



Project to Revise the Pricing Strategy for Water Use Charges and Develop a Funding Model for Water Infrastructure Development and Use and a Model for the Establishment of an Economic Regulator

Raw Water Pricing Strategy Gap Analysis

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PEGASYS
Strategy and Development

www.pegasys.co.za

In Association With

 **Khanyisile**
Consulting Services CC

 **DLA CLIFFE DEKKER**
HOFMEYR

 **TLOU CONSULTING (Pty) Ltd**
Reg. No. 2001/000171/07

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1 Introduction

This document is one of the deliverables in the PERR project WP10465: Revision of Pricing Strategy and Development of a Funding Model and an Economic Regulator. The Pricing and Economic Regulation Reforms (PERR) project is a strategic project that will enable DWA to have good policies on the pricing of water, cost reflective tariffs for the entire water value chain in South Africa with potential for the poor and a good funding framework for infrastructure development, operations and maintenance. The project has been listed under Outcome 6 as a priority and some of its elements fall within the Minister's performance agreement.

The three main project work-streams and respective outputs are the following:

- Pricing Strategy Review – a revised pricing strategy
- Infrastructure Funding Models – a funding model for water infrastructure development and refurbishment.
- Economic Regulator – recommendation on the establishment of a model for an economic regulator for the entire water value chain.

This report falls under the Pricing Strategy work-stream. The raw water pricing strategy document sets out the approach of the government towards charging for raw water use. It refers only to pricing for the use of water from South Africa's water resources (surface and groundwater) and not to the pricing of municipal water supply. It deals with the use of raw (untreated) water from the water resources and/or supplied from a government waterworks. The strategy covers the setting of prices by DWA as well as by water management institutions as defined in the NWA

This document is the deliverable under activity 3.1: Review of current pricing strategy success and failures (gap analysis). The abstraction based water resources management charge (WRMC) has been established for over a decade now, with more recent enabling of charges on waste discharge through the development of a waste discharge charge system. The assumptions behind the WRMC require review, particularly related to the allocation of functional costs and the capping of charges on forestry and agriculture. On the other hand, while conceptually relevant, the requirement to base cost recovery related user charges on waste discharge load has complicated its implementation, so the current pricing strategy must be reviewed to identify the key challenges, problem areas, gaps, and opportunities for improvement.

Therefore, this report aims to identify the gaps and challenges that the pricing strategy stipulations pose to the water sector in South Africa so as to develop workable solutions to those challenges. This is not the revised pricing strategy, rather a document identifying the challenges that need to be addressed in the pricing strategy.

It is important to note that there are a range of different challenges surrounding the raw water pricing strategy. Firstly, there are a number of implementation challenges, such as poor maintenance of the WARMS data base, poor billing systems, low levels of recovery of water resource management charges in particular, and lack of procedures for allocating income against particular cost centres. These issues are not dealt with in this document, which is focused on the actual content of the strategy, and it is recognised that there are various processes in place in the department to address the implementation challenges. It is to be recognised, however, that if the implementation challenges are not addressed, the challenges of sustainable funding of water

resources management and infrastructure development, operation and maintenance, will remain well into the future. Revision of the pricing strategy itself is important, but only one part of a much bigger chain that must be addressed.

1.1 Structure of Document

This document is structured in the following manner:

- **Section 2:** provides an overview of the principles and objectives outlined in the raw water pricing strategy and the gaps that the strategy has in terms of principles and objectives
- **Section 3:** provides an overview of the various water use charges that the raw water pricing strategy makes provision for and why it does so, how they are calculated, who they are levied on and the gaps that they present
- **Section 4:** explores the pros and cons of the various levels at which tariffs can be set: national, system and scheme
- **Section 5:** provides a discussion on the principles of cost allocation, first between the fiscus and the water trading entity and then on the determination of social (state funded) versus commercial (off-budget funded) water resource infrastructure
- **Section 6:** provides a brief conclusion on the discussions of this raw water pricing strategy gap analysis

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2 An Analysis of the Pricing Strategy Principles and Objectives:

2.1 Principles:

The provisions of the pricing strategy are underpinned by certain overarching principles that guide what it aims to achieve. There are four principles underpinning the provisions of the pricing strategy, these are:

- ✚ Social equity – contribute to social equity and redress of the imbalances of the past
- ✚ Ecological sustainability – ensure the protection of the water needs for the effective functioning of aquatic ecosystems
- ✚ Financial sustainability, and – ensure the generation of adequate revenue for the development, management and maintenance of water resources
- ✚ Economic efficiency – set the price of water to reflect the scarcity value of water to ensure that it's conserved and used for high value purposes

The four guiding principles outlined in the pricing strategy remain valid in the South African context, and need not be revised nor altered in any way. However, these four principles do not cover the full spectrum of the challenges that need resolution within the South African water sector. Given the level of persistent poverty in the country, and the extremely high levels in inequity in the society, at least one more guiding principle should be considered – one that will specifically be tailored towards the use of the water resources in the country for the development of the economy in a way that reduces, alleviates or eradicates poverty and reduces economic inequality. This will allow the provisions of the pricing strategy to focus on a dimension of the South Africa's landscape that will have a real impact on the everyday lives of common ordinary South Africans.

Principles Gap:

It could be argued that an additional principle that should be considered important is economic development.

- **Though economic efficiency can be interpreted to encompass economic development, it does not quite make clear the need to prioritise the development of water resources for the purpose of economic development and the eradication of poverty in particular**

2.2 Objectives

The principles of the pricing strategy are set in place for the purposes of directing the pricing strategy towards the achievement of certain objectives. The aim of the pricing strategy is to spell out the methodology and implementation strategy for setting water use charges for the purpose of:

- ✚ Funding water resources management by DWA and water management institutions through water use charges

- ✚ Funding state owned water resource infrastructure development , betterment, operation and maintenance
- ✚ Achieving the equitable and efficient allocation and use of water through a charge hereafter referred to as the “economic charge”
- ✚ Providing for a differential rate for waste discharge, hereafter referred to as the WDCS

Objectives Gap:

- **The pricing strategy does not outline a methodology and implementation strategy for setting water use charges for the purpose of ensuring the redress of past imbalances and redistribution of water for the development of rural communities – although it does state social equity and redress as a principle**
- **Although the granting of financial assistance is stated as a tool to help contribute to social equity and redress is referred to, nothing is said about the form that the assistance will take and how long it would be in place for**

While each of these objectives is appropriate in and of itself, a significant challenge is that they might well be contradictory in their implementation. For example, a pricing approach that aims to achieve efficient water use might well militate against redress and reallocation of water to historically disadvantaged communities. Equally, high infrastructure related costs might militate against new entrants into the water sector from historically disadvantaged and poor communities. It is thus important to understand how the objectives operate in synergy or in contradiction to each other, and which objectives are to be prioritised, and under what circumstances.

2.2.1.1 Closing the Gap

The water price setting methodology outlined in the pricing strategy correctly focusses on water resource development, management, waste discharge management and ensuring that water is equitable and efficiently allocated to ensure maximum economic output an equitable distribution of water. These objectives are well in line with the user pays principle and the principle of sustainability. There is a key principle of the pricing strategy for which a methodology is not outlined that is important in the South African context, redress.

Recognising redress as a key principle is a good first step, but it is not enough to ensure that it will be achieved. The systematic development of rural communities could be the key to unlocking the persistent poverty trap. The pricing strategy needs to have built into it a clear methodology outlining how pricing of water for previously disadvantaged and resource poor rural communities and farmers can be structured to ensure targeted government support for their development over a realistic time period. The form which the support will take – from a water point of view – needs to be prescribed. An approach similar to the government’s free basic water policy for rural development purposes would be a useful way to get more crop production for home food security.

Historically, there has been a waiver on certain charges for historically disadvantaged farmers, but there have been numerous challenges associated with this approach. Firstly, it is to be questioned whether the five years over which the full charges are brought in in an incremental fashion is

sufficient to support the development of resource poor farmers. Secondly, the actual subsidy provided to resource poor farmers in this way has not been clearly quantified with an appropriate mechanism for covering this cost, either through cross-subsidisation of other users or through a specific budget line item.

3 Water Charges

The raw water pricing strategy state that “the full financial cost of water resource management and supplying water should be recovered from water users, including the cost of capital. While it is important to keep water prices as low as possible, DWA has to ensure that water is priced at levels consistent with efficient and effective delivery of services. This approach may be phased in by taking account of constraints of various sectors to adapt quickly to price increases”. The charges prescribed in the pricing strategy, the manner in which they are calculated and the users (by sector) on whom the charges are levied is almost entirely guided by the above statement. The only point of difference between the stated approach and what has happened is that in some cases sectors have been entirely exempt from paying the charges in question instead of having the charges phased in, in accordance with their ability to adapt to increases.

3.1 Water Resource Management (WRM) Charge: Abstraction

3.1.1 Why WRM

Water Resources Management expenditure relates to those activities that are required to protect, allocate, conserve, manage and control the water resources and manage water quality located within a WMA. These costs do not only relate to water subject to charges, but to management of all water and water resources within a WMA.

3.1.2 Calculating WRM

The WRM charge is currently calculated in the following manner:

- The total budget cost of each activity is determined for each water management area (WMA)
- The total budget cost of each activity is then divided by the registered volumes to arrive at a unit charge per activity
 - Where water in a WMA is fully utilised or over-allocated (registered use exceeds allocable yield) the total volume of registered sectoral water uses will determine charges.
 - In an under-utilised WMA the volume of allocable water will determine volumetric charges. The estimated allocable sectoral use volumes will then be determined by applying the ratio of volumes registered by each sector to the allocable yield.
- The budgeted activity cost will be applied only to those sectors attracting such costs as stipulated in the pricing strategy
- The unit charge for all relevant WRM activities will then be applied to each user’s registered volumes to arrive at a WRM charge per user

Unless other arrangements are approved by the DWA/CMA the charges will result in a fixed payment, which will be invoiced on a six monthly basis for the irrigation and stream-flow reduction sectors, and a monthly basis for the other sectors.

3.1.2.1 Closing the Cap: Using registered water to calculate charges

Where water use is not metered, registered water use is used as the basis for charging for water. This pertains particularly to the irrigation sector, since most municipalities and industries using raw water have meters in place. The use of registered water use volumes to determine charges is a double-edged disincentive. On the one side, it is a disincentive for DWA when it comes to ensuring that adequate and proper metering or water use measuring is done in catchments so that an up to date understanding of water use in the catchment can be maintained. On the other hand, because users know that the level at which their charges are set is based on the amount of registered water use, they have a disincentive to save water. This is a particular challenge in the irrigation sector since this is the largest user of water in the country, and improved water use efficiency is a critical part of ensuring water availability for other purposes.

WRM Calculation Gap:

- **From a user's point of view, this approach to charge determination completely eliminates all the risk from DWA and ensures that users are charged maximum costs for water regardless of whether they use it or not**
- **This approach is a disincentive for water users to save water or use it efficiently**
- **Some proper metering/measuring needs to be done in order to ensure that all costs that are variable in nature are treated as such**
- **Allowing for fixed payments to happen, coupled with the use of registered volumes to calculate charges, eliminates the need for DWA (or their responsible WMI) to meter water use and accurately measure and charge the according to use**
- **This makes sense for stream-flow reduction sectors, but not quite the same for agricultural water use**

What is of interest is that the pricing strategy does not prescribe whether the invoices sent to water users be based on their registered or metered/measured water use, it only states that the charges should be set based on the cost of activities divided by the **registered volumes**. This protects DWA from the possibility of not being able to invoice and collect enough charges for WRM during years of water restrictions, or years of high rainfall when irrigation use is reduced, if the both the charge setting and invoicing are based on the registered water use.

In order that the disincentive for users to save water is countered, an incentive for efficient water use, specifically below the registered volumes needs to be designed. Where water use charges are directly linked to the amount of water used, there will be an incentive to reduce water use, unless the water use charges are set below the price that will drive such changes in behaviour. However, in order for this to be made possible meters must be installed and monitored, and an allowance for the payment for actual water usage (not registered volumes) be made.

While there are regulations under development to ensure the introduction of compulsory measuring of water use in the irrigation sector, these regulations have not yet been published, and will, once they are in place, take some time before they are effective across all irrigation water users. There is,

in addition, a policy issue on this matter that in our understanding is still outstanding – the question of who pays for the installation of the meters – DWA or the water user? The resolution of this policy matter is critical for the pricing strategy, both in terms of its revision and in terms of impacts on future charges. If the meters are to be paid for by DWA, the decision must be made whether the cost is to be included in the pricing strategy or to be paid for from the fiscus.

Policy Gap:

- **A decision is needed on who will pay for meters and/or measuring devices for farmers once the proposed regulations on this matter come into force. If DWA is to pay, a decision is needed whether this is to be incorporated into the pricing strategy or whether they will be funded from the fiscus.**

3.1.3 Who Pays WRM Charges

The user sectors for which unit sectoral water resource management charges will be calculated are currently categorised as:

- Domestic/industrial (water services authorities, industrial, mining, strategic)
- Agriculture (irrigation of agricultural crops)
- Stream flow reduction (commercial forestry at this stage, other sectors may be added)

All identified water user groups pay the WRM charge except that the forestry sector does not pay the charges related to water quality management. However, there are two user groups who have their WRM charges capped – the forestry sector and the agricultural sector.

WRM charges to the forestry sector are capped at R10 per hectare plus Producer Price Index (PPI) rate (%) at April of each year with the 2002-03 financial year as the base year. Resource poor foresters and non-irrigation growers with land equal to or less than ten hectares under cultivation will be excluded from this charge.

WRM charges to the irrigation sector are capped at 1.5 cent per m³ plus PPI rate (%) at April of each year with 2007-08 as base year. In instances where the actual 2006-07 charges to the agricultural sector as calculated under the 1999 Pricing Strategy would have been higher than the capped amount of 1.5 cents per m³ (because of the impact of PPI resulting in charges above 1.5 cent in previous years), then the higher actual charge will be used as the base charge for charge setting purposes.

WRM charges for resource poor farmers and resource poor foresters are currently to be phased in over five years through subsidy of the amounts not recovered from the beneficiaries. A differentiated subsidy policy is applied to determine annual costs to be recovered from resource poor farmers and forest growers. The subsidy comes into effect on the date of registered water use by individual resource poor farmers or resource poor foresters.

Who Pays Gap:

- **No provision is made for the use of water for animal rearing**
- **There is no reason given as to why these caps are in place and what the logic was for how they are calculated– for example, what was the motivation for 1.5 cents as opposed to say 2 cents? And over what period is this capping to be maintained without revision?**
- **If the effective *subsidisation* of agriculture and forestry is to continue, it must at least be properly accounted for, its value calculated and clearly reported on, and it must be transparently recognised as a subsidy, not hidden under the term price cap.**
- **The use of PPI as the rate of increase is also unclear given that the basket of goods used in calculating PPI is not necessarily reflective of the basket of goods used in executing WRM.**

3.1.3.1 Closing the Gap

The WRM charge caps put in place for irrigation and forestry appear to have been arbitrarily set. There is no ignoring or denying the strategic importance of ensuring food security for the nation, and setting a cap on the price of water for irrigation may make sense from that point of view – the same cannot be said for forestry. The manner in which the cap levels were arrived at is unclear and there is no clear relation to food security or any other clearly stated national priority. If the caps are indeed in place as a response to the challenge of food security, then their calculation must be linked to that purpose. If, however, the issue of price capping is related simply to the notion of ‘affordability’ then this concept must be unpacked and clearly understood as a subsidy provided by government to a particular sector in order to support that sector.

Depending on the actual purpose of the price capping, one might need to consider whether the price cap should be applicable to all crops, or only to those crops that make up the staple diet of the nation – based on a clearer definition of staple diet – and be linked to the inability of those farmers who plant those crops to be profitable without those caps. In other words, the caps of irrigation water must be calculated in view of the total input costs of those farmers and not in isolation. Coupling this approach with the possibility of extending price caps for other inputs (e.g. electricity) to farmers could better position the water sector for sustainability because it would not have to be the only sector sacrificing revenue for the sake of food security – especially because studies show that water is not the biggest input cost of the agricultural sector. This approach could lead to the continued application of PPI as the rate of increase of water prices above the cap, but it is also equally likely that it could prove inaccurate.

What is particularly important in relation to the caps is that they are seen as targeted subsidies, and that the full value of the subsidy is calculated, is transparent, and is funded through another source, either cross-subsidisation or the fiscus.

As an offshoot of the principle of redress resource poor farmers essentially get preferential tariffs based on the charge waivers that are applied to them. Unfortunately, the period over which these waivers are applied appears to not be long enough to make financial sustainability possible. A proper study of the requirements for sustainability, in terms of both time and resources, needs to be done

so that it can inform how long the period of support ought to last in order to make sustainability a possibility. Once again, it is also important that these charge waivers are seen, calculated and reported on as a subsidy, and that a clear policy position is taken on how these subsidies are funded.

3.2 Waste Discharge Charge (WDC)

3.2.1 Why WDC

The waste discharge forms part of the pricing strategy to promote the preservation of resource quality. It is specifically designed to promote the polluter pays principle which is itself an offshoot of the user pays principle that guides the pricing strategy.

3.2.2 Calculating WDC

The calculation of charges is based on the registered discharge waste loads of salt and phosphorous, as representing the two most widespread water quality problems in SA, based on the following:

- Salt load will be estimated using electrical conductivity
- Phosphorous (as the limiting nutrient for freshwater eutrophication) will be estimated using soluble phosphorous (phosphate)

In calculating the waste loads, the methodology that is used is that of taking the average (mean) discharge concentration of salt and/or phosphorus multiplied by the discharge volume or volume of water or volume of disposed water as reflected on a lawful permit or licence, general authorisation and/or verified as existing lawful use

The point source salt and phosphorus waste loads in a WMA will be calculated from the registered discharge load in terms of Section 21(f). This will be distinguished from the total phosphorus waste load through marine outfalls and the total salt and phosphorus waste loads disposed to facilities or land.

Waste discharge related WRM charges for each water use category in each WMA will be determined by dividing the total cost allocated to each category by the total registered waste load of salt and/or phosphate for the water use category.

The charges will result in a fixed payment, which will be invoiced on a monthly or six monthly basis, according to the abstraction related invoicing cycle.

3.2.3 Who Pays WDC

The sectors for which waste discharge related water resources management charges will be calculated are similar to the sectors for the abstraction related charges, these are municipal (domestic), industrial, mining, energy and agriculture. The stream flow reduction activities are excluded from having to pay the WDC.

The budgeted water resources management activity cost allocated to waste discharge related water use will be allocated to the water use categories according to the ratio of management effort applied in the WMA. Certain activities will only benefit or only be related to specific water use categories and therefore will only be allocated to those categories. No differentiation will be made between sectors within a category. The categories are:

- Point source discharge

- Marine outfalls
- Waste disposal to facilities or land
- Irrigation of land with water containing waste

The additional water quality management cost related to discharge load into a downstream WMA will be allocated to the waste discharge water use categories, except marine outfalls, based on the same management effort ratios.

3.3 Infrastructure Charges

The pricing strategy currently utilises a depreciation, return-on-assets (ROA) and off-budget funding approach for setting charges to fund the capital cost in respect of development, refurbishment and betterment of schemes owned by government. State funding is mostly to social water resource development or betterment projects and where the demand is not driven by specific commercial water users or sectors. However, to date, some projects that are commercially viable have been funded on-budget due to the refusal of future water users (such as mining companies) to sign the off-take agreements that are a necessary part of obtaining off-budget funding.

New infrastructure development or betterment may have a social as well as a commercial component in which case, under the current strategy, state funding and related charges will apply on the social component, while loan funding and related charges will apply on the commercial component, unless, as mentioned above, off-budget funding cannot be utilised because of the lack of off-take agreements.

Currently the classification of a project as social or commercial is at the sole discretion of the Minister of Water Affairs. Project classification is on a case by case basis, dependent on a submission made to the Minister on the ability to pay of sectors to be served by the project. The pricing strategy does not currently contain any principles or methodologies for determining what projects are to be funded on-budget or off-budget. This is an area that can be considered for inclusion in the revised strategy.

3.3.1 Why Depreciation

Depreciation is defined as the loss in functional performance and real term value of existing water resource infrastructure that occurs due to wear and tear, decay, inadequacy and obsolescence, not restored by current maintenance. It is intended that through cost recovery, depreciation charges will be used to refurbish existing assets on a prioritised basis, as and when required. Currently, depreciation income from the general revenue base is intended to be used for the refurbishment of infrastructure assets from a dedicated refurbishment fund. As refurbishment will only restore the original capital value of assets in real terms, no increases in charges will take place as a result of the refurbishment.

On schemes funded off-budget, the depreciation charge is currently only applicable once the loans have been repaid. If refurbishment is required during the repayment period, a refurbishment charge will be arranged by agreement between the parties.

3.3.2 Calculating Depreciation

For charge calculation, depreciation is the systematic allocation of a depreciable amount of an asset over its useful life and is currently applied as follows:

- On a straight-line basis over the useful life of the asset
- The depreciation amount = annual depreciable portion of the replacement value of assets
- Replacement value = revaluation of the value of the assets as determined in March 2000
 - Full technical revaluation will be carried out at least every 10 years
 - Desktop revaluations will be carried out annually – PPI of April of each year will be applied to escalate the base value of the infrastructure assets to nominal values

Annual Depreciation Cost = (Replacement value*Depreciable portion %) / expected useful life

3.3.3 Who Pays Depreciation

The depreciation charge is applicable to all sectors supplied from government waterworks.

Depreciation Gap:

- **The annual revaluations based on PPI might not accurately reflect the correct value of those assets – a more suitable rate or equation ought to be considered**
- **No dedicated refurbishment fund comprised of depreciation charges has been established**
- **Part of the challenge is that there is no protocol for the water trading entity regarding the allocation of income across different elements of the charges where invoices have been paid either in part or above the invoiced amount. It is therefore extremely difficult to record and assess what income there has been against which elements of the water charges. It should be examined whether this should be addressed in the pricing strategy or simply in an internal protocol for the WTE.**
- **Saying refurbishment will only restore the original capital value of assets in real terms assumes that the value of the asset will never actually increase – this is tricky when dealing with assets like land etc. that are likely to increase in value over time, especially if proper refurbishment and maintenance are taking place**
- **Given that the pricing strategy prescribes that depreciation be taken at cost, there is some infrastructure in the country that was constructed a long time ago that would not be able to cover the cost of their refurbishment**

3.3.3.1 Closing the Gap

While the annual asset evaluation based on PPI is acceptable in some respects, however, to make this a more accurate the department ought to create a basket of goods that is more reflective of the components of the assets in their balance sheet and the work needed to maintain that. The price movement in this basket of goods can then be used to calculate an internal inflation rate of the assets in question and be used for re-evaluation.

The purpose for which the depreciation income was designed is critical to the sustainable delivery of water and all its related services. The fact that the dedicated refurbishment fund has not been established is a big part of the reason there now exists a massive refurbishment backlog calculated to be between R10 billion and R16 billion. For this challenge, the execution of what is already

provided for in the pricing strategy would likely lead to its resolution. Equally important is ensuring that the right funds/charges are put into the depreciation fund. This requires that a system of allocating funds from user payments actually be designed and implemented. If invoices do not already indicate how much DWA is charging the user on which charge, that needs to be done – sending one invoice is preferable. This must be complemented by an internal system in the department guiding those responsible for the finance to prioritise which charges are drawn first from user payments or whether there is a pro-rata allocation, and how this is to be done.

To avoid the possible challenge of depreciation not being able to cover the refurbishment cost of the older infrastructure, the cost on which the calculation of depreciation is based should be adjusted to current day rand value given the inflation over time. This ought to adequately address the challenge.

3.3.4 Why Return on Assets (ROA)

The purpose of the ROA is to raise funds for the development and betterment capital value of government waterworks.

Ring-fenced ROA revenue is meant to be applied on a prioritised basis for meeting the cost of planning and feasibility of future augmentation or betterment of existing GWS and the development of social projects.

In view of the off-budget funding arrangement for certain projects, the target level of income to be generated through ROA charges is directed towards recovering the annual capital cost requirement for state funded social projects.

The critical issue is how the RoA is determined. In this regard, there are two options. Either the ROA should be based on the social opportunity cost of capital to government, or it is calculated on the basis of bringing in sufficient money to fund the annual capital expenditure budget requirement for the development of new social waterworks and betterment of existing infrastructure.

3.3.5 Calculating ROA

Currently, the ROA is determined by fixing a charge to earn a specific rate of return on the current depreciated replacement value of the infrastructure. The ROA rate of 4% laid down in terms of the 1999 pricing strategy was based on the estimated growth in water demand for industrial and domestic demands at the time. This was carried through into the 2007 pricing strategy.

3.3.6 Who Pays ROA

The ROA charge is applicable on state funded and owned assets for as long as they exist in an operable condition. On off budget schemes, the ROA charge is not be imposed during the repayment periods of the loan. This means that it can be charged to any user benefiting from state owned water resources infrastructure as long as off-budget infrastructure has already been paid off. As a result, there are some users that do not pay the ROA charge because they do not directly benefit from the development and refurbishment of water resource infrastructure.

For the agricultural sector, ROA charges as per the 2007 pricing strategy are not be applied to existing state irrigation schemes. These charges are also not to be applicable to resources poor farmers for both existing and new schemes constructed as part of the water allocation reform programme.

Forestry also does not pay ROA and depreciation, assumedly because they do not use waterworks, but rely on rainfall instead. However, there is an argument that in stressed catchments extensive forestry may result in the need for infrastructure to serve other water users because of the water uptake of afforestation. In this case, there is an argument that forestry should at least contribute to the infrastructure charge.

ROA Gap:

- **From the definition of what the ROA is based on, there are two possible approaches of setting it – either an actual opportunity cost approach (the calculation of which would need to be figure out) or the determination of the annual spend on social waterworks**
- **The demand growth for water in these two sectors used to initially set the ROA rate has not been reviewed since 1999 and infrastructure development has not quite been at the level of revenue which the ROA could potentially generates if all users in those sectors were billed, invoiced and fees collected.**
 - **The rate needs to be reviewed of the concept revised entirely**
- **ROA revenue still has not been ring-fenced (same problem as depreciation revenue) – and so we find that betterment has not happened in a while.**
- **There is no clear reason why resource rich agricultural water users do not pay ROA**
- **It is not clear how a farmer becomes classified as resource poor**

3.3.6.1 Closing the Gap

Given that the ROA charge is meant to be levied on water user to ensure that the department is able to develop new water schemes or improve already existing schemes, one way to determine the ROA charge would be by having development and betterment projections calculated every year and revised quarterly that inform how much ROA should be charged on users. In years in which no new developments or betterment projects are expected to take place, the charge can be zero. However, the opportunity approach to setting this charge would likely be a complicated and inaccurate process. Calculating water demand growth as a measure of infrastructure development and betterment is yet another possible approach, but this requires the execution of a number of complicated steps and would also likely result in the setting of unrealistic charges – whether too low or too high. If this is the approach to be taken, it is critical that there be an annual review to the water demand growth figures.

Like depreciation, ring-fencing the income dedicated to ROA charges is also important.

3.4 Invasive Alien Plants Charges:

Currently, the full cost of control of certain invasive alien plants (IAPs) may be charged to affected water users, but only with the agreement of those water users. In this regard, the responsible WMI, in consultation with affected stakeholders, will recommend that the control of IAPs in a particular catchment is necessary for water security and, from the range of options available, the control of

IAPs is the best and most cost effective action possible to increase long term water security and availability.

Once agreement is reached on the method of control of IAPs, and before going ahead with clearing, the total cost of control must be communicated to all affected stakeholder organisations. The agreed upon costs of control will then be allocated to all water use sectors in proportion to their registered abstraction related water use. These costs may be supported by subsidy where available and appropriate.

In the event of consensus not being reached amongst water user sectors, the responsible WMI will go ahead with clearing in co-operation with those sectors that have agreed to participate in the clearing process. The resultant additional water after taking the ecological reserve and reducing over allocation into account may be allocated to sectors that financially participated in the clearing project.

This current approach is problematic in that:

- a) If water users do not agree to the additional charge, DWA is obliged to find other sources to fund the clearing activities, from which the water users may then benefit, or to not implement the clearing activities. The latter is a problem as delayed action against IAPs may result in much later costs later when the invasion has spread more widely;
- b) Those water users that do not agree to the cost of the clearing, and do not pay this charge, may nonetheless benefit from increased water availability in the catchment, from improved river health or aquifer recharge, and from the ecological reserve being met without them having to contribute equally with other users in this regard.

One of the challenges of this charge is that magnitude of the charge, which is of similar proportion to the infrastructure charge, being in rands per cubic metre, not cents per cubic metre. Users are therefore extremely uncomfortable about paying this as an additional charge to existing water use charges.

Discussion is needed on whether to continue with the current model, or to find some other way of dealing with this challenge.

3.5 Economic Charges

The pricing strategy makes provision for the setting of an economic charge, to support the objective of economic efficiency, which will provide an incentive to shift water use from low to high value uses. While this charge has not yet been implemented, the two methods of setting this economic charge that have been considered are 1) the use of a proxy for the economic value of water and 2) the use of market oriented mechanisms.

1. The proxy approach would be based on the opportunity cost of water as determined by prevailing trading transactions, but would be capped at the level of the ROA charge
2. The market oriented mechanisms approach would aim to make use of the public auction procedure to sell off amounts of water that are still available for allocation after compulsory licenses have been issued
 - a. A second option for this approach is the transfer of water use entitlements via trading transactions within and between water use sectors

3.6 Hydropower Generation Tariffs

The State has been promoting the development of hydropower generation as an alternate and additional source of renewable energy. This raises the question of the appropriate nature of hydropower charges for water use.

Currently, there is very limited hydropower generation in the country. While hydropower is generated on the Lesotho Highlands Water Project, this power is reserved for the exclusive use of Lesotho for which an agreed tariff is paid by the government of Lesotho. This income is utilized to partly pay off the loan raised to fund the Lesotho Highlands Water Project. In addition to this, there is a limited hydropower generation from various small schemes.

There is, however, the potential to develop approximately twelve more small hydropower plants in South Africa with capacities ranging from 1 MW (megawatt) to 15 MW, generating approximately 446 000 MWh/annum.

Under the current pricing strategy, hydropower is not specifically addressed. If the consumptive charge as it stands in the pricing strategy is applied, it will render these small hydropower schemes financially unviable. It is also inappropriate in that hydropower is not essentially a consumptive use of water. However, the presence of hydropower schemes does affect the scheduling of water releases, which may affect the availability of water for downstream users according to their different scheduling needs.

An internal DWA document proposed, as an alternative, that “charges for small scale hydropower generation of no greater than 20 MW should be based on c/kWh (cent per kilowatt hour) of energy generated and a fixed charge based on kW installed, instead of the cent per cubic meter of water use charged for raw water abstraction, which is neither practical nor applicable”.

It goes further to say that “Hydropower operators are required to provide NERSA (National Energy Regulator of South Africa) with an annual reconciliation of power generated and sold which will make calculations of water tariff based on the power generated simple to implement.”

In terms of the scheduling issue, the document states that “It could be possible that a hydropower generation operator may require water to be released from a dam to generate power at times that such water would NOT be used by other downstream water users, resulting in a loss of water stored in a dam. The amount of water released in this manner will be regarded as “taking of water from a water resource”. In such instances the hydropower generator will need to acquire a water use license for the taking of water which qualifies as a section 21(a) water use in terms of the National Water Act, No. 36, 1998. Such a use will be subject to normal tariffs in terms of the current raw water pricing strategy. In addition, the said user will be subject to the energy related charges as proposed in this submission.”

The document recommends that “small hydropower plants with a capacity of less than 20 MW should be charged as follows”:

	Hydropower plant integrated within DWAF’s infrastructure at the dam	Hydropower plant developed downstream of DWAF’s infrastructure and downstream of the dam wall
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	(A)	(B)
Fixed charge	R10.00 / kW per annum	R5.00 / kW per annum
Variable charge	R0.01 / kWh	R0.01 / kWh

This would result in an annual income under scenario A of around five million rand, and under scenario B of slightly less than five million rand. It is most likely that a combination of scenarios A and B will be implemented, giving a combined income partially from scenario A and partially from scenario B.

The document states that “The total average unit charge based on kWh would be R0.0114 cent under scenario A and R0.0106 cent under scenario B. This compares favourably with the proposed water tariff of R0.0106 cent, proposed by NERSA (National Energy Regulator of South Africa), in their document titled South Africa Renewable Energy Feed-in Tariff (REFIT) – Regulatory Guidelines, 26 March 2009”. It must be noted, however, that these figures date from 2009 and would need to be revised accordingly.

3.7 Funding Gap Resulting from Caps and Exemptions

Significant backlogs in maintenance have built up over the years due to budgetary constraints. The total revenue on the Water Trading Account was much less than the maintenance needs required in the respective operating areas. This is particularly severe for the irrigation schemes as the charges do not include the capital portion of the assets and thus no provision is made for asset replacement, including re-lining of canals, replacing of fences etc.

Just looking at the impact of pricing caps and exemptions of the irrigation sector alone – which uses 60% of all available water resources – and ignoring, for the time being, those of the forestry sector, a clear picture of the difference they make to the funding needs of the water sector emerges. To support the need for food security, the irrigation sector is excluded from the following charges:

- ROA (return on asset) charge
- Depreciation and Water Resource Management charge is capped to 1.5 cent per cubic meter
- Limits are set on tariff increases for operations and maintenance charges

Table 3.1: Irrigation Sector Funding Gap

Charge item	Pricing Strategy R billion	Estimated Need R billion	-Shortfall/ Surplus R billion
Operations and maintenance	0.9	1.4	-0.5
Depreciation	0.7	1.3	-0.6
Return on assets	2.5	1.8	0.7
Sub-total	4.1	4.5	-0.4

Less: Caps on tariff increases	0.8		-0.8
ROA exemption	0.8		-0.8
Unbilled volumes	0.6		-0.6
NET INCOME	1.5		
INCOME SHORTFALL			2.6

As a result of capping and exemptions allowed to the irrigation sector income is reduced by approximately R2.6 billion, resulting in an estimated annual income of only R1.5 billion, to cover the cost of managing assets valued at R123 billion. This is clearly unsustainable. A review of the principles underpinning these caps and exemptions is necessary to develop a clear understanding of how best to structure such support. Those who lobby for the continuation of the caps and exemptions offer the following reasons:

- The sectors survival is critical to ensure national food security
- While agricultures contribution to GDP has steadily declined over the years and currently stands at 4%, the sector employs 15% of the workforce
- Most employment in the irrigation sector takes place in rural areas, which has reduced the extent of urbanization
- The sector employs unskilled workers, who have very little chance of succeeding in the formal economy
- The sector is the main provider of input into the agro-processing industries (canned foods, wine etc.) which contributes approximately 20% to GDP and is a major earner of foreign exchange
- Given the lower assurance of supply to the irrigation sector during times of drought, they believe that a discount on tariffs is justified

All these points are indisputable. The issue is not so much around the provision of some level of support to the sector, the matter revolves around targeting it where it is needed and quantifying the amount of support given. If a political decision is taken to continue subsidizing the irrigation sector, then the subsidy must be clearly accounted for and the value of the subsidy must be transferred to DWA so that much needed refurbishment and betterment of water infrastructure is allowed to continue. The same level of justification and subsidy quantification must be provided for the forestry industry.

Alternative approaches to building the right level of income and reserves to address the maintenance and refurbishment backlog include the use of cross subsidization within and between sectors and/or the privatisation of parts of the infrastructure e.g. the reticulation system, if it can be safely concluded that it will not lead to further negligence by the users themselves.

4 National vs. Scheme/System Level Tariff

Water use tariffs can be set at a number of levels. The global trend towards decentralised water management and governance that has seen the emergence of catchment level water resources management seemingly advocates scheme level tariff setting. However, there is more to consider than just the need to place water management as close to the user as possible when considering the level at which to set tariffs. A number of these considerations include affordability across user classes, redress prerogatives, sustainability of systems, ability to influence user patterns etc.

Table 4.1: Pros and Cons of National, Scheme and System Charges

Criteria	National	System	Scheme
Equity and fairness	May result in subsidisation of users who don't need subsidisation; Some users will pay more for their water than the real costs – may negatively affect some users; Allows for equal tariffs on old and new schemes;	Allows smoothing of tariffs across integrated systems; Fair since all users benefit from the integrated system arrangements;	Most aligned with 'user pays' principle; Aligns actual cost with price; Expensive for new entrants on new schemes
Administration	Pool of income must be apportioned per system/scheme to cover real costs;	Income can be directly allocated to the system but must also be allocated per element of the system; Reduces the number of tariffs to be published annually;	Income can be directly allocated to the scheme; Large number of tariff calculations per annum;
Calculation of costs	Difficult to work out the right price to recover all costs; Incorrect calculations will have national impact;	Relatively simple to work out actual costs and therefore price;	Easier to work out actual costs and price; Incorrect calculations likely to have local impact;
Impact on price of new schemes	Less susceptible to price shocks since introduction of a new scheme is spread across the whole country	Enables some absorption of new scheme costs across the system;	New schemes are paying the marginal cost of water which can be high;
Cross subsidisation	May result in introduction of non-viable schemes because cross-subsidisation masks the	Allows cross-subsidisation within a scheme;	Does not support cross-subsidisation from user charges;

	unsuitability/non-viability.		
Water use efficiency	Loses the incentive for water use efficiency in areas where users are paying lower than the actual cost of water;	Incentive for water use efficiency occurs at the system level; may lose particular incentives within the system;	Incentive for water use efficiency driven by actual cost of water; Actual costs of scheme are clear to decision-makers and users

Lower tariffs are charged for water schemes built in the 1960's which hold no debt, while the more expensive schemes like the Lesotho Highlands Water scheme which was recently built with debt financing of R20 billion will naturally attract a higher tariff. If a national average tariff is imposed, new water schemes will become more affordable. The reason this is particularly a challenge in South Africa is the fact that the users that are likely to be benefitting from the use of already established water schemes are farmers who can afford to pay higher water prices, while the new schemes are targeted at farmers who need government support to be established and form part of the process of land and water redistribution efforts.

The overarching objectives of setting user charges should also be used to inform the level at which user charges are set. If for example, the overarching objective is to ensure that users pay for the exact amounts of water and level services they receive then scheme level charges are most appropriate. However, if one considers redress and sustainability as equally important (assuming that new entrants tend to be previously disadvantaged) then the user pays principles can be interpreted to mean that the total revenue collected from users must cover the cost of WRM and water resource development without stipulating which users that revenue must be collected from. Water pricing can then be set at a national level.

What is important in informing this decision is the exact profile of water users. It is important that the profile of water users in new schemes and already established schemes be established to either support or refute the claim that those in new schemes are mainly previously disadvantaged. Alternatively, all users in new schemes must be previously disadvantaged to ensure that the national tariff actually achieves its objective. In addition to the concern of redress, the affordability of the users must also be considered. If the users of new schemes are in high value crops that make it possible for them to cover the costs of the new scheme and be profitable while the water users in old scheme are unable to be profitable then the national tariff will only serve to subsidize the rich and punish those who are struggling.

There are pros and cons (some of which are outlined in Table 4.1 above) to every level at which tariffs can be set. The aim must be to set it at a level that will make it possible to achieve maximum impact on those challenges that characterise the South African water sector.

5 Principles of Cost Allocation

Since there are two sources of funding for DWA activities, it is important to determine which activities are funded from the Water Trading Entity (WTE) and which are funded through the parliamentary appropriation. A reading of available documents from DWA suggests that there is no single document that captures the principles and criteria for determining this.

Equally, there are no clearly drafted principles or allocation criteria against which the determination of a new infrastructure project as a social or a commercial project is assessed. Currently the approach taken is on a case by case basis, on the motivation of non-affordability of the CUC for a particular scheme or part of a scheme and the need, in that case, for the state to fund the infrastructure rather than for it to be funded off-budget. The tariffs then charged would be in accordance with the pricing strategy for on-budget infrastructure. There are no specific guidelines or criteria on what constitutes a social project, or how the proportion of the social element of a scheme should be determined.

In the review of the Pricing Strategy, however, consideration must be given to whether it is necessary to develop principles and criteria for the division of functions between the WTE and the main account, and for the determination of social infrastructure projects. The former division is important in assessing what CMA functions will be funded from water resources management charges and whether any functions performed by a CMA should rather be funded off the fiscus.

These two issues are addressed separately below.

5.1 Cost Allocation between the WTE and the Fiscus

There are two sources of income for DWA that support the execution of its activities at all levels, from head office down to the user associations – the fiscus and the revenue from user charges. The National Water Act states the following:

56. (1) The Minister may, with the concurrence of the Ministry of Finance, from time to time by notice in the Gazette, establish a pricing strategy for charges for any water use within the framework of existing relevant government policy.

(2) The pricing strategy may contain a strategy for setting water use charges -

(a) for funding water resource management, including the related costs of -

(i) gathering information;

(ii) monitoring water resources and their use;

(iii) controlling water resources;

(iv) water resource protection, including the discharge of waste and the protection of the Reserve; and

(v) water conservation;

(b) for funding water resource development and use of waterworks, including -

(i) the costs of investigation and planning;

(ii) the costs of design and construction;

(iii) pre-financing of development;

(iv) the costs of operation and maintenance of waterworks;

(v) a return on assets; and

(vi) the costs of water distribution; and

(c) for achieving the equitable and efficient allocation of water.

- (3) The pricing strategy may -*
- (a) differentiate on an equitable basis between -*
 - (i) different types of geographic areas;*
 - (ii) different categories of water use; and*
 - (iii) different water users;*
 - (b) provide for charges to be paid by either -*
 - (i) an appropriate water management institution; or*
 - (ii) consumers directly;*
 - (c) provide for the basis of establishing charges;*
 - (d) provide for a rebate for water returned to a water resource; and*
 - (e) provide on an equitable basis for some elements of the charges to be waived in respect of specific users for a specified period of time.*
- (4) The pricing strategy may differentiate under subsection (3)(a) -*
- (a) in respect of different geographic areas, on the basis of -*
 - (i) socio-economic aspects within the area in question;*
 - (ii) the physical attributes of each area; and*
 - (iii) the demographic attributes of each area;*
 - (b) in respect of different types of water uses, on the basis of -*
 - (i) the manner in which the water is taken, supplied, discharged or disposed of;*
 - (ii) whether the use is consumptive or non-consumptive;*
 - (iii) the assurance and reliability of supply and water quality;*
 - (iv) the effect of return flows on a water resource;*
 - (v) the extent of the benefit to be derived from the development of a new water resource;*
 - (vi) the class and resource quality objectives of the water resource in question; and*
 - (vii) the required quality of the water to be used; and*
 - (c) in respect of different water users, on the basis of -*
 - (i) the extent of their water use;*
 - (ii) the quantity of water returned by them to a water resource;*
 - (iii) their economic circumstances; and*
 - (iv) the statistical probability of the supply of water to them.*
- (5) The pricing strategy may provide for a differential rate for waste discharges, taking into account -*
- (a) the characteristics of the waste discharged;*
 - (b) the amount and quality of the waste discharged;*
 - (c) the nature and extent of the impact on a water resource caused by the waste discharged;*
 - (d) the extent of permitted deviation from prescribed waste standards or management practices; and*
 - (e) the required extent and nature of monitoring the water use.*

While this sets out what may be charged for under the Pricing Strategy, it does not clearly state what **should** be charged for and what should be covered from the fiscus. It is therefore critical to look at the principles and criteria that might support such a decision. This decision relates to both the infrastructure or consumptive charges and the water resource management charges (WRMC), including waste discharge charges.

Currently, in terms of the WRMC, there appears to be an assumption that regional office water resource management activities are funded from the WTE, while national WRM activities are funded

from the fiscus, but this is by no means clear. In terms of the current pricing strategy (2007), the following statements are made:

- “The activities of the CMAs will be funded *largely* from water resource management charges.”
- “DWAFC/CMAs will budget annually for the estimated costs of activities to be performed by them in each WMA.”
- “The water resource management charge for abstraction related water uses will be based on the budget for abstraction activities and integrated functions.”
- “The cost of waste discharge activities and integrated functions will be used for setting the waste discharge component of the WRM charge.”
- “The costs of integrated functions need to be allocated between abstraction and waste discharge related use in a transparent manner reflecting the management effort incurred in the WMA.”
 - “Allocation of the costs of integrated functions between waste discharge and abstraction will therefore be according to the management effort (resources) being allocated to abstraction related uses vs. management effort allocated to waste discharge related water uses within the WMA.”
- “The national network is designed to effectively monitor the country’s water resources for national water resource planning purposes. The construction costs of gauging stations and of associated water quantity and quality monitoring comprise national functions and is borne by the fiscus
 - Data and information gained at existing and new sites may be of direct benefit to a specific scheme or water management area. In these cases it is reasonable to charge a specific WMA or water scheme a reasonable portion for this type of monitoring.”
- “It is necessary to monitor the availability of the reserve on an on-going basis. The existing network will be utilised for the purpose of reserve monitoring. Where this is not possible, and new monitoring points are needed, the beneficiary WMA or scheme will fund this infrastructure since it is a part of effective water resources management. This will be reflected in either water resource management charges or operations and management charges.”
- “Regions must subdivide their total budget allocations for the ICMTA between WMAs in respect of the water resource management activities provided for. The relevant budget figures must include the cost of gathering information, monitoring, public participation and support, where applicable.”

A draft report to the Director General on the WTE, dated 30 October 2008 states that “There are other two more functions which are funded from both Main and Trading Account i.e. Geo Hydrology and Hydrology. These functions are funded under the trading account if they are scheme related. It is these functions that the recent policy board meeting gave approval that they may be shifted to the Trading Entity completely. The challenge with the decision is that it did not give guidance in terms of the main account portion of these functions whether it will be recovered from the users as the functions are completely falling under the trading account.”

Cost Allocation Gap:

- The Raw Water Pricing Strategy is unclear about how WRM cost should be allocated between the fiscus and the WTE (i.e. the revenue generated from water charges)
- A second gap is that there are no clear guidelines in place informing how the development of schemes is classified either as intended for social or commercial purposes – this makes assigning cost as wither on-budget or off-budget difficult. Addressed in the next section.

5.1.1 Closing the Gap

It would appear that it is the intention of DWA that the CMA's that are set up must become self-sustaining from a financial point of view. The manner in which the WRM charges are set reflects this objective – CMAs determine the cost of WRM activities, divide them by the registered water volumes and invoice the relevant users. It would appear that the assumption is that all WRM activities should be paid through the WRMC, although this is not clearly stated. This throws the idea that regional office water resource management activities are funded from the WTE, while national WRM activities are funded from the fiscus into doubt. These provisions only serve to further confuse how the allocation between the fiscus and the WTE is done.

Unfortunately, the implementation of this approach has been of such a nature that the collection of WRM charges from users has been poor, leading to a shortfall in the revenue collected for the purpose of water resource management. Coupled to this problem is the view held by some that some WRM activities of the CMAs should be funded by the fiscus because of their strategic nature. These are essentially costs that some argue do not form part of WRM costs. An example of such a costs that have been referred to include governing board related costs, head office WRM cost such as regulatory functions and others like catchment management agency (CMA) establishment, water resource studies licensing.

The various statements from the pricing strategy listed above give some indication of where the money for the cost of various activities is expected to come from, the challenge is that there is no overarching set of principles that guides how these costs are allocated between the fiscus and the revenue from user charges. Clear principles must be developed that will make it possible to separate fiscus funded costs from user charges funded costs. One guiding principle that could be put in place and clarified within the pricing strategy is to ensure that national functions are financed from the fiscus while localized function are funded by identified water users.

5.2 Determination of On-budget/Off-budget Funding of Schemes

The National Treasury has indicated that it will in future only fund social schemes and that the remainder of water resource development funds should be generated through the pricing strategy. The current pricing strategy differentiates between state funded infrastructure and infrastructure funded off-budget by means of private sector loans. In the pricing strategy, social water resource development of betterment projects are defined as those that conform to the purpose set out in section 2 of the NWA, 1998, as well as where the demand is not driven by commercial water users or sectors. This is a difficult definition because it suggests that previously disadvantaged individuals

cannot have water resource development of betterment projects funded by government if they will be using the water for commercial purposes, which should be the aim of all HD farmers. The table below shows which components of the pricing strategy apply for each of these two cases.

Table 5.1: Charge Allocation by Funding Type

Water charge	State Funded	Funded Off-budget (e.g. TCTA)
Water resource management	Yes	Yes
Operation and Maintenance	Yes	Yes
Depreciation	Yes	No
Refurbishment	No	Yes
Return on Assets	Yes	No
Water Resource Development	Yes	No
Betterment	No	Yes
Capital Unit Charge	No	Yes

Although there are clear definitions of the purposes of these charges and distinctions as to which type of charge is applied on what type of infrastructure, there is little guidance in determining how the infrastructure itself is to be classified either in State Funded or Off-budget – in other words, how to determine whether it ought to be classified as social infrastructure or as commercial infrastructure.

6 Conclusion

The raw water pricing strategy is a good guiding document for the pricing procedure for the water sector. There are a number of gaps that can and should be closed to further enable its effective implementation. The gaps identified in this document represent the list of some of the most jarring gaps. These including gaps in the principles, objectives, the manner in which certain charges are calculated and the manner in which subsidies are extended to certain sectors within the economy.

A demonstrative calculation of the impact of the caps and exemptions granted to the agricultural sector alone shows the revenue gap created which has consequences for the maintenance of water resource infrastructure. Some recommendations intended to spark discussion about how best to close the gaps in the raw water pricing strategy are made. These recommendations must be considered within the various structures supporting the project and refined to arrive at implementable solutions.

This pricing strategy gap analysis is only the second step of a multi-stage process of reviewing the pricing strategy.