumetric use, the assurance of supply to users from schemes owned by water management institutions will be taken into account. (see **5.3.2.1** for dealing with existing Government water schemes). The water resource management activity costs to be borne by individual user sectors will be determined as follows:

- Water services authority sector — This sector will attract all activity costs in a water management area, but only in proportion to their "economic" use of water (i.e. excluding basic human needs) in relation to total estimated annual "economic" use (see **7.2**).

- Industrial, mining and energy sector — This sector will attract all water management activity costs pro rata to its share of total "economic" use in the water management area.

- Irrigation sector — This sector will attract all water resource management activity costs pro rata to "economic" use, except those related to the subsidisation of the working for water programme (see **7.4**).

- Streamflow reduction activities — Currently, afforestation is the only declared streamflow reduction activity, but in the near future other dry-land farming activities could be added to the list. Afforestation will attract all water resource management costs, pro rata to "economic" use, except for dam safety control and the "working for water" programme.

- A differentiated subsidy policy will be applied to determine annual costs to be recovered from the various user sectors. In this regard, standing agreements with regard to the subsidisation of existing activity costs will form part of the pricing strategy. The Act also makes provision in clause **56(3)(e)** for the waiving of charges in respect of certain water users. This is described in more detail in part **7** below.

- Sectoral water resource management charges for each water management area will be determined by dividing recoverable sector costs, per activity, by the registered or total estimated utilisable annual volume consumption for the sector (the latter in the case of under-utilised water management areas).

- Water sales accounts of registered water users will be determined by multiplying the relevant sectoral unit charge by the registered annual volume of water. These charges will therefore result in fixed payments which will be invoiced on a six-monthly basis for the irrigation and stream flow reduction sectors and on a monthly basis for the other sectors. The DWAF and / or CMA's may, based on cost considerations, determine minimum cut-off values of registered volumetric use per person, below which water users will not be invoiced.

- In under-utilised water management areas, the deficit in budgeted water resource management costs to be recovered by means of charges which are based on total estimated water use, will be subsidised from the Exchequer by means of the DWAF trading account.

5.3.2 Funding water resource development and use of waterworks

Water resource development and use of waterworks relate to those activities required to fund the planning, design, development, operation, maintenance and betterment (improvement) of Government water schemes and schemes to be funded by water management institutions.

5.3.2.1 Government water schemes

Water resource development costs (i.e. capital costs)

In terms of section 56 (2)(b) of the National Water Act, 1998, water resource development costs can include the related costs of investigation, planning, design and construction of water schemes, which constitute the capital cost of projects. The most significant departure from the financing methods used by the DWAF in the past can be found in the treatment of capital costs, which are different from all other costs. This is because long term capital investments, such as water schemes, often have a life which extends beyond a financial year. Three common financial approaches can be used for determining the capital portion of the unit cost of water; they are the *"funding"* approach, the *"depreciation"* approach and the *"rate of return"* approach.

- **Funding approach.** The basic feature of the funding approach is that revenues should be sufficient to cover debt service obligations (interest charges) and the redemption of loans. The funding approach has been historically used by DWAF and is generally more easily understood in the public sector because of the cash-oriented budgeting and accounting system traditionally used by this sector. This method was based on so-called "notional loans", where it was assumed that the State raised loans to fund schemes and that these "loans" then had to be repaid through water use charges.

- In the **depreciation approach**, asset values (composed of water infrastructure assets and other fixed assets) are depreciated over their useful economic lives. Depreciation is normally calculated on a straight-line basis over the life of the asset. In an inflationary environment, it is prudent to depreciate assets on the basis of current replacement cost. Depreciation cost recovery is used to ensure sustainable water supplies from existing assets.

- The **rate of return approach** allows for fixing a charge to earn a specific rate of return on either the total capital employed (fixed assets base or total assets) or the total financial investment used to finance facilities to supply water. The rate of return should be based on the social

opportunity cost of capital to government and this should approach a level sufficient to fund the annual cost requirement of providing new assets. Typically, this approach would be applied in conjunction with depreciation accounting.

In assessing these three approaches, it is important to note that the current DWAF accounting policy is in line with the *"funding"* approach, namely on a cash basis with strict cost controls against budget. Fund accounting is not consistent with Generally Accepted Accounting Practice (GAAP), and is not favoured by organisations dependent on external investors and lenders. The Public Finance Management Act, 1999 requires State financing to adapt to GAAP. Moreover, the funding approach is problematic in water-scarce countries in that unit costs will decrease when loans have been repaid.

The first tier pricing strategy for Government water schemes set out in this document is based on the *"rate of return"* approach, which is applied together with depreciation. The reasons for this are as follows:

- First, depreciation is a real part of the cost of water infrastructure, in that it represents the loss in value of existing facilities, not restored by current maintenance, that occurs due to wear and tear, decay, inadequacy, and obsolescence. The depreciable portion of the development costs of assets constitutes the replacement cost required when the scheme reaches the end of its useful life.

- Second, the **return on assets** is intended to provide a fair rate of return on the total capital employed by Government to finance the development of water infrastructure. This will ensure financial sustainability of schemes constructed by DWAF with funds provided by the Exchequer, and equally important, that the true cost of water is paid by users.

Thus, in order to recover water resource development costs, the capital component of the unit cost of water supplied from Government water works will be determined by a depreciation charge and a return on assets charge.

Depreciation

Depreciation is defined as the systematic allocation of the depreciable amount of an asset over its useful life and will be applied as follows:

- Depreciation will be applied on a straight line basis, which means that the depreciable amount will be allocated in equal amounts over the useful life of the assets.

- The depreciable amount will be the annual depreciable portion of the depreciated replacement value, which will be determined in accordance with a revaluation policy whereby water resource assets will be periodically re-valued. Initially, calculations will be based on the figures produced during the investigation into the inventory of assets and

financial information relating to Government water schemes which was initiated in 1998.

- Full technical revaluations will be carried out in intervals not exceeding 10 years. The remaining useful lives of assets and the depreciable portion will also be reassessed during the revaluations. In the intervening years, desk-top re-valuations will be carried out annually and will apply the average October to September producer price index (PPI) to the asset values and thus to the annual depreciation amount.

- The depreciable portion and useful lives over which the asset will be depreciated must be determined by qualified engineers and for purposes of initial price-setting, are in accordance with the table below. The technical revaluations will also be determined by qualified engineers.

The depreciable portion and useful lives listed in the table relate to new water resource asset components and could change with each re-estimate. The annual depreciation cost of existing assets could therefore also adjust with each re-estimate and will be based on the re-estimated remaining useful life.

Component	Depreciable Portion (%)	Estimated Total Useful Life (years)
Dams & weirs	10	45
Reservoirs	100	45
Canals	40	45
Tunnels	10	45
Pump Stations	40	30
Syphons & concrete pipelines	30	45
Steel pipelines	75	30
Water Treatment Works	30	45
Buildings	100	40

Return on Assets

This component of the charge will be determined by applying an average percentage to the current depreciated replacement value of water infrastructure assets. This will be done with a view to generate capital to fund the annual cost of planning, design and construction of new and augmentation schemes or demand management measures. The percentage return will be determined in consultation with the Department of Finance on the real long term cost of capital to Government. A figure of 4% has been suggested as being an appropriate rate to meet the projected long term growth in demand for raw water supplied from Government water schemes. This approach assumes that the marginal unit cost of new schemes will equal the average unit cost of existing assets, revalued at current price levels. Although it can be argued that the cost of new schemes would be higher than the replacement cost of existing schemes due to the fact that the cheaper dam sites have been exhausted, it is also true that demand management can

reduce demands and thus the annual capital cost requirements. These two opposing influences are assumed to balance out.

This component of the charge will be set on a scheme-related basis, but will be applied only to those sectors with increasing demands. These sectors have been identified as the local government, industrial, mining and energy sectors. Investigations into the historic growth in demand of these sectors have confirmed that application of an average annual rate of **four percent** to the depreciated replacement cost of the relevant State water infrastructure assets would achieve a breakeven return.

Setting of water resource development charge

The new approach to determine the capital cost component of water supplied from Government water schemes, consists of two components, i.e. the depreciation and return on assets charges, which will be determined by dividing allocated annual costs by the expected water sales.

Depreciation of assets on a straight line basis will result in constant real term annual costs between intervals of revaluation of assets, to which the PPI can be applied as inflator. The depreciation charge will thus not be subject to sudden variations and will give rise to smooth sectoral charges.

As far as the return on assets component of the charge is concerned, it is important to note that the strict application of a constant rate to the depreciated replacement value of water infrastructure would give rise to declining financial returns over time in real terms (i.e. the depreciated replacement value of an asset is lower in year 2 than year 1). The resulting annual return on assets charges determined in this way would also lead to significant hikes in tariffs when asset components of a scheme reached the end of their useful lives and had to be replaced, thus restoring the asset value and increasing the return on assets above that of the previous year.

In order to avoid spiked tariffs, it will be necessary on a scheme-by-scheme basis to establish equalised return on assets values which are constant in real terms. Such an "average" return will be calculated over a 45 year period for all asset components making up the scheme or system. Between the periodic revaluation of scheme assets, the equalised annual return on assets value, plus the annual depreciation cost, will be inflated by the PPI for purposes of setting smooth water resource development charges.

Pre-financing (Section 56 (2)(b)(iii) of the Act)

The return on assets charge caters for financing the development cost of new schemes and could thus be used to finance the cost of development of augmentation schemes prior to the delivery of water. The return on assets charge will thus be utilised to finance the annual costs of planning feasibility studies for committed augmentation schemes.

A unique developmental situation may occur where a large augmentation scheme is planned and executed, but for certain reasons the infrastructure did not become State property and the construction expenditure has to be financed by the established water utility from payments from water users from the existing Government water scheme before water is delivered into the system by the augmentation scheme. This is the situation in the case of the Lesotho Highlands Water Project Phase 1A, which was built to augment the Vaal River System and where expenditure required to service the loans obtained by the TCTA to build the scheme was and continues to be recovered from the Vaal River System water users. This was done to ensure a smooth price setting process in the long term and the avoidance of sudden and significant hikes in water prices.

In future the return on assets revenue obtained from current Government water schemes must only be used to fund state-owned augmentation schemes, but payment for the expenditure incurred for schemes owned by other institutions, such as the LHWP Phase 1, will have to continue to be recovered by additional charges to water users in the relevant system.

Assurance of Supply (Section 56 (4)(b)(iii) of the Act)

In determining tariffs of multi-purpose waterworks, it will be necessary to consider the level of assurance at which water is supplied to the various users in order to allocate capital costs between different users. Users that require a higher assurance of supply, for example, would have to pay a premium for their water allocation relative to those users who require a lower assurance of supply. This will be effected in the following way:

- Water resource development costs of dams will be allocated in proportion to the long term estimated average annual use of water allocations to the different users/sectors, thus bringing into contention the differential imposition of water restrictions during droughts.
  To accomplish this strategy, sophisticated hydrological risk analyses should be conducted for all State dams and the levels of assurance negotiated with users. In the mean time, the long term average annual use of the various user sectors will be considered to be the following percentages of sectoral allocations on Government water schemes:
  - Irrigation sector — 91% (100% for 70% of the time and 70% for 30% of the time);
  - Municipal sector — 97% (100% for 70% of the time and 90% for 30% of the time);
  - Strategic industrial sector, e.g. Eskom, Sasol — 100% (no water restrictions would normally be imposed).

- In the case of conveyance structures, the division of capital costs will be done in proportion to the required peak rates of supply to the various sectors.

Treatment of Reserves

When the new pricing structure has been phased in, the depreciation and return on assets charges will result in reserve funds theoretically being built up over time. However, as long as Government water schemes are owned by the State, these reserve funds will revert to the Treasury, either indirectly by reducing the annual augmentation of the Departmental Trading Account from Treasury funds, or directly as a result of annual surpluses on the Trading Account flowing to the Treasury. Thus, the DWAF will be in a position to finance capital cost requirements for depreciation on specific schemes from its general revenue base on the Trading Account and to finance the development of augmentation schemes from Exchequer budget allocations. DWAF will establish an accounting system to record the extent and use of these funds.

Use of waterworks costs

These are the costs, both direct and indirect, that are incurred in the operating and maintenance of Government water schemes. These are broken down between direct and indirect scheme costs.

- **Direct Scheme Costs**
  These are the fixed and variable costs which can be attributed directly to administering, operating and maintaining schemes. Direct costs include administration costs, operating and maintenance costs, pumping costs, direct labour and overheads and distribution costs.

- **Indirect Scheme Costs**
  These are the costs which cannot be directly attributed to a specific scheme, but which contribute towards the management of the water resources of the entire water management area, and comprise the DWAF regional office costs, a portion of which can be allocated to individual schemes using an equitable allocation base. Timebased costing will be used to separate overheads allocated to schemes and those related to water resource management.

<u>Implementing a charge to fund water resource development and use of waterworks on Government water schemes</u>

The DWAF has created three separate trading accounts for:

- Bulk supply schemes (which could eventually be transferred to water management institutions)
- Integrated systems (national water infrastructure)

- Water services schemes (to be eventually handed over to local government). The pricing strategy as set out here regarding funding of water resource development and use of waterworks, is not applicable to these schemes.

Water resource development and use of waterworks charges will be implemented as follows:

- All Government water schemes or integrated systems and their supply areas will be identified and taken up in the relevant trading account.

- Cost information relating to the water infrastructure assets will be determined. This includes the evaluation of current and depreciated replacement values for each component of the schemes, as well as the expected remaining useful life thereof. Capital costs of new State-funded schemes will include the cost of project planning, design and construction. Direct and indirect costs relating to use of waterworks will be determined as part of the annual budgeting process.

- The water allocations to various user sectors and the long term estimated average annual use based on assurance of supply will be determined for cost allocation purposes.

- The expected annual water sales volume per user sector per scheme will also be determined as part of the annual budgeting process for the next financial year.

- An assessment will be made of the quantities of raw water to be provided free of charge in terms of the procedure prescribed in **7.2**.

- Based on the above information, annual costs will be determined and allocated to user sectors. This will allow the determination of unit costs and thus charges per sector per scheme. The bases for determining and allocating the different costs are as follows:

    - Division of capital costs between sectors — costs of dams will be divided in proportion to the long term estimated average annual sectoral use (i.e. economic use) of allocations, thus taking account of assurance of supply. The cost of conveyance structures will be divided in proportion to the peak rates of supply of maximum sectoral allocations.
    - Depreciation — Capital cost allocations (as above) to different sectors will be depreciated as described above to determine the annual depreciation component per sector.
    - Return on assets — The methodology described above to determine the real term average annual return on assets based on 4% of the depreciated cost allocations, will present the relevant cost component per sector. The sectors involved are the water services authority, industrial, mining and energy sectors.

- Direct use of waterworks costs — Sector-specific costs will be allocated directly to the relevant sectors. The cost of joint works will be shared pro rata to the estimated annual sectoral water uses.
- Indirect use of waterworks costs — Indirect costs which have been allocated to the schemes will be further allocated to the different sectors using an equitable time-based allocation base.

- Once all costs are determined and allocated to sectors and expected consumption values per sector have been determined, unit cost charges per sector for each scheme or system can be determined. The principle of equalising system charges in cases where more than one augmentation scheme per sector is involved, as currently applied in certain cases, will be adhered to. Each sectoral charge will consist of two components, i.e. the water resource development charge and the use of waterworks (O&M) charge.

- In determining the water use charges per sector, a differentiated subsidy policy will be applied. This simply means that the full financial cost will not be recovered initially from all sectors. Standing agreements with representative bodies will be adhered to and the new charges will be phased in progressively from current levels within sectoral constraints. Proposals in this regard are described in more detail in part **7** below.

- Billing to water users on schemes will be based on the sectoral charge and the irrigation quotas and for other sectors on the measured quantity of water actually used or by agreement in the case of integrated systems. For major water users such agreements could include the payment of fixed monthly amounts and variable amounts based on water actually used. For irrigation schemes block rising tariffs within the quotas are envisaged. This will provide incentives to conserve water.

5.3.2.2 Schemes funded by water management institutions

- Catchment management agencies and water user associations must, when determining their revenue requirements on which water use charges for development and use of waterworks are based, take into account:

  (a) recovery of overheads, operations and maintenance costs;

  (b) recovery of capital costs and the servicing of loans (water management institutions are entitled by the Act to raise loans to finance new water supply infrastructure, and should therefore be able to service these loans through cost recovery);

  (c) reasonable provision for the depreciation of assets, which can be placed in a reserve fund for utilisation at the appropriate time;

(d) other charges levied by law on the institution and in terms of this pricing strategy; and

(e) the financial targets included in its business plan.

- Charges levied by water management institutions may be levied on a proportional or differential basis, depending on the provisions of the association's constitution, or if directed so by the Minister to give effect to the provisions regarding the rendering of financial assistance in terms of sections **61** and **62** of the Act.

- A catchment management agency must, when considering charges for raw water supplied from a storage dam owned and funded by the agency, provide for:

  (a) subsidising basic human needs in accordance with **7.2**(1) of this strategy; and

  (b) differences in assurance of supply of user sectors on an equitable basis.

5.3.3 Achieving the equitable and efficient allocation of water

It is important to note that the proposals regarding the funding of water resource management and water resource development and use of waterworks that have been described above will make a significant contribution towards achieving the equitable and efficient allocation of water.

However, in the context of increasing water resources scarcity, it may be necessary to introduce additional **economic incentives** in order to optimise the allocation of scarce water resources between competing uses. Such economic incentives could be introduced in water-stressed areas; the objective being to shift water use from low to high values.

This charge may only be introduced by DWAF on a regional or national basis and the revenue will accrue to the Treasury. If it were deemed necessary to introduce economic incentives in water-stressed areas, this could be achieved administratively via an explicit charge or via market-orientated mechanisms.

- **Administrative mechanisms.** An administratively determined *economic* charge could be introduced in areas where water is used predominantly for low-value purposes. Such a charge would be over and above the charges for water resources management and development referred to above. The basis for determining the economic charge will be the opportunity cost of water as reflected in transactions taking place between water users. This charge will not exceed the marginal cost of the next scheme and should be ideally based on the market-clearing level in each area. Due to the fact that State water infrastructure assets would in

future be priced at their current or marginal costs, the economic charge would not be applied to users of Government water schemes on whom the return of assets charge was imposed. The return on assets charge could thus be used as a proxy for the economic charge at Government water schemes.

- **Public Auction.** This method could be followed in areas which are under water stress (Chapter 4, part 8 of the Act) and for which compulsory licences have been issued. The issuing of new permits for any remaining water could be effected through a bidding or tendering process for certain catchment or sub-catchment areas. The highest bids or tenders would be awarded the available permits at a price equal to the lowest bid above the cut-off, or, in other words, at the price that clears the market by allowing users to take up the entire available supply. The price established in this manner should be an efficient and economic price for water in that particular area and for the specified water use. The scarcity value of water would now be implicitly reflected in the bids that are made by competing water users.

  Prospective permit holders would thus compete with each other for entitlements, facilitating a move away from the administrative setting of first tier prices towards a market-oriented approach to price determination. The public auction concept stops short of making provision for a fully-fledged water market in that the permits representing water use entitlements would not be traded freely among competing water users.

- **Water Markets (*Sections 25 and 26(l) of the Act*).** Tradeable water use entitlements will promote the shift from low to high value use of water and may obviate the need for administratively set prices in the water-stressed areas where there is an increasing water demand. The advantage of making a water use entitlement tradable, is that it allows for a more efficient user to buy the entitlement from an existing, but less efficient, holder of the entitlement.

  The National Water Act, 1998 provides for trading in water use entitlements. The Act recognises, however, that while the trading of entitlements between uses may optimise the economic use of water, they may in turn impose considerable external costs on the rest of the local economy. Thus, trading in water use entitlements would have to be subject to some form of control to protect the public interest as opposed to the interests of the contracting parties. The necessary regulations in terms of section 26 (l) of the Act must first be made.

5.4 Transparency and Accountability

In establishing the pricing strategy, every attempt must be made to control costs by the application of sound financial management principles such as strict budgetary control. The new pricing strategy embraces the principle of

transparency, which of itself should promote cost control. In terms of this principle, the forthcoming year's sectoral charges that are developed during the budgetary process for each water management area will be forwarded to regional offices for dissemination and discussion with interested parties. Final sectoral charges will then be formalised and made available to the regional offices for re-distribution to the area offices, prior to the commencement of the financial year.

In addition, a summarised version of the budgeted trading accounts for the forthcoming year, detailing estimated deficits and surpluses of accounts, will be made available at the regional offices for discussion with the representative bodies of stake-holders, prior to the commencement of the financial year. Similarly, after financial year end, summarised trading accounts reflecting actual expenditure and revenue compared to budget expenditure and revenue for the year, will be made available at the regional offices. CMAs must introduce similar accounting practices.

6 PHASING IN THE NEW APPROACH

6.1 Introduction

The starting point for the phasing in of the new pricing strategy is the recognition that there are fundamental differences between water use charges for a) funding water resource management, b) funding water resource development and use of waterworks, and c) achieving the equitable and efficient allocation of water.

It is important to note that while both water resource management and water resource development and use of waterworks charges reflect financial costs, there is a logical difference between the two which requires that they be separated. Water resource development and use of waterworks charges are only levied on the users of specific government water schemes or systems, and schemes funded by water management institutions and are based on the costs associated with those schemes. Water resource management charges, on the other hand, relate to all water utilised within the water management area and should, therefore, be charged to **all** water users, irrespective of whether water is provided from a water scheme or not.

Finally, when introduced, a charge for achieving the equitable and efficient allocation of water would reflect not a financial cost, but rather an economic one, the objective of which would be to provide incentives for water to be allocated to those who value it highly. Like the water resource management charge, such a charge would be area-specific and would apply in water-stressed areas.

It is clear from the above that a fundamental principle underlying the proposed pricing strategy is that eventually it should apply to all water, not just that which is currently supplied from government water schemes.

6.2 Phasing in the Various Charges

The phasing in of the proposed water pricing strategy will have to be structured so as to follow the phased implementation of the National Water Act, 1998. The process for phasing in can be summarised as follows:

Water Resource Management Charges

The introduction of water resource management charges will have to proceed more slowly than the introduction of water resource development and use of waterworks charges (see below), as the registration of water use in water management areas is a prerequisite for its full implementation. The current situation is that catchment management charges relating to the water resource management functions of water conservation (invasive plant and water weeds removal) and water utilisation (abstraction, storage and afforestation permit control) have already been introduced for water users at certain Government water schemes. Registration will be prioritised in the water management areas containing the catchments of those schemes so that all water users can be charged in an equitable way.

Water resource management charges will be introduced as soon as the greatest part of existing water use in priority water management areas has been registered.

Water Resource Development and Use of Waterworks Charges

The phasing in of full financial cost recovery for water sold from government schemes can be introduced more rapidly, as the users thereof are easily identifiable. This will have to be done bearing in mind standing agreements with specific user groups and adaptability constraints (See part **7** below).

Charges for Achieving the Equitable and Efficient Allocation of Water

As already mentioned above, charges relating to the funding of water resource management and water resource development and use of waterworks will make a significant contribution towards achieving the equitable and efficient allocation of water. On Government water schemes, the return on assets charge will be used as an economic incentive to conserve water, by introducing stepped tariff structures. Thus, the introduction of additional economic incentives will not feature soon. The reason for this is that it is acknowledged that it would be premature to introduce economic

pricing before the effect of full financial costing of water on resource utilisation has been evaluated.

The introduction of a charge to achieve the equitable and efficient allocation of water will proceed as follows:

- In water-stressed areas where compulsory licensing has been accomplished, any remaining water that can be allocated, may be priced through the public auction process described in **5.3.3**.
- The setting of an economic charge in an administrative way, based on the opportunity cost of water, would only be considered from the date when the period of compulsory licenses in water management areas has expired.

To promote the beneficial use of water, DWAF will also regulate the trading of water use between individuals.

7 APPLICATION OF PRICING STRATEGY TO DIFFERENT CATEGORIES OF WATER USE / USER SECTORS

Section 56 of the National Water Act, 1998 also provides for the pricing strategy to differentiate on an equitable basis between-

- different types of geographic areas (**S 56 (3) (a) (i**))
- different categories of water use (**S 56 (3) (a) (ii**)); and
- different water users (**S 56 (3) (a) (iii**)).

This differentiation is discussed with regard to the main categories of water use / water users in detail below.

7.1 Discharge of Waste

Discharging of waste or water containing waste into a water resource is also defined in terms of section **56(5)** of the Act as a water use for which charges can be imposed. It is the DWAF's intention to develop and implement a waste discharge pricing system which will be based on the "polluter pays principle" (PPP) to provide economic incentives to reduce water pollution to the level with the least cost to society as a whole.

The waste discharge pricing strategy will form part of the introduction of charges for achieving the equitable and efficient allocation of water in terms of section 56 (2)(c) of the Act and will be separate from the water resource management charge in respect of water quality management.

A separate project was initiated in 1999 to develop the pricing strategy for waste discharges. It will include the determination of future charges for point

and diffuse sources of pollution, based on the "polluter pays principle". This will include measures to internalise the cost of water pollution, as well as economic incentives and disincentives to promote the reduction of waste discharge. The pricing strategy in this regard will be developed and published for public comment in due course.

7.2 Water Services Authority Sector

1) **Free raw water for basic human needs**

Section 56 (6)(c) of the Act provides that in setting a pricing strategy for water use charges, the Minister must consider measures necessary to support the establishment of tariffs by water services authorities in terms of section 10 of the Water Services Act, 1997 and the use of lifeline tariffs and progressive block tariffs.

In terms of this pricing strategy for raw water use charges, the above requirement will be accomplished by providing the raw water requirement for basic human needs (defined as the essential needs for drinking, food preparation and personal hygiene which is put at 25 liters per capita per day) free of charge to water services authorities. The main objective of this strategy is to promote the introduction of differential lifeline tariffs at third tier by ensuring that the first step of a progressive block tariff structure to provide for the basic needs component for local government domestic users, will exclude the raw water charge or portion thereof, as determined in terms of Chapter 5 of the Act.

The raw water pricing strategy provides that the cost of water at the resource for meeting basic human needs in the areas of water services authorities be borne by the "economic users" of the relevant water management area, system, or government water storage works. This includes the use of water above the basic needs component in local government areas.

The implication of this provision contained in this raw water pricing strategy is that the cost of water ex source for basic human needs will not be cross-subsidised within the water services authority sector alone, but by all user sectors within a specific water management area, State scheme or system. This will lead to increases of the sectoral raw water charges that will be applicable if the basic needs component is not provided free of charge.

In order to calculate the relevant sectoral raw water charges to be imposed in each water management area, system or scheme, information must be readily available on the annual basic needs requirement of each water service authority. This information can be obtained from water service development plans (WSDP) prepared i.t.o the Water Services Act, 1997, but should also be subject to verification. The prescribed procedure to access free quantities of raw water will ensure that realistic estimates of basic needs requirements are provided and also that no raw water will be supplied free of charge before the relevant local authority has committed itself towards implementing lifeline tariffs.

The following procedure is prescribed for implementing the abstraction / supply of free raw water by/to water services authorities:-

- Water services authorities may apply to the responsible authority in writing for the free raw water allocations from water resources or State storage dams after they have submitted the information contained in the draft WSDP required under section 13 of the Water Services Act, 1997. Particular information that must be provided with the application is the following:

  - Domestic user population (permanent residents only) and expected growth rate.
  - Total annual water use and expected growth rate.
  - Detail regarding the yield of own sources and the expected annual supply from any State storage dam or system.
  - Written declaration of intent of the introduction of lifeline tariffs i.t.o the Water Services Regulations.

  The application must be routed through and supported by the relevant second tier bulk supplier or Water Board where applicable, which must be responsible to coordinate the applications.

- The responsible authority will then determine the first annual quantity of raw water that must be passed through free of charge to the relevant water services authorities. In cases where a bulk supplier or water board and/or the local authority have own sources and supplementary water is supplied from a State dam or system, the quantity of free water will be determined as that portion of the basic needs requirement that has to be supplied from the State dam or system, which will be based on the percentage that the required supply from the State dam or system makes out of the total annual demand.

  Information regarding possible free quantities of water and current raw water tariffs will then be conveyed by the resposible authority to the relevant water services authority with the request to:

  (a) set tariffs in accordance with the Tariff Regulations for Water Services to be promulgated in terms of section 10(1) of the Water Services Act, 1997 and
  (b) reduce the tariff of the first block of the rising block tariff structure for households to contain the subsidy provided by the free water allocation.

- The resulting block tariff structure must then be submitted to the responsible authority for approval of the free water allocation. Compliance with rising block tariff structures as required in terms of the regulated norms and standards set by the Minister in terms of section 10(1) of the Water Services Act, 1997 is a precondition for a free raw water allocation. The essence of the strategy will also be reflected in the said water services regulation.

- Only those water services authorities which have applied for free raw water supplies for basic needs will be considered for such purposes and the relevant free quantities for these authorities and resulting sectoral charges for the rest of the water management area, scheme or system will be published annually when the charges are formalised.

- Auditing will take place through information required to be provided by water services authorities in terms of the regulations to be promulgated under section 9 of the WSA, 1997.

- Where water boards or other bulk water suppliers are involved, the relevant body will receive the bulk allocation of free raw water, which must be passed on to the qualifying local authorities.

The principle of subsidising the basic human needs component of domestic water use in the areas of water services authorities will apply to charges to recover water resource management costs and also charges related to the development and operation of State dams and future dams to be owned by Catchment Management Agencies.

2) **Water resource management charge**
The current method of determining catchment management charges for water supplied from Government water schemes — relating to the estimated proportional activity costs of water conservation (invasive plants and water weeds removal) and water utilisation (abstraction, storage and afforestation permit control) — is consistent with the new strategy and will be continued. However, adaptations will be made after the registration of all water users in the particular catchments has been accomplished and more accurate data on sectoral water use becomes available (currently the extent of water use in the relevant catchments is based on estimates).

Charges for the full recovery of the other allocated water resource management costs in terms of **5.3.1** will be introduced once the majority of the water users in the particular water management area in which the scheme is located have been registered. Water resource management charges for the water services authority sector will also reflect the fact that only the "economic" uses of water from the water management area, scheme or system will contribute towards cost recovery (i.e. excluding basic human needs).

3) **Water resource development and use of waterworks charge**
This charge will be based on the method described in **5.3.2**. The determination of unit costs for water supplied from Government water schemes, based on the notional loan approach, will be replaced by determining the unit costs through the proposed new approach (depreciation and return on assets) as set out in this strategy. The principle of excluding the water requirements for basic human needs for purposes of setting 1st tier prices will be introduced as described in **1**) above. This charge will be introduced from April 2000.

A maximum increase equal to the producer price index (PPI) + 10% over current tariffs for the first number of years of the new pricing strategy will be implemented. In the change-over from current to new water use charges no reduction of charge levels shall take place. The objective is to reach the target charges within ten years. Thereafter, annual tariff increases will be limited to the inflation rate (PPI).

7.3 Industrial, Mining and Energy Sector

The application of the first tier pricing strategy to this sector will be identical to that of the water services authority sector, except for the aspect of dealing with basic human needs. The introduction of the water resource management charge will be based on full financial cost recovery by charging for "economic" uses of water in the water management area and will be implemented after registration of water uses in the area. The water resource development and use of waterworks charge will be subject to increases of the PPI + 10% over current tariffs for the first number of years from April 2000 onwards. The objective is to reach the target charges within ten years. Thereafter, annual tariff increases will be limited to the inflation rate (PPI). Tariffs wil not be reduced below the level of the previous year.

7.4 Irrigation Sector

Established schemes and commercial farmers

1) **Existing agreement with SAAU**

Negotiations were concluded in 1995 with the South African Agricultural Union (SAAU) on a strategy for tariffs to be imposed on State irrigation schemes. This strategy was based on the following principles:

- Full recovery of operation and maintenance (O&M) plus catchment management costs, plus
- a surcharge on the above costs to counter under-recovery during droughts, plus
- an agreed upon amount to cover future replacement, betterment and drainage works costs. Prior to the construction of any betterment or drainage works, negotiations regarding the repayment would have to be carried out on an ad hoc basis with the respective Advisory Committee or Irrigation Board.

To give impetus to implementation of the strategy, it was further agreed that tariff increases would be gradually and uniformly effected from 1996/97 onwards on the following basis:

- The full recovery of annual operating, maintenance and current drainage/betterment costs, plus a 10% surcharge had to be reached within 5 years at each scheme, i.e. by the end of the 2000/2001 financial year.
- The following catchment management costs would be added to O&M costs: abstraction and storage control, afforestation permit control, the Working for Water Programme (subsidised by 90% as a result of subsequent representations to the Minister) and water weeds control.
- Increases for 1996/97 would be based on one-fifth (20%) of the difference between the estimated 1996/97 costs plus 10% and the 1995/96 tariffs. For the following four years, the increases would be based on one-fourth,

one-third, half and full recovery of the corresponding differences between costs and tariffs as recalculated annually.

- On schemes where the current tariffs already exceeded the following year's costs plus 10%, tariffs would remain at the current level.
- A maximum annual increase of 50% on the current tariffs would apply.

2) **Water resource management charge**

Full recovery of water resource management costs must be achieved in a phased approach. The agreement reached with the South African Agricultural Union (SAAU) makes provision for the allocated costs for the Working for Water Programme (water conservation) to be subsidised by 90% due to the fact that this activity will only increase the assurance of supply to this sector and will not make additional allocations possible. The catchment management activity costs relating to water conservation (invasive plant and water weed control) and water utilisation (storage, abstraction and afforestation permit control) which have already been introduced, plus a 10% surcharge (to account for under-recovery of costs during drought years), will be phased in together with operation and maintenance costs, to be recovered in full by March 2001. Thereafter the other water resource management costs in terms of this strategy will also be introduced for water pricing purposes, but only after the majority of water uses in a particular water management area have been registered.

3) **Water resource development and use of waterworks charge**

In line with an agreement between the DWAF and the SAAU, described in 1) above, all management, operating, maintenance and current refurbishment costs, together with certain water resource management costs plus a 10% surcharge, will be recovered in respect of existing Government schemes by March 2001, by gradually phasing out the subsidy over a five year period. The agreement also makes provision for the full recovery of future refurbishment and betterment costs. This agreement will be reviewed before April 2001, from which date the introduction of a depreciation charge on existing schemes, in line with **5.3.2** of this pricing strategy, will be considered. This depreciation component will replace the obligation to pay for the future replacement, betterment and drainage costs in terms of the current agreement.

It is not DWAF's policy to develop new Government irrigation schemes. Where a storage dam scheme is developed for other purposes and established irrigation farmers will benefit by an increased assurance of supply, the full operation and maintenance costs will be payable. New farmers would only be given access or existing farmers allowed to expand on condition that the full financial cost (O&M plus depreciation plus return on assets) would be payable for such new development.

4) **Phasing in of charges**

Total existing tariffs will be increased gradually to reach full recovery of the SAAU negotiated costs by March 2001. The maximum annual increase of existing tariffs will be limited to 50% of the previous tariff during this period. Tariffs would also not be decreased in any year. From April 2001, the other

water resource management activity unit costs for water resource management and a depreciation component of water resource development costs should be added to the charge. Terms of a new agreement will be negotiated in this regard with the full spectrum of organised irrigation agriculture (not only the SAAU).

Ex-homeland schemes and emerging irrigation farmers

In redressing the imbalances with respect to irrigation farming in the past, it should be noted that the State is committed to supporting disadvantaged individuals and communities through land restitution, land reform, or other programmes of corrective action. These could include concessionary periods during which the full cost of water, based on the approach proposed in this document, is not levied. A phasing-in period of 5 years for catchment management plus the use of waterwork charges on State irrigation schemes is proposed, in order to bring the strategy in line with current practice on established schemes.

The following strategy will be applied to the pricing for ex-homeland irrigation schemes and emerging farmers given access to established or new government water schemes:

- Betterment costs at ex-homeland government water schemes supplying emerging farmers of the historically disadvantaged groups must initially not be taken into account for pricing purposes. The reason for excluding these is that most of the government water schemes in the former homelands are in a highly dilapidated state due to years of neglect of maintenance. The catchment management and operation and maintenance costs plus a surcharge of 10% as contained in the agreement with the SAAU, must be phased in over a period of five years, starting with one-fifth of such costs in the first year after registration or licensing of the emerging farmers.

- For new farmers of the historically disadvantaged groups, who are given access to established or new government water schemes, there must be a phasing in of the full cost recovery of the same costs allocated to established farmers in terms of the negotiated agreement with the SAAU. This must also be over a five-year period, commencing after registration or licensing.

- Future negotiations to be conducted with the SAAU before 2001 regarding the implementation of a depreciation charge must also include representation by representative bodies of these emerging farmers. The further phasing in of the full charges in terms of the raw water pricing strategy must then be done over the same number of years for both the commercial and emerging farmers, but staggered in time due to different commencement dates.

- Established commercial farmers of the historically disadvantaged groups, whose existing irrigation development will be stabilised by any new State storage dam built for other purposes, will be liable to pay the water resource management charges, as well as the operation and maintenance cost of the dam, without subsidies.

Registration of irrigation water use for pricing purposes

An existing lawful water use as defined in section **32** of the Act, can continue to be exercised until the responsible authority requires that water use be licensed. As the extent of existing lawful use has in many cases not been quantified by means of the authorisations granted in terms of legislation which was in force immediately before this Act came into effect, the Act empowers the responsible authority to record the extent of such existing lawful use by means of a registration process, subject to regulations made under section **26 (1)(c**) of the Act.

The necessary regulations to guide the registration of existing water use will be promulgated. These regulations will enable the DWAF to register existing lawful use in all water management areas from October 1999 in order to facilitate the effective allocation and management of water use and waterworks and the imposition of charges as set out in the pricing strategy. In terms of section **59 (2)** of the Act, any person registered in terms of a regulation under section **26**, or holding a license to use water is liable for water use charges.

For pricing purposes, irrigators not supplied from waterworks owned by the Government or water management institutions, must be registered for their estimated average annual volumetric water use, which will be based on the crop water requirements of those crops and irrigated areas which constitute their registered existing lawful use and the estimated water losses incurred by their registered on-farm irrigation systems. On Government or WUA schemes, the water use on the scheme will be registered as a unit and will be based on the sum of the individual volumetric allocations at field edge, adapted for assurance of supply to represent long term average annual use, plus average annual distribution losses on communal infrastructure.

The following methods will be used by DWAF to determine the volumetric extent of average annual water use of individual irrigators for pricing purposes, based on information provided on the official registration application forms:

- **Irrigation requirement:**
  The annual irrigation requirement (the amount of water to be distributed onto the soil surface) is calculated by subtracting the average annual effective rainfall (that part of the rainfall that effectively replaces irrigation) from the average annual crop water requirement (the minimum quantity of water necessary for optimal plant growth for the specific crop at the specific location).

The following procedure will be followed to calculate the crop water requirement:

The SAPWAT computer program currently being developed under the auspices of the Water Research Commission, using the internationally accepted Penman-Monteith climatic model for crop water requirements as developed by the FAO, plus the effective rainfall for different crops at 350 weather stations country-wide, will be used for estimating the irrigation requirements for those crops noted in the program, anywhere in South Africa. The weather station with climatic characteristics nearest to those experienced on the specific farm will be chosen and for crops not noted in the program, a crop with more or less similar characteristics will be chosen in the model.

- **In-field irrigation losses:**
  The irrigation system used does have some built-in losses that must be added to the irrigation requirement to be able to establish the total quantity of water used.

The following system efficiencies (which accounts for losses between the farm dam and where water is placed on the soil surface) as given in the "*Irrigation Design Manual*", 1996, produced by the Agricultural Research Council, will be used:

Irrigation method	System efficiencies
Flood : Furrow	65%
Flood : Border	60%
Flood : Basin	75%
Sprinkler : Dragline	75%
Sprinkler : Quick-coupling	75%
Sprinkler : Permanent	85%
Sprinkler : Hop-along	75%
Sprinkler : Big gun	70%
Sprinkler : Side-roll	75%
Sprinkler : Boom	75%
Sprinkler : Travelling gun	75%
Sprinkler : Travelling boom	80%
Centre pivot	85%
Linear	85%
Micro sprinkler	85%
Micro spray	90%
Drip	95%

- **Irrigation management:**
  If no irrigation scheduling or any other method to improve irrigation efficiency is used, the management of the specific irrigation system is not optimal and a further quantity of water is lost. A quantity of **10**% of the total use will then be added.

Stepped water tariffs

To promote water conservation and the beneficial use of water in terms of the National Water Act, the introduction of stepped water tariffs for irrigation will form part of the pricing strategy. The present agreement with the SAAU regarding the phasing-in of the recovery of current expenditure at schemes may lead to under-recovery of costs if stepped tariffs are introduced immediately, and such an immediate introduction may therefore be counterproductive. The introduction of stepped tariff structures also needs further applied research and refinement and can furthermore only be effectively applied where water supply is accurately measured and monitored.

The development of stepped tariff structures to promote water conservation will also form part of the revised agreement to be concluded with organised agriculture, which will be implemented from April 2001.

Government institutions

Water supplied for irrigation purposes from State schemes to other government departments or institutions financially supported by government departments, will be charged a tariff based on full financial cost recovery, without subsidisation.

Purchase of "extra water"

The current policy of allowing scheduled irrigators on Government water schemes to purchase "extra water" under certain conditions at heavily subsidised prices will be discontinued. Only under exceptional circumstances, such as an unexpected heat wave, will irrigators be allowed to purchase additional water over and above the quotas. The tariff for such extra water will be the raw water tariff for domestic and industrial supply.

7.5 Stream Flow Reduction Activities

1) **Water resource management charge**

In terms of the Act, forestry is declared as a stream flow reduction activity. Existing and new forestry plantations will attract charges for water resource management. Full recovery of allocated water resource management costs in

terms of **5.3.1**, based on the total registered average annual volumetric water use, must be achieved for each water management area. The Act makes provision for the DWAF to make a volumetric determination of water to be ascribed to a stream flow reduction activity for purposes of water use allocation and the imposition of charges.

Water resource management charges for stream flow reduction of commercial forestry plantations will be expressed in cents per cubic meter for each water management area and the registered average annual stream flow reduction volume per water user will determine the amounts payable to the responsible authority.

The volumetric determination of stream flow reduction for registration purposes will be based on the outcome of the current stream flow reduction modelling research project conducted for the Department under supervision of a steering committee on which the forestry industry is represented. The results of this research, which is intended to refine existing empirical models, will be available in 2000. The model to be used will be based on the document "*The impacts of timber plantations on runoff in South Africa*" by Le Maitre, Scott and Fairbanks, 1997, taking account of the different species, areas planted, location and resulting moisture availability in quaternary catchments.

2) **Water resource development and use of waterworks charge**

This charge would not generally be applicable, unless the sector willingly buys in on the construction of storage dams to compensate for stream flow reduction effects.

8 CONCLUSION

This document has presented a resource pricing approach for South African water, based on financial and economic principles, and taking into account the country's social and ecological objectives. It has argued that supply-side approaches to address the problem of water scarcity are all but exhausted, and that an integrated approach, containing also demand-side measures represent the only viable long-run solution to the management of South Africa's water resources.

The new approach to water pricing recognises this, and proposes that the full financial cost of 1st tier water eventually be recovered from water users. Where necessary, this financial charge may ultimately be supplemented by an economic charge in water-scarce catchments, in order to reflect the relative scarcity of water as a commodity at a given time and place and thus to promote the efficient allocation and beneficial use of water.

Finally, it would be premature to assign definite time-frames to the staged phasing-in of full economic pricing in the absence of actual data. However, it is important to remember that the country's scarce water resources are at great risk if the move towards economic pricing is delayed any longer than is absolutely necessary.

9 GLOSSARY OF TERMS

Social equity: In the context of water resources, social equity implies that all user groups have fair and reasonable access to the nation's scarce water resources, and that the allocation of water resources facilitates universal and affordable access to a basic water supply.

Ecological sustainability: This concept captures the view that there is a need to treat ecological protection and continuing economic growth as mutually compatible rather than as necessarily conflicting objectives.

Economic efficiency: A condition that is achieved when resources are used over a given period of time in such a way as to make it impossible to increase the welfare of any person without harming another.

Economic value: The cost that represents the scarcity value of a good which would prevail in competitive markets.

Economics: Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses.

Externalities: are essentially activities whose full cost or benefit is not incorporated into an economic decision; hence they lead to sub-optimal social allocation.

Market approach: This is an accepted means through which buyers and sellers can communicate and trade at mutually agreed terms.

Market clearance: A condition that is attained when the price of the good traded adjusts so that the quantity buyers wish to buy is equal to the quantity which sellers wish to supply.

Opportunity costs: The costs of alternatives forgone by using scarce resources in a particular manner.

Polluter pays principle: A principle that ensures that a charge per unit of pollution emitted into the ecosystem is charged to those responsible for such pollution in order to internalise the cost thereof**.**

Scarcity: The situation which arises when demand for any given good outstrips the supply of that good.

Water market: A market where water is traded in the same fashion as other goods.