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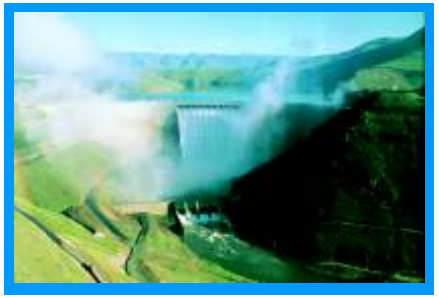

Strategic Planning for Water Resources in South Africa

A Situation Analysis 2009

Report No: P RSA 000/00/7809

Water has a multiplicity of roles:

- In providing for domestic and social needs,
- in supporting the development that will bring about economic growth,
- in maintaining the environment (with domestic and social objectives), and
- in improving overall quality of life.

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REPORT TITLE
Strategic Planning for Water Resources in South Africa: A Situation Analysis

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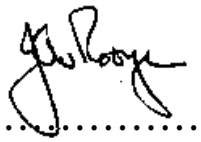
REPORT NUMBER
P RSA 000/00/7809

REPORT STATUS
Final

APPROVAL



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15 September 2009

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SITUATION ANALYSIS

1. Introduction

This document provides an expression of the thinking and planning of the Department, and includes a summary of the water resource situation for all the identified growth areas in the country as at 31 March 2009. It is the intention of the Department to update this knowledge base annually.

The objective is to provide information on the Department of Water Affairs' strategic level planning activities aimed at ensuring adequate water supplies in support of economic growth and development in the country. The plans of the Department are set against an understanding of water resource requirements, availability, and the limitations and challenges facing the water sector.

It is the Department's responsibility to ensure that South Africa's scarce water resources are made available to meet its needs. Historically the focus has been on developing major dams, irrigation schemes and inter-basin transfer schemes to meet agricultural, urban and industrial requirements. The resource situation is very different today, with almost all readily available water already put to use. There are very few opportunities for additional new dams to supply demand and water resource planners are having to shift focus towards the careful management and optimisation of existing use.

The Department is expected to ensure that water can be supplied to all major development centres, whilst also serving industrial and agricultural requirements at regional and national scale. Water resource planning must account for ecological imperatives, international obligations, and human needs at local level. There is a growing emphasis on ways in which water can make a difference to people's lives at all levels of growth and development. This document outlines the approaches adopted.

This situation analysis makes it clear that the adequate supply of water for many areas can be sustained only if immediate actions are taken to stave off imminent shortages. The most important action is the concerted implementation of water conservation and demand management measures. The re-use of water offers an immediate and practical supply intervention for cities and fast growing development centres. Urgent action is required to bring other long-term supply interventions to fruition in time.

The challenge of deteriorating water quality is noted as being at least as

important to security of supply as the quantity available. Whilst this document is focused on the quantity of the resource, an equivalent assessment of the position regarding water quality should also be compiled. The Department, through its Chief Directorate: Integrated Water Resources Planning, will seek to provide this information concurrent with the next update of this report.

2. Planning for Water

Water is essential for development but will not, on its own, bring about development. Many other factors have to fall in place. Water is not the resource that drives development but the resource that provides for the needs of development. So too, water resource planning does not direct or drive development. It is the Department's role to respond to expected growth initiatives, to advise on water sources and supply, and to ensure, where economically viable, that the necessary water is available when it is required. The planning for water resources must be undertaken long before the need realises.

The water requirements for the ecological Reserve and for basic human needs must be factored into all planning activities, both within the Department and by all other authorities where planned development projects require water. The National Water Act (NWA) and the National Water Resource Strategy (NWRS) make provision for the basic water needs of both people and the environment. It is recognised that making water available only to meet basic requirements is not enough and that improved quality of life must be provided for. Water is needed to grow and sustain the economy, but also to sustain people and livelihoods in achieving a healthy and happy South African society. This document looks at economic growth and development in the context of the national economy (see the National Spatial Development Perspective, section 4), but always acknowledging the needs of the deeper rural livelihoods economy.

District and Local Municipalities are responsible for their Integrated Development Plans (IDPs). An important part of every IDP is the Water Services Development Plan (WSDP), and the Department's Regional Offices provide support for developing both the IDPs and WSDPs. Giving attention to the water resources required has, however, often proved to be an unfortunate gap in IDP planning and it is one of the objectives of the Department to put information and strategies in place that can be assimilated into IDPs to address this gap. The water resource reconciliation strategies for metropolitan areas and all other towns (see sections 7 and 8) should go a long way towards achieving this.

3. Strategic Water Resource Planning in the Department of Water Affairs

The Directorate National Water Resource Planning, within the Chief Directorate: Integrated Water Resource Planning is responsible for strategic level planning to ensure sufficient and sustainable water resources for the country. Its work is aimed at the provisioning of raw water up to the point where this water is abstracted for purification and distribution to users. These latter functions are largely the responsibility of other water management institutions and municipalities.

The planning approach is to seek reconciliation of the available water resource with growing requirements. Water quality, and the delivery of water fit for use, is a very critical consideration in determining availability. The Department must respond to growth and development needs, and plan for projected future water needs. In some instances the required water may not be readily available. Responsible water management authorities need to understand the constraints imposed by a scarcity of water so that they too can work towards a convergence of need and supply in their own planning and development initiatives.

On the raw water supply side the Directorate: Options Analysis, in the same Chief Directorate, does the pre-feasibility and feasibility studies necessary for the construction of large government water schemes. Water Boards and/or Municipalities may address local supply-side solutions such as desalination, re-use of water, and use of local groundwater and surface water sources.

The Department's water resource planning activities are integral to water supply and management functions. So, for example, water resources are fundamental to the DWA's responsibility for domestic supply and sanitation through its Water Services Chief Directorate, and the need for close alignment goes without saying.

Whilst operating within a timeframe of 25 years, with the time from planning to execution of some large projects taking as long as 18-20 years, thinking has also to be extended beyond this to a time when conventional sources of water will no longer be available. A long-term view is thus also required.

Planning has followed a logical sequence in seeking to contextualise the water resource situation and to provide strategies and tools that can serve all levels of decisions. The National Spatial Development Perspective (NSDP, 2006), as noted in Section 4 below, provides a useful basis for planning.

Further to this the sequence has been as follows:

- The National Water Resource Strategy (NWRS, 2004) (see section 5).
- The Department's Internal Strategic Perspectives (ISPs - 2005), which address each of the 19 Water Management Areas considerably increasing and improving the level of detail in the NWRS (see section 6).
- Intensive studies covering the major metropolitan areas and large water resource systems; some completed, others now being addressed (section 7).
- Attention is shifting to all other towns and villages across the country, with a focus first on towns with the most pressing water resource problems, as well as the growth centres as highlighted by the NSDP (see section 8).

4. The National Spatial Development Perspective (NSDP)

The State President's Office completed the National Spatial Development Perspective in 2006, identifying 26 areas in the country considered key to the national economy. A map depicting these areas is copied at the end of this document (Map 1) along with a table (Table 1) of socio-economic statistics. These can be found as Map 27 and Table 26 in the NSDP.

The NSDP concluded that " … *The principles and methodology of the NSDP should inform the development plans, policies and programmes of all spheres and agencies of government as a matter of policy*". The Department has taken its cue from this and a short description of water resource planning initiatives for each of the 26 growth points, with a précis of the water situation for each area, is given in Annexure 1.

5. The National Water Resource Strategy (NWRS)

The first edition of the NWRS (September 2004) provides a clear indication of the overall state of the country's water resources at year 2000, and projected to 2025. Many catchments are already under stress, with water requirements and existing allocations to users exceeding the available supply. By 2025 the situation will be considerably more difficult. This makes it imperative that the implication of increasing water requirements be very carefully planned for, along with ways of managing use and securing supply.

The NWRS (2004) states the following:

"In general, sufficient water can be made available at all significant urban and industrial growth points in the country for water not to be a limiting factor to economic development. However, given the long lead times for developing new supply schemes, co-operative planning will be required between water users and water management institutions to ensure that water can be made available when it is needed."

To achieve this, the following reconciliation interventions were listed:

- demand management
- water resource management
- managing groundwater resources
- re-use of water
- control of invasive alien vegetation
- re-allocation of water
- development of surface water resources and
- inter-catchment transfers.

The fact remains that water resources are limited, and that growth puts increasing strain on those resources. In seeking economic growth it is important not to lose sight of social needs, equity, and the ultimate reason for achieving economic growth, which is to create better lives for all. This increases the imperative for both careful planning and efficient use.

6. DWA's Internal Strategic Perspectives (ISPs)

The Department's ISPs serve as water resource strategy and management tools for its Regional Offices. In the ISPs the water resource situation was reviewed for each of the 19 Water Management Areas (WMAs), thus at a much finer level of detail than in the NWRS. Information was integrated into a framework allowing for useful strategic decisions to be taken, although further systems modelling and evaluation is often required for specific situations. The function of the ISPs will be taken over by the Catchment Management Agencies, which are mandated to develop Catchment Management Strategies.

The ISPs pointed clearly to the need for water reconciliation strategies for all of the country's major metropolitan areas, these being the recognised engines of the economy but with growth trajectories determined in large measure by water availability. The Department's Directorate National Water Resource Planning addressed this as a core planning activity, commissioning a series of reconciliation studies.

7. Reconciliation Strategies for Large Metropolitan Areas

Water resource reconciliation strategy studies involve an assessment of the current availability, use, and future requirements for water and how these can be 'reconciled' through various strategies.

Objectives of these reconciliation studies have been to:

- develop future water requirement scenarios for and with the metropolitan area,
- investigate all possible water resources and other interventions that could add to water availability,
- investigate all possible methods for reconciling the requirements for water with the available resources,
- provide recommendations for development and implementation of interventions and actions required, and
- offer a system for continuous monitoring and updating of the strategies into the future.

The major reconciliation studies addressed thus far are listed below. These studies cover the primary growth areas identified in the NSDP, and outputs are summarised as part of Annexure 1. All studies are referenced in the Annexure.

Completed studies are

- *Western Cape Water Supply System: Reconciliation Strategy Study*, covering the City of Cape Town and certain Overberg, Boland, West Coast and Swartland towns, as well as irrigators along the Berg, Eerste and Riviersonderend rivers (September 2007).
- *Reconciliation Strategy for the Amatole Bulk Water Supply System*, which provides water for urban, rural and agricultural users in the catchments of the Buffalo and Nahoon rivers, including the Buffalo City Municipality, King William's Town, Bisho and Stutterheim (March 2008).
- *Vaal River System: Large Bulk Water Supply Reconciliation Strategies*. The Vaal River System supplies a vast area covering the Eastern Highveld of Mpumalanga, Gauteng, the North West goldfields around Klerksdorp, the Free State goldfields around Welkom and down to Kimberley in the Northern Cape. Reports for this study have just been finalised.
- *Crocodile (West) Reconciliation Strategy Study*, covering the northern areas of Gauteng, the platinum mines and other developments around Rustenburg and Brits and further north to Thabazimbi. This study also covers the strategy for supplying the large-scale energy-related developments that are planned for the Waterberg coalfields in the vicinity of Lephalale. The study has just been completed.

Studies in progress

- *Water Reconciliation Strategy Study for the KwaZulu-Natal Coastal Metropolitan Areas*. This essentially covers the area from Pietermaritzburg to Durban (west to east) and from KwaDukuza (Stanger) in the north, to Amanzimtoti in the south. It includes the eThekwini Metropolitan area and the Msunduzi and iLembe Municipalities. The study was commissioned in December 2006 and is scheduled for completion by October 2009. Stage 1 of the strategy has been completed.
- *Algoa Water Supply Area*: This study was commissioned in May 2008 and is progressing well. The Preliminary Reconciliation Strategy has been developed in co-operation with all the major roleplayers, inter alia the Nelson Mandela Bay Municipality, the Gamtoos Irrigation Board and the Sundays River Water User Association. The final Strategy should be in place by the middle of 2010.
- A study for the *Mangaung Municipality (Bloemfontein area)*, started in February 2009. Stage 1 of the strategy should be completed by February 2010 and the final strategy a year later.
- A study for the *uMhlathuze Local Municipality*, which includes the town of Richards Bay, will start early in 2010.

These studies are achieving their objectives, and much more (see Annexure1). They have succeeded in facilitating co-operative governance

and the Department is receiving good co-operation from municipalities, provinces and other water management institutions. These institutions are helping to deal with the uncertainties in the planning process, and are contributing towards the formulation of the planning scenarios required.

While more detailed results and findings from these reconciliation studies are discussed in Annexure 1, some important conclusions are synthesised below:

- Water use efficiency measures (Water Conservation and Water Demand Management) must be implemented as a matter of urgency. For many of the systems investigated no other measure can be implemented in time to prevent shortages over the medium term. If water is not used more efficiently, shortages will develop and water restrictions will become inevitable. There is still enough time to implement structured programmes to achieve greater efficiency, provided these are well managed and given political support.

- The re-use of water has been identified as a major potential source of water for coastal cities and in some inland areas this is now also a necessity. Return flows to the Vaal River from the upstream Gauteng metropolitan areas are increasing to the extent that, with downstream use quite stable, these flows will soon exceed uptake, and thus be in surplus. A portion of these return flows have been identified as the best resource for the new power stations and a possible coal-to-liquid fuel plant on the Waterberg coalfield near Lephalale in the Limpopo province. The rest of the increase in return flows will have to be treated to potable standards and re-used in Gauteng.

- Groundwater resources are of particular importance, not only for smaller towns, but also for larger cities, such as Cape Town and Nelson Mandela Bay Municipality.

- The further development of surface water resources and inter basin transfers will also play an important role in a number of areas.

Both the strategies and their implementation will have to be monitored and adjusted as the future unfolds. After the completion of the studies, the strategies will be taken forward by 'Strategy Steering Committees', which involve key stakeholders in each study area. These committees are being set up to monitor the interventions and will include structures to check on actual water use, assess the results from further planning studies, and make recommendations on the approaches taken. The Strategy Steering Committees will review the strategies annually, seeking always to maintain a 25-year planning horizon.

8. Reconciliation Strategies for All Other Towns

A major planning thrust, commenced in June 2008, has been to extend the structured planning process to cover all towns in the country. Every town, village, or cluster of villages, is now being assessed in terms of water resource availability. Growth nodes as highlighted in the NSDP offered an important first prioritisation of towns for early attention, although any town with obvious and immediate supply needs must clearly be addressed without delay. In some instances Regional Bulk Infrastructure options have been launched for water services provision, but where possible these are being informed by the '*All Towns Reconciliation Strategy Studies*'.

The 'All Towns Reconciliation Strategy Studies' will thus, over the next three years, provide, at the very least, first-order reconciliation strategies for all centres of population not already covered by the larger metropolitan reconciliation strategies. The 'All Towns' strategies should give clear direction to municipal managers on the best sources of water supply, and for the development of implementation strategies. In addition to informing the need, or otherwise, for bulk infrastructure provision, this is essential for water resource planning to be properly taken into account in the WSDPs and IDPs. Towns will be studied at different levels of detail, depending on the extent of the water resource problems and the difficulty of reaching a workable solution. Elements of each study will include water requirements, resource management options, source development options (surface water, groundwater, return flows and re-use), and approaches to reconciling demand with supply. Implementing water conservation and demand management will be addressed as a key tool in reducing both losses and requirements. Additional elements to address will be water quality, and the state of water services infrastructure.

This study promises to deliver a thorough situation analysis for all towns, and particularly those where water resources are scarce. Strategies are multi-faceted in their search for solutions, and infrastructure, management, skills and capacity problems will also be highlighted.

9. Water Supply to the Energy Sector

Information on the NSDP's 26 key areas (Annexure 1) also covers the energy sector but, with energy a strategic water consumer, this is given special attention here.

The Department is working very closely with the large water users in the energy sector to ensure that existing and possible future plants are incorporated into water resource planning.

The bulk of Eskom's existing large coal-fired power stations are situated in the supply area of the Vaal River System and a complex pipeline infrastructure network provides these stations with water from many Departmental dams. When the bulk of these stations were built, Eskom used wet-cooled technology, with a typical large (3 600 MW) power station requiring 45 million m^3 of water per annum. Under pressure from the Department, with water no longer abundant, and with the high cost of providing water better recognised, Eskom has moved over to dry-cooled systems which use in the order of 4 million m^3 of water per annum for a comparable power station. Dry-cooled stations cost more to build and operate and are not quite as energy efficient as wet-cooled stations, but the country's water situation necessitated this. Eskom is now planning the Kusile dry-cooled station near Kendal that will also be supplied from the Vaal River water supply area and this requirement has been factored into the Vaal River Reconciliation Strategy Study.

The large coal-to-liquid plants, Sasol 1 at Sasolburg and Sasol 2 and 3 at Secunda are also situated in the supply area of the Vaal River. Sasol 1 uses 20 million m^3 and Sasol 2 and 3 some 90 million m^3 of water per annum in the production of fuel and associated chemical products.

The Vaal River Eastern Sub-system Augmentation Pipeline (VRESAP) augments the water supply to the Eskom power stations and Sasol 2 and 3 from the Vaal Dam by means of a temporary lowlift pumpstation. A permanent inlet tower is being constructed and a highlift pumpstation has also not yet been fully commissioned. The delivery capacity of this scheme meets current demand projections.

The largest potential for the building of new coal-fired power stations is on the Waterberg coalfields near Lephalale in the Limpopo province. Eskom already has the dry-cooled 3 600 MW Matimba power station in this area and has approval to add the dry-cooled 4 800 MW Medupi station. This may be followed by three or four more power stations. Water for existing use in this area comes from the Mokolo Dam, but this supply cannot meet the requirements of these new power stations, even though dry-cooled, and additional water must be provided.

Sasol is also currently planning the building of the Mafutha 1 and 2 coal-to-liquid fuel plants on the Waterberg coalfield near Lephalale. These plants would be of the same order as Sasol 2 and 3 at Secunda. They would share the supply system planned for Eskom in this area. Even at increased levels of water use efficiency, as insisted upon by this Department, these plants require large quantities of water (80 million m^3 per annum) and this will put pressure on the water resources. This has been taken into account in strategy scenarios and feasibility studies.

Current planning is aimed at bringing water from the Crocodile (West) River,

where the growing return flows from the northern urban and industrial areas of Gauteng serve as an important source of water. The Crocodile (West) reconciliation strategy study showed that this return flow will not be sufficient and water will have to be pumped from the treatment works south of Johannesburg to ensure enough water to the Waterberg coalfields. A feasibility study is currently being done on the pipelines, pumping stations and reservoirs that will be required for these transfers. This scheme is expected to be operational by December 2014. Implementation time cannot be shortened and both Eskom and Sasol will have to tailor their plans accordingly.

In the Olifants catchment, the Department is planning to supply water from the De Hoop Dam, now under construction near Steelpoort in the Limpopo Province, for the operation of Eskom's proposed pumped storage hydropower scheme. The Department is also negotiating with Eskom to utilise the pumped storage scheme's capacity to pump water 700 m up from the Steelpoort River valley to the top of the Nebo Plateau for the benefit of local communities.

10. Water Supply to the Agricultural Sector

Agriculture, in particular irrigation, is the country's biggest water user with 60% of the available water resources of the country used by this sector. This is largely a result of government policies, in a past era of agrarian development, which favoured agriculture through the construction of large Government funded and managed irrigation schemes.

South Africa has moved on to a far more diversified and modern economy and the agricultural sector's (agriculture, fishing and forestry) direct contribution to the GDP in 2007 was only 2,4% although, with secondary linkages, its importance is far greater. Certainly the state of the South African economy is strongly influenced by the state of the agricultural sector and the country has a very important role in regional food production.

Opportunities for new “green-fields” irrigation projects are few and far between, not only due to scarcity of water resources, but also the fact that almost all locations with good soils, favourable climate and available markets have already been developed. As the scarcity and value of water increases the trend will be towards efficiency, the production of higher value crops, and the migration (through water trading) from the irrigation sector to other, higher value, sectors. As custodian of the nation's water

resources and in the furtherance of growth and development, the Department will continue to support viable irrigation projects but will also facilitate agreed improvements in the allocation of the water resource asset base.

Presently the activities of the Department include only one large new irrigation project - the proposed Lower Sundays River (Barclay Bridge) scheme, close to Nelson Mandela Bay Municipality. This is for emerging farmers. The investigation into this scheme is being conducted in conjunction with the Department of Agriculture, Eastern Cape.

The Directorate has also been investigating the potential of the Mzimvubu river system to supply water for irrigation development. The results are not promising for large-scale irrigation schemes due to the limitations posed by the topography and climate. Apart from run-of-river use, additional irrigation opportunities are most likely to be smaller schemes along the riverbanks, supplied from smaller dams on tributaries. There is, however, potential for dryland agricultural development on a large scale. These opportunities will be investigated in detail by the Eastern Cape Department of Agriculture. There is also significant forestry opportunity in the Mzimvubu catchment, and impacts on water resources are being investigated alongside agricultural development.

11. Water and Forestry

Plantation forestry is an important water user, and is regulated as a 'stream flow reduction activity' or SFRA. The country has some 1.34 million hectares of plantation, using an estimated 1 400 million m^3 of water per annum, although only a third of this would be available to other users without additional storage. The industry is able to meet most of the country's solid and processed wood requirements at present, also earning a significant export income, and is an important job creator in rural areas.

There have been a number of recent studies to assess the extent of remaining potential land and water for further afforestation. The Forestry Sector Transformation Charter has a target of 100 000 hectares over the next 10 years, mostly in the Eastern Cape and southern KwaZulu-Natal. It appears that there is sufficient water to support this. There are also opportunities to trade water out of agriculture and into forestry, and vice versa. The guiding criteria for such trades should be water use efficiency determined through a weighting of social, environmental, and economic cost and benefit.

12. Socio-economic Benefits of Large Water Resource Development Projects

Investments in new water resource projects, such as dams, bulk water pipelines, pumping stations and reservoirs, often have significant spin-off benefits to local communities in what are often otherwise economically depressed areas.

During the planning phase, as well as during the actual implementation phase of any water project, there is close consultation with local and provincial government to identify additional opportunities that would enhance local economies and improve the quality of livelihoods in the vicinity of the project. These may, for example, relate to local tender opportunities, the construction of housing, and the routing of roads.

Major construction projects boost the local economy, bringing hundreds of jobs, skills development, and downstream spin-offs to the commercial and service sectors. Roads, electricity supply, communications and other infrastructure are established during the construction, and remain after the completion of the project to service the local communities. The water bodies themselves generate tourism and create other jobs once construction is complete. The bulk of the employment is, however, temporary as the maintenance and operation of the project provide only limited permanent opportunities.

13. Climate Change

The planning of water resources requires the consideration of many uncertainties, including the extent and nature of future requirements, and knowledge of both rainfall and runoff; knowledge that slowly improves as the historical record grows. Climate change increases this uncertainty, with trends becoming the most important feature to be distilled from historical records.

Climate change is an accepted global reality but in South Africa the impact is not yet obvious. The long-term predictions are for a drier western half of the country and for far more variability, with more extreme events, to the east. The Department needs to consider these long-term predictions in its planning, keeping an eye on trends and adapting as required. There is growing concern that the shrinking raingauging network is no longer sufficient to detect these trends.

In the reconciliation strategies for the metropolitan areas the possible impacts of climate change on available water are included in scenarios for the future to ensure that augmentation options are studied timeously. Mitigation measures can then be introduced as their necessity becomes evident. An example would be the predicted drying of the West Coast and the effect this would have on the water supply to Cape Town.

Presently climate change can be viewed as an added uncertainty, with impacts that can be mitigated. The relatively gradual nature of climate change allows time for well-considered adaptation measures. It is vital that the monitoring of rainfall and runoff be continued rigorously, and the hydrological monitoring network improved to ensure that the actual effects of climate change are measured accurately and brought as quickly as possible into the analysis of resources.

14. International Rivers

South Africa shares four major river systems with neighbouring countries. Some cross boundaries (trans-boundary rivers), whilst others serve as the international border (contiguous rivers):

- The Orange/Senqu system is shared with Lesotho (trans boundary) and Namibia (contiguous)
- The Limpopo River is shared with Botswana and Zimbabwe (contiguous) and Mozambique (trans-boundary)
- The Incomati system is shared with Swaziland and Mozambique (trans-boundary)
- The Usutu/Pongola-Maputo system is shared with Mozambique and Swaziland (trans-boundary).

The Revised Protocol on Shared Watercourses in the Southern African Development Community provides the framework for the management of these rivers, whilst the National Water Act gives international requirements a priority that is second only to basic human needs and the ecological Reserve (NWRS, 2004).

Growth and development are goals for the sub-region and international obligations must be kept in mind when considering how South Africa chooses to use water from shared rivers. A discussion on international agreements in place is included as Annexure 2 - International River Systems.

15. Challenges Facing the Water Sector

(i) Water resources are limited

Every sector and every individual needs to recognise South Africa's water resource limitations. Bringing all South Africans up to an acceptable standard of water related service and delivery is a tough challenge given these limitations. Recognising and adjusting to the limits of what is possible is one of the adaptations that water-scarce areas are going to have to accept; becoming more efficient, using less water, and in some cases moving water from traditional uses such as agriculture into urban and industrial development. The reliance on ever further exploitation of surface water will have to be replaced with a respect and acceptance of all resources - with groundwater and the re-use of water playing an increasing role in the future.

(ii) The cost of water

Water is going to get more and more expensive and cost will in future determine the location of water-demanding industries. It is critical that the cost and availability signals are recognised early in planning industrial expansion. So, for example, while desalination has energy costs, new technology is fast turning this into a viable option, offering long-term water security at coastal sites.

The relative cost of different supply schemes, both current and future, have not been dealt with in this document but will be a focus in future strategic analyses.

(iii) Meeting the needs of the environment

The National Water Act demands that environmental standards of rivers be upheld for the sustainability of water resources, and this water requirement must be understood and accepted.

(iv) Water quality

Water quality deterioration from agricultural, industrial, mining and settlement pollution, may be the country's most serious threat to water resources. The decanting of mine-polluted groundwater into surface systems is one of the greatest challenges, and will have to get focused attention. Re-use of this water suggests an opportunity to solve a supply as well as a quality problem.

(v) Skills and long planning horizons

Technical and management skills in the water sector are needed in both local and national government. Above all things, neither the Department nor the country can afford to slip on the long planning horizons, and must retain the skill and capacity that will allow the identification and implementation of necessary measures in good time.

16. Conclusions

(i) Adaptive planning is essential

Water resource planning is structured but flexible, with the Department guided by national policies, plans and programmes. Rapid growth, and particularly urbanisation, has required rapid adaptation to secure supplies to a mixed and growing economy and meeting the needs of all people. Flexible reconciliation strategies have been developed, and will ensure water for the large metropolitan areas - but only if implemented on time.

(ii) Surface and groundwater use

In terms of surface water, a number of new dams have been built, or are at least in the planning stages, so that the country's major metropolitan areas are secure into the immediate future. The next phase of the Lesotho Highlands Project has been approved, and further utilisation of the Thukela is a longer-term prospect. The Mzimvubu is a major resource although logistically very difficult to utilise economically. Significant opportunity can be unlocked by increasing the use of groundwater in conjunction with surface water. This will increase total water availability, in large measure by improving overall resource use efficiency.

(iii) Water Conservation, Demand Management, and the re-use of water

Much of the country is using all the water it has and the only way to get more from the resource is to demand less and conserve more - using water more efficiently, and using it over and over again. Both Water Conservation and Demand Management and the re-use of water are critical new strategies for many areas. Implementation is urgent and immediate.

(iv) Forward planning - Strategy Steering Committees

Water security requires continuous forward planning. The Department will rely on the Strategy Steering Committees now being set up to oversee the implementation of the reconciliation strategies for the metropolitan areas. These Committees will keep the strategies relevant, monitor the situation and the implementation of interventions, and recommend adaptations - always with a 25-year planning horizon.

(v) There is a need to monitor and update

In the light of rapid growth, increasing water requirements, changing expectations, and a changing climate it is important to measure and monitor water availability and use continuously. Hydrological and climate monitoring networks must be maintained and improved.

17. Gazing into the Crystal Ball

What will happen beyond the 25-year planning horizon? Nobody knows just where life on the planet is headed. Will the current economic corrections steady the ship or are they a prelude to a major planetary adjustment? In South Africa, with continued growth, the developed and populous zones will be increasingly affected by water availability and the cost of supplying the required water. Patterns of use will have to change.

A view of the future suggests that the re-use of all water will be the norm. Desalination technologies will provide enough water to the coastal cities, but desalinated seawater is unlikely to be affordable inland. Industries will lead the way by relocating towards cheaper water sources and people will follow. Water may become too valuable to continue using it for the irrigation schemes nurtured in the past, and it may be necessary to shift some of this agricultural production north beyond the country's borders. If it is to grow as a populous industrial nation South Africa may have to rely on importing 'virtual water' from the rest of Africa through the food produced there.

Innovative thinking is required if South Africa is to adapt to the realities of a water-scarce country.

Map 1: Areas of key economic significance identified in the NSDP

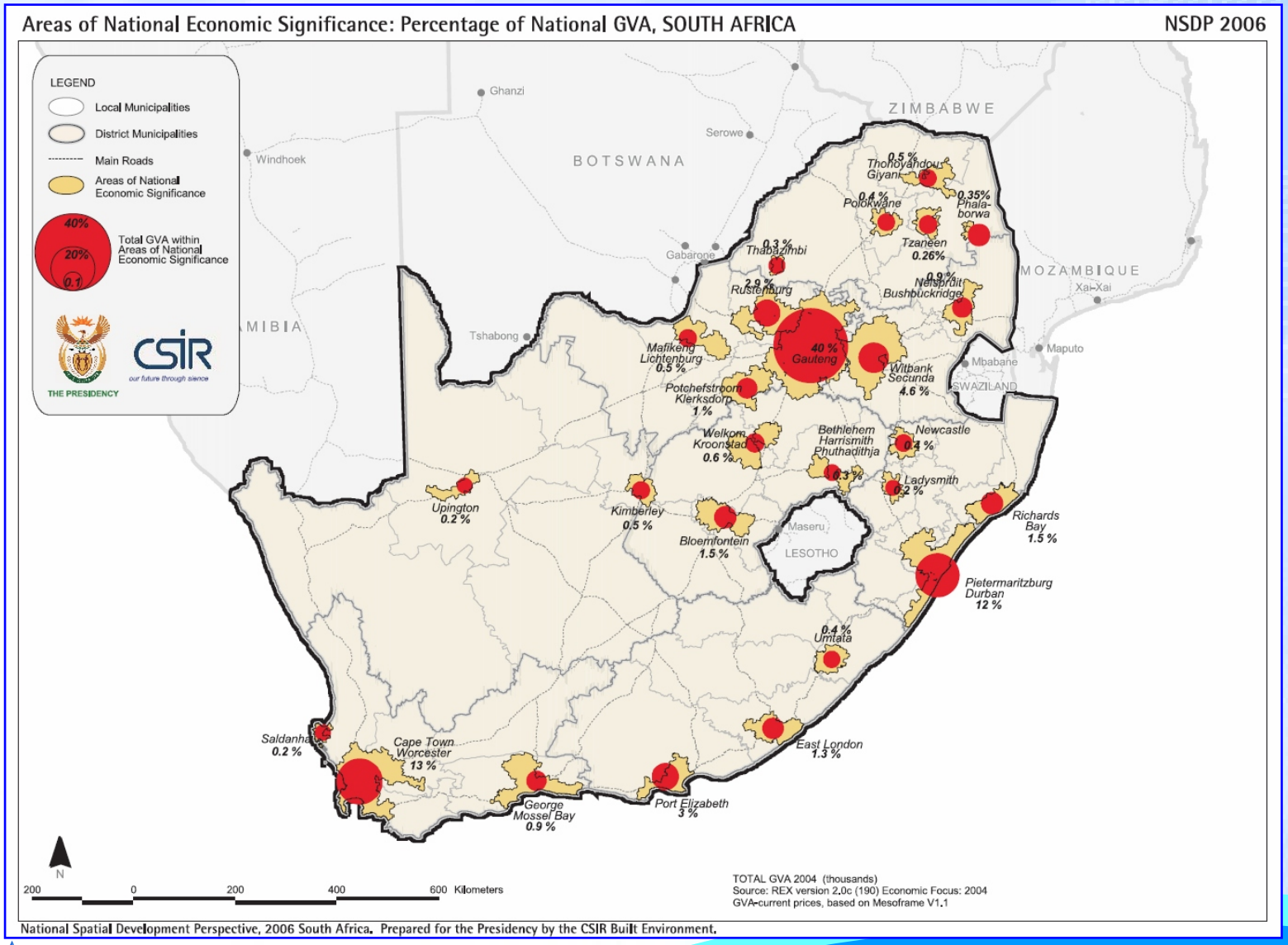

Table 1: Socio-economic statistics per area of national economic significance identified in the NSDP

Table 26: Socio-economic statistics per area of national economic significance: Population, people living below MLL, GVA

Areas of national economic significance*	Population 2004	% of the national population	Number of people living below MLL	People living below MLL as % of national total	People living below MLL as % of total population of area	Total GVA (2004 current prices)	% of the national GVA in this sector	Area (ha)
Gauteng area	10 213 353	21.79	3 063 809	12.99	30.00	490 744 655	40.20	2 127 579
Cape Town-Worcester area	3 721 716	7.94	858 963	3.64	23.08	163 495 507	13.39	1 216 472
Durban-Pietermaritzburg area	4 413 552	9.42	1 890 637	8.02	42.84	54 446 520	4.46	965 931
Witbank-Secunda area	784 758	1.67	306 396	1.30	39.04	37 469 744	3.07	1 117 593
Port Elizabeth area	1 207 810	2.58	480 998	2.04	39.82	36 430 221	2.98	369 910
Rustenburg area	699 655	1.49	244 480	1.04	34.94	18 415 605	1.51	721 143
Richards Bay area	601 670	1.28	333 334	1.41	55.40	18 075 814	1.48	379 812
Bloemfontein area	693 674	1.48	278 878	1.18	40.20	13 191 447	1.08	483 919
East London area	924 197	1.97	527 563	2.24	57.08	11 817 841	0.97	415 980
Potchefstroom-Klerksdorp area	549 652	1.17	290 756	1.23	52.90	11 778 519	0.96	505 684
George-Mossel Bay area	353 433	0.75	77 670	0.33	21.98	11 092 286	0.91	705 769
Nelspruit-Bosbokrand area	674 925	1.44	358 819	1.52	53.16	9 260 182	0.76	360 588
Welkom-Kroonstad area	623 521	1.33	306 523	1.30	49.16	7 459 578	0.61	492 570
Kimberley area	241 726	0.52	106 411	0.45	44.02	6 545 526	0.54	223 947
Mafikeng-Lichtenburg area	324 249	0.69	192 285	0.82	59.30	6 378 218	0.52	444 121
Thohoyandou-Giyani area	737 084	1.57	500 875	2.12	67.95	5 833 019	0.48	333 959
Polokwane area	302 964	0.65	222 581	0.94	73.47	5 437 431	0.45	224 152
Newcastle area	424 109	0.90	234 916	1.00	55.39	5 386 913	0.44	224 777
Umtata area	423 260	0.90	311 670	1.32	73.64	4 611 628	0.38	271 509
Phalaborwa area	112 579	0.24	46 468	0.20	41.28	4 246 170	0.35	73 391
Thabazimbi area	41 110	0.09	11 619	0.05	28.26	4 152 555	0.34	75 392
Bethlehem-Harrismith-Phuthadithjaba area	476 447	1.02	300 634	1.27	63.10	3 754 672	0.31	282 537
Tzaneen area	420 361	0.90	271 413	1.15	64.57	3 208 898	0.26	223 680
Saldanha area	59 416	0.13	6 276	0.03	10.56	2 675 482	0.22	85 789
Upington area	122 252	0.26	45 215	0.19	36.99	2 327 693	0.19	230 126
Ladysmith area	198 014	0.42	114 122	0.48	57.63	2 277 061	0.19	165 713
Total	29 345 487.00	62.62	12 548 811	53.21	42.76	940 513 197	77.04	12 722 056
RSA Total	46 864 884.00	100.00	23 584 394	100.00	100.00	1 220 888 209	100.00	122 079 198

** The areas listed in this Table are not administrative regions. These areas should be read as broader functional economic regions.*

SOURCE DOCUMENTS

DWAF website: http://www.dwaf.gov.za/

National Water Act (NWA), Act 36 of 1998.

National Spatial Development Perspective (NSDP). Spatial Guidelines for Infrastructure Investment and Development. The Office of the Presidency, Republic of South Africa, 2006.

National Water Resource Strategy (NWRS). Department of Water Affairs and Forestry, First Edition, September 2004.

Internal Strategic Perspectives (ISPs). Directorate: National Water Resource Planning, Department of Water Affairs and Forestry, 2004

Metropolitan Reconciliation Studies. Directorate: National Water Resource Planning, Department of Water Affairs and Forestry, 2008 and 2009 See Annexure 1 for details)

Revised Protocol on Shared Watercourses in the Southern African Development Community. Ratified September 2003.

ANNEXURES

Annexure 1: The Water Resource Situation in the 26 Priority Economic Growth Areas Identified in the NSDP

Annexure 2: International River Systems

ANNEXURE 1

THE WATER RESOURCE SITUATION IN THE 26 PRIORITY ECONOMIC GROWTH AREAS IDENTIFIED IN THE NSDP

A note on the content

The text in Annexure 1 provides a short description of the water situation for each of the 26 areas where 77% of the Gross Value Added (GVA) of the country is produced. These areas are shown on Map 27 and listed in Table 26 of the National Spatial Development Perspective (NSDP, 2006). Copies of both the map and table are included as Map 1 and Figure 1 at the end of the Situation Analysis serving as the cover document to this Annexure. The areas are discussed in the order given in the NSDP's Table 26 (listed from highest to lowest contribution to the GVA) and using the names given in that table.

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Planning Studies and Water Resource Reconciliation Reports, where completed for the above areas, can be accessed on the DWA website http://www.dwa.gov.za/documents/ Under "All Categories" go to Other: Integrated Water Resource Planning - WMA Documents and search under the relevant Water Management Area. DWA's Internal Strategic Perspectives for all WMAs can also be found here. For studies on the Vaal Catchment go to www.dwa.gov.za/Projects/VaalWRMS/

Should difficulty be experienced please contact Mrs Patricia Viljoen, at viljoenp@dwaf.gov.za, with your request.

A1.1 Gauteng area

The Gauteng area includes all the metropolitan and local municipalities in the Gauteng province.

Sources of supply

The Gauteng area receives the bulk of its water from what has become known as the Integrated Vaal River System (Vaal River System). The area supplied by the Vaal River System stretches far beyond the catchment boundaries of the Vaal River and includes most of Gauteng, Eskom's power-stations and Sasol's petro-chemical plants on the Mpumalanga Highveld, the North-West and Free State goldfields, iron and manganese mines in the Northern Cape, Kimberley, several small towns along the main course of the river, as well as irrigation all along the main stem of the river and the large Vaalharts Irrigation Scheme. Supplying this huge area is achieved through a very complex water supply system of reservoirs, pumping schemes, diversion weirs, canals, pipelines and inter-basin water transfer schemes.

An important characteristic of the Vaal River System is that a substantial quantity of water is transferred in from the Thukela, the Usutu and the Senqu (in Lesotho) rivers. The Vaal River serves as conduit to transfer water to the Upper, Middle, and Lower Vaal Water Management Areas (WMAs). Significant water transfers out of the Upper Vaal WMA occur through the distribution system of Rand Water to urban and industrial users in the Crocodile West and Marico WMA. Water is also transferred to the Olifants WMA, mainly to supply the power stations in this region.

The Department supplies raw water in bulk from the Vaal River Stemto Rand Water. Rand Water purifies the water and supplies it to the local authorities and other users in its supply area. At present, Rand Water serves an area extending from Rustenburg in the north to Sasolburg in the south and from Bethal in the east to Carltonville in the west.

Planning studies

A number of studies are relevant to the Gauteng area.

The Development of a Reconciliation Strategy for the Crocodile West Water Supply System study covers the whole catchment of the Crocodile (West) River, including the urban and industrial areas of northern Johannesburg, Pretoria, irrigation downstream of Hartebeespoort Dam, and the large mining developments north of the Magaliesberg. 25% of the national GDP is generated in this catchment. The reconciliation study also covers the Mokolo catchment where large

developments are planned on the coal fields in the vicinity of the town of Lephalale. Most of the water in the catchment is supplied from the Vaal River System, and the Crocodile (West) and Vaal River strategy studies are inextricably linked. Stage 1 of the Crocodile (West) River strategy has been completed and further refinements will be added towards the middle of 2009. The results and recommendations from this study are captured in the Reconciliation Strategy for the Crocodile West Water Supply Area: Executive Summary, and only the key aspects are highlighted here.

Crocodile (W) catchment study recommendations

The area currently supplied by Rand Water from the Vaal System must in future also be supplied from the Vaal System.

- The growth in effluent from the large metropolitan area of Northern Gauteng must be treated to the appropriate standards to be released into the rivers and will serve as the source of water for further mining and urban requirements north of the Rand Water supply area.
- The surplus effluent that remains after these demands have been met will be transferred to the Lephalale area for the requirements of the development on the coal fields.
- Any shortfall in supply in this area will be made up by the pumping of treated effluent from some of the sewage treatment plants in the Vaal River catchment to the Crocodile catchment. At this stage three treatment works south of Soweto have been identified for this transfer. The treated effluent will be subjected to further treatment to ensure that water quality problems in the Crocodile will not be exacerbated by these transfers. Detailed studies on this transfer will start during 2009.
- Implement Water Conservation and Water Demand Management measures to reduce losses and thus also urban demand.
- The Department to assist the Municipalities w.r.t. implementation and resources (including possible options of funding) for the required Water Conservation and Water Demand Management measures.
- Implement measures to manage the water quality in the Crocodile River System.
- Constitute a Strategy Steering Committee.

The impacts that the implementation of these recommendations will have on the Vaal River System were incorporated fully into the *Vaal River System Large Bulk Water Supply Reconciliation Strategy* study. This was commissioned in 2005 and has just been completed. Its aim was to investigate future use, all the resource options, and to

develop a strategy to ensure the future supply of water for this area, as well as supply to all the other users from the Vaal River System. Water quality is a very important aspect of the management of the Vaal River System and must be fully integrated with the management (distribution and use) of quantity. To this end the development of an *Integrated Water Quality Management Plan Study for the Vaal River System* study was conducted parallel to the Reconciliation Strategy study. A third very important study, *Potential Savings through Water Conservation / Water Demand Management (WC/WDM) in the Upper and Middle Vaal Water Management Areas*, was undertaken at the same time to assess prospects for the reduction of demand through various measures. Results and recommendations are summarised in a report *Vaal River System: Large Bulk Water Supply Reconciliation Strategy: Executive Summary*, with key aspects highlighted here.

Vaal River System study recommendations

A mix of actions must be implemented to ensure sufficient water of acceptable quality in the supply area. These include:

- Apply all the necessary resources to eradicate unlawful water use as a priority by 2011.
- Implement Water Conservation and Water Demand Management measures to reduce losses, and thus also urban demand, by at least 15% by 2014.
- The Department to assist Municipalities both in the supply of resources (including possible options of funding) for, and the implementation of, the required Water Conservation and Water Demand Management measures.
- Undertake a feasibility study into the use of the excess water, with as first priority the water pumped from the gold mines, and implement.
- Prepare for the implementation of Phase 2 of the Lesotho Highlands Water Project, with the current target to supply water to the system by 2019.
- Implement measures to manage the water quality in the Vaal River System.
- Constitute a Strategy Steering Committee.

The recommendations from both the Crocodile (West) and Vaal River System studies have been approved by the Top Management of the Department for implementation.

References

- *The Development of a Reconciliation Strategy for the Crocodile West Water Supply System. Report No. P WMA 03/000/00/3608*

- *The Development of a Reconciliation Strategy for the Crocodile West Water Supply System: Executive Summary. Report No. P WMA 03/000/00/3909*
- *Vaal River System Large Bulk Water Supply Reconciliation Strategy. Reports P RSA C000/00/4406/01 to /08*
- *Vaal River System Large Bulk Water Supply Reconciliation Strategy: Executive Summary. Report No P RSA C000/00/4406/09*
- *Integrated Water Quality Management Plan Study for the Vaal River System. Reports P RSA C000/00/2305/1 to /7*
- *Potential Savings through Water Conservation / Water Demand Management (WC/WDM) in the Upper and Middle Vaal Water Management Areas. Report No. P RSA C000/00/4405/02*

A1.2 Cape Town-Worcester area

This area includes the City of Cape Town, and some of the local municipalities resorting under the Cape Winelands, Overberg and West Coast District Municipalities, being served mainly by the Western Cape Water Supply System.

Planning studies

The *Western Cape Water Supply System Reconciliation Strategy Study* was commissioned by the Department in January 2005, in close cooperation with the City of Cape Town, to investigate the reconciliation of future water requirement scenarios with supply from the Western Cape Water Supply System (Western Cape System), for a 25-year planning horizon. The Strategy provides a decision support framework to facilitate timeous decision-making for the implementation of the appropriate water resource development and water conservation and water demand management interventions necessary to ensure that future water requirements can be met on a sustainable basis.

The Western Cape System serves more than 3 million people and provides the communities of Cape Town and certain Overberg, Boland, West Coast (including Saldanha) and Swartland towns, as well as irrigators along the Berg, Eerste and Riviersonderend rivers. Urban domestic and industrial use within the City of Cape Town (CCT) is, at 63%, the largest water requirement. Total water use, irrigation included, at present amounts to 493 million m^3/a (2008). With the addition of the recently completed Berg River Dam to the System, water availability is slightly in surplus at 556 million m^3/a.

Two future water requirement scenarios were developed. For the high scenario, with high economic and population growth, the total system water requirement would grow from 493 million m^3 in 2008 to 935 million m^3 in 2030, and for the low scenario, with low economic growth and low population growth, to 670 million m^3/a. It is predicted that the area will receive less rainfall in future. The possible impacts of climate change and the impact of implementing the ecological Reserve for the existing schemes were also examined in the scenarios.

The huge increase in water requirement estimated by the high scenario cannot be met by any single intervention, and the available yield from possible interventions can also not meet the high growth scenario requirements. At this level it will be necessary to implement a mix of interventions, and reduce the demand, if requirements are to be met. Implementing measures to drastically reduce the requirements is of paramount importance.

The Western Cape Water Supply System Reconciliation Strategy Study was completed in June 2007 and the most important recommendations from the study, along with progress in implementation, are the following:

- A Strategy Steering Committee must be formed in order to monitor the situation and make timely recommendations on planning and implementation of interventions to ensure that the water requirements are sufficiently supplied.

  Current status: The Strategy Steering Committee (SSC) was established in September 2007. The SSC's main functions are to monitor the implementation of strategy recommendations, to monitor the growth in water requirements in the System against the available supply, and to make recommendations on further strategies and studies needed to ensure the continued reconciliation of water availability and requirements.

- Without the implementation of water conservation and water demand management (WC/WDM) measures the yield capability of the existing Western Cape System (even with the Berg River Dam included) would, in the case of the high-use scenario, be exceeded by 2011.

  Current status: With current WC/WDM measures that have been implemented and due to good rains in the area, this date has already been moved to 2013.

- The City of Cape Town must implement the urban WC/WDM

strategies contained in the City's approved WC/WDM 10-year programme, and further measures must be assessed for possible later implementation. Other municipalities must also introduce water use efficiency measures.

Current status: The CCT is committed to implementing their WC/WDM programme and if successful, the water requirements could be maintained at the 2008 levels until 2013, effectively "buying 5 years" before the next augmentation will be required, i.e. 2018 or 2019. Committing the necessary resources to effect these savings need however to be ensured by all the parties concerned.

The other towns in the System are also implementing WC/WDM measures, but funding remains a challenge.

- The re-use of the large volumes of treated effluent currently flowing into the ocean must be investigated as a matter of priority.

  Current status: The SSC commissioned a high-level assessment of the potential for water reuse in the area. The initial results look so promising that a full-scale feasibility study will be commissioned by the CCT, supported by DWAF, in the next financial year.

- Development of the various groundwater and surface water resources, identified during the Western Cape Reconciliation Strategy Study, must be investigated to a feasibility level of detail.

  Current status: The CCT commissioned a pilot study to nine boreholes of 200 to 600 m deep to determine the feasibility of developing a well-field in the Table Mountain Group (TMG) aquifer. Drilling is far advanced and monitoring put in place to determine the effect of abstraction on existing boreholes and springs. Feasibility studies into the development potential of the Cape Flats and Newlands aquifers will be started by the CCT in the new financial year. DWAF commissioned a feasibility study in October 2008 for the evaluation of six surface water interventions.

- The CCT should proceed with the implementation of a pilot seawater desalination plant to gain experience in the implementation of desalination projects.

  Current status: The CCT plans to start a pilot study in the new financial year.

- The potential impact of climate change on the reconciliation of water supply and requirements should be studied in more detail.

  Current status: The SSC is very concerned about climate change and has requested that both DWAF and the CCT improve their

monitoring networks to enable proper data collection in order to monitor the effects of weather pattern changes on rainfall and runoff in the area. The Strategy is flexible enough to enable various interventions to be fast-tracked for implementation should any drastic and unexpected changes start to manifest. The SSC is also in the process of establishing a specialist task team to closely monitor the situation globally and locally.

Although the Berg River Project was recently completed, leaving a small surplus, there is still a need to closely monitor the water balance situation. None of the available surface or groundwater interventions can be developed to come on line before 2019, and then only by fast-tracking some of the elements required for implementation. Decisions will have to be taken quickly and studies run at full speed. All required resources to enable both the studies and resultant design and construction, will have to be made available in good time.

The studies into surface and groundwater resource development options required in the Strategy were almost all started 18-24 months late and the SSC is concerned that the necessary interventions will not be in place in time to augment the System when the growing requirements exceed the available supply. The only intervention available currently is to reduce requirements by implementing and effectively managing WC/WDM measures.

Because the CCT is situated at the coast, desalination of seawater is an obvious long-term augmentation option, depending on the cost and availability of energy. Water should therefore never be a cap on development. As most water used in the WCWSS is already being imported from neighbouring catchments at considerable cost, a cap has however been placed on further irrigation development. With less demanding crops and more efficient use of water for irrigation, more land could possibly be developed with the water saved.

The continued spilling of poorly treated effluent, and the uncontrolled polluted runoff from dense settlements into the Berg River and the other smaller rivers, poses a serious threat to the continued export of agricultural produce. This must be resolved by the responsible authorities.

Both the CCT and DWAF are fully committed to the implementation of the Reconciliation Strategy and are taking responsibility for all the tasks and actions assigned to them, although some of the studies and other actions assigned to them have started late. The Strategy

Steering Committee closely monitors progress.

Water supply strategies for the Worcester-Robertson area are covered in the Breede River Basin Study, completed by the Department in 2003. Enough water has been allocated for urban and industrial uses from the Brandvlei Dam to meet the requirements well into the future. The rest of this dam's water is used for irrigation. There is still some water available in this system for irrigation development by emerging farmers, especially in the Buffeljagts area along the Lower Breede River.

References

- *Western Cape Water Supply System Reconciliation Strategy Study. Report no P WMA 19/000/00/0507*
- *Western Cape Water Supply System Reconciliation Strategy Study: Executive Summary. Report no P WMA 19/000/00/0509*

A1.3 Durban-Pietermaritzburg area

The Msunduzi Local Municipality and the eThekwini Metropolitan Municipality are responsible primarily for the Cities of Pietermaritzburg and Durban respectively. These centres are experiencing rapid growth because of the influx of people from the rural areas, economic growth, and development initiatives such as the Dube Trade Port. Water requirements already outstrip availability, and water restrictions may have to be imposed should normal to low rainfall be experienced.

Sources of supply

The main source of water is the Mgeni River. The Midmar Dam on the Mgeni at Howick was raised recently to increase the available water and this river is now fully utilised meaning that further dams would not significantly increase yield.

- The Mgeni is already being supplemented by a water transfer scheme from the Mooi River, a tributary of the Thukela, with the first phase completed in parallel with the raising of Midmar Dam.
- The short-term plan for increasing water supply is to build the Springgrove Dam in the Mooi River in order to transfer more water into Midmar Dam.
- On the North Coast, Hazelmere Dam on the Mdloti River will be raised

to improve water supply to that area.

- Water from the Thukela River will be piped in to provide water to the far North Coast.

Planning for the future

A Water Reconciliation Strategy Study for the KwaZulu-Natal Coastal Metropolitan Areas was commissioned by the Department in December 2006 to investigate growth in future water requirements. This study extends from Pietermaritzburg to Durban, and from Stanger to Amanzimtoti, and is now being completed. The study is looking at a number of options to manage water demand and to extend the resource. These are: water use efficiency, water harvesting, re-use of water, desalination, dam construction and transfers of water. A combination of these elements will most likely be required.

It is recognised that additional sources of water will also soon be required. Possibilities include:

- The large-scale re-use of water through the use of treated effluent. Approximately 60 million m^3/annum is currently suitable for further treatment to supply urban use. eThekwini has initiated a dedicated feasibility study to investigate this, and Umgeni Water is investigating the re-use of water from the Darvill treatment works. Re-use schemes have a relatively short implementation time
- further transfers from the Thukela River
- water resource development (i.e. storage dams) with transfers from the Mvoti and Mkomazi rivers
- desalination

The Thukela may seem to offer the most immediate source of water at relatively low cost, but consideration must be given to reserving this water for other longer-term demands, including transfer to the Vaal system.

These options will be thoroughly investigated in order to come up with the best benefit given both short- and long-term, and local and national water resource needs - alongside economic, social and environmental considerations.

Reference

- *A Water Reconciliation Strategy Study for the KwaZulu-Natal Coastal Metropolitan Areas. Report no. P WMA 11/000/00/2902 (to be completed in 2009)*

A1.4 Witbank-Secunda area

The Witbank-Secunda area includes Middelburg. The area comprises of the Emalahleni, Lekwa and Govan Mbeki Local Municipalities. Witbank and Middelburg fall in the upper Olifants River catchment (Olifants WMA) and Secunda in the Vaal River Catchment (Upper Vaal WMA).

Water supply to Eskom power stations is discussed in Section 9 of the main report.

Sources of supply

The Secunda urban area is supplied with water by Rand Water (Vaal River System). Sasol Synfuels is located near Secunda and supplied with raw water by pipeline from the Grootdraai Dam, a sub-system of the Vaal River System.

A pipeline has recently been completed to also supply some of the requirements for water directly from the Vaal Dam to Sasol and Eskom power stations in this area, augmenting the supplies from Grootdraai Dam. Future growth in this area will be supplied from the Vaal River System. (The Vaal River system is described in depth under the Gauteng area in paragraph A1.1).

Water quality in both the Vaal and Olifants rivers is affected by coal mining in the area, and in particular acid water decanting from existing and defunct mines. Decant from defunct mines is particularly difficult to deal with as there are no longer active mining interests to hold responsible, and the problem is left for government to handle. DWAF has just completed a study for the upper and middle Olifants River Catchment: *"Upper and Middle Olifants Development of an Integrated Water Resources Management Plan"*. The product of this study is a water quality strategy aimed at managing this part of the catchment in a structured way.

Although the main stem of the Vaal River above Grootdraai Dam is not highly modified at present, its ecological functioning might come under threat with the planned expansion of coal mining in the catchment of the dam. Resource Water Quality Objectives (RWQOs) were set at strategic points on the main stem as well as in the tributaries as part of the development of an *Integrated Water Quality Management Plan for the Vaal River System* study (refer to the Gauteng area under paragraph A1.1), and the future challenge will be to ensure that these objectives are achieved through proper monitoring and source control.

The industrial and domestic water requirements of the Emalahleni Municipality (Witbank) are supplied from the Witbank Dam on the upper

Olifants River. The water in this dam is fully allocated and shortages are being experienced. Eskom is also experiencing shortages as the water supplied to Duvha power station via the Witbank Dam is not suitable for use in the cooling towers without treatment to reduce the high level of sulphates, which would damage the concrete structures. A direct supply to Duvha from the Vaal River System is now being considered. A grouping of mines south of Witbank (BHP Billiton Energy and Douglas Colliery, Xstrata and South African Coal Estate, Tweefontein Colliery and Optimum Colliery), are planning to re-mine parts of their existing mines. These are flooded and have to be dewatered, but this is being turned into an opportunity. The mines have constructed a 20 Ml/day (20 000 m^3/day or 4 million m^3/annum) reclamation plant where this water is purified to potable standard and is being supplied to Emalahleni Municipality under contract. This reclamation plant could be extended to double output in future if the need for more water arises.

The Optimum Coal Mine at Hendrina has problems with decant water of poor quality. Optimum plans to construct a 10 Ml/day purification plant to augment supplies to Hendrina, which at present gets its water via a transfer pipeline from the Komati River but experiences shortages. The reclamation plant could also be expanded to deliver 40 Ml/day and any surplus could be discharged into the river to supplement Middelburg Dam.

The Steve Tshwete Municipality (Middelburg) is currently supplied by the Middelburg and Pienaar dams and enough water is available to meet the water requirements for industrial and domestic use up to 2015. Further requirements will be addressed through the reclamation and use of excess mine water.

While the Witbank-Middelburg area has sufficient water for development into the immediate and foreseeable future, a study to develop a reconciliation strategy for the Olifants River Water Supply System (ORSSD) is currently being commissioned by the Department. This is aimed at addressing the growing water demands as well as serious water quality problems in the Olifants River system.

References

- *Upper and Middle Olifants Development of an Integrated Water Resources Management Plan. Report No. P WMA 04/000/00/7007*
- *Vaal River System Large Bulk Water Supply Reconciliation Strategy, Executive Summary Report No P RSA C000/00/4406/09*
- *Integrated Water Quality Management Plan Study for the Vaal River System. Reports P RSA C000/00/2305/1 to /7*

A1.5 Port Elizabeth area

The Nelson Mandela Bay Municipality (NMBM) is the economic hub of the Eastern Cape Province, particularly with its focus on the automotive industry and agriculture.

The Algoa Water Supply System (Algoa System) is a network covering the Nelson Mandela Bay Municipality (Port Elizabeth and the surrounding towns) and large commercial irrigation areas in the Gamtoos area. Large-scale irrigation along the Lower Sundays River is fed with water from the Orange- Fish-Sundays inter-basin water transfer scheme.

The Algoa System supplies drinking water to about 1.5 million people, large irrigation developments and a large number of industries, as well as the fast-growing Coega IDZ. The total volume of water used from the Algoa System in 2007 was 157.4 million m^3. Of this the total urban and industrial use was 96.6 million m^3, total irrigation use 50.4 million m^3, while ecological water requirements were 2 million m^3 and unaccounted for water/canal losses amounted to 8.4 million m^3. The water available from the Algoa System is currently 157.7 million m^3/a, so the System is in balance at the moment. Any increase in use therefore stresses the system, and immediate interventions are required. Future growth in demand is expected to be primarily for urban/industrial water, with little or no additional allocation to irrigated agriculture. The water requirements of the Coega IDZ will be a significant part of the demand but it should be noted that a pre-requisite for the development of the IDZ was that its industrial requirements would be supplied by treated effluent.

Sources of supply

The Algoa System has evolved over more than a century from several individual schemes that have become interlinked as development in the area, and concomitant water requirements, have increased. The bulk of the water is supplied from the western system with major dams on the Kromme (Churchill and Impofu Dams) and Kouga (Kouga Dam) rivers, as well as the eastern system, which provides water from the lower Sundays River, which is part of the Orange-Fish-Sundays System. A number of smaller dams and groundwater sources make up the rest of the supply. All the dams are situated far from the metropole, making distribution of the water very expensive.

Additional water from the Orange River, up to 54.8 million m^3/a if this is needed, has been reserved to augment the resources of the Algoa System and this should meet the urban water requirements well into the future. This scheme, the Nooitgedagt Low Level Scheme, is the only

significant intervention that can be implemented with an adequate level of certainty and within a short enough period to avoid the risk of a significant shortfall. The installation of the necessary local infrastructure to access this water is the responsibility of the NMBM and this is at present being put into place.

Other potential sources include the proposed Coega chlorine production plant (Straits Chemicals), where seawater would be desalinated to produce salt to be used for chlorine production, generating large quantities of desalinated water as a by-product. The developers are negotiating the sale of this water to NMBM. This project is considered a serious prospect, with 85 million m^3/a of clean water potentially available at full production.

There is also the possibility of using significant quantities of irrigation return flow water from the Lower Sundays River. This will require partial desalination to potable standards before adding it into the present distribution system.

Planning Studies

A *Water Reconciliation Strategy Study for the Algoa Water Supply Area* was commissioned by the Department in May 2008. This has a focus on water efficiency measures, possible groundwater resource development and, in the longer term, re-use of water, and the desalination of seawater. The industrial requirements of the Coega IDZ are required to be supplied by treated effluent. Industrial water use in the NMBM is such a large component that most of this requirement will most probably be supplied in future by suitably treated effluent. The principle is one of efficient and full use of local resources.

A draft Preliminary Reconciliation Strategy has already been completed as part of this study (May 2009). Water Conservation and Demand Management is an important intervention, with an expected savings of 7.3 million m^3/a materialising over 3-5 years. The strategy reviews a number of different growth rate scenarios, with the development of the Coega IDZ an important variable.

More detailed analyses and costing are now being done of interventions that can only be implemented in the longer term. There is great uncertainty about the extent of developments in the Langkloof and Kromme River systems over the last decade or more, and these could have serious negative impacts on the yield of the Kouga and Impofu dams. This in turn would impact on the water available both to NMBM and the large irrigation developments dependent on these dams.

The preliminary strategy action plan has been set out as follows:

- Access additional Orange River water (short term and immediate priority)
- Urban water conservation and demand management
- Increasing system operational efficiency (Loerie Dam)
- Re-use of water treated to industrial standards (pre-feasibility study and pilot plant for reverse osmosis treatment)
- Groundwater development
- Desalination: The Straits Chemical Supply Option
- Desalination: Lower Sundays River Return Flows

If all the supply interventions available to the NMBM are implemented and the Straits Chemicals development realises, the area's water requirements should be met for many decades ahead. If the chlorination plant does not realise (the big uncertainty being power supply), the Orange River Project allocation, along with the smaller other interventions being studied at present, should meet the requirements until about 2035.

The final Strategy should be completed by mid-2010.

Reference

- *Water Reconciliation Strategy Study for the Algoa Water Supply Area. Report no P WMA 15/M000/00/1409 (Project in progress).*

A1.6 Rustenburg area

This area falls under the Bojanala District Municipality.

Strong growth in mining activity has a direct impact on the growth in water requirements, both to supply the mines as well as the resultant growth in the urban areas. As described under section A1.1 (Gauteng Area) Rustenburg is supplied from the south with potable water from the Vaal River brought by Rand Water, and from the north with water from the Crocodile and Elands rivers brought by Magalies Water. Recommendations from the *Crocodile (West) River: Development of a Reconciliation Strategy for the Bulk Water Supply System* study are outlined in Section A1.1. A large and growing resource in this area is the re-useable effluent from the Gauteng area (originally from water supplied from the Vaal River System) that is discharged into the Crocodile River and its tributaries. This is then available for use in the Rustenburg, Thabazimbi and Lephalale areas.

The provision of water from Hartbeespoort Dam to the mines in the Rustenburg area would free up some potable water currently used by the mines for urban use in Rustenburg. This would extend the sufficiency of the existing pipeline capacity from Rand Water by a number of years, after which expansion of the distribution network may become necessary.

Reference

- *The Development of a Reconciliation Strategy for the Crocodile West Water Supply System: Executive Summary. Report No. P WMA 03/000/00/3909*

A1.7 Richards Bay area

The uMhlathuze Local Municipality, which includes the town of Richards Bay, is situated in the Mhlathuze River catchment. The Mhlathuze River, together with coastal freshwater lakes in the area, provides water for this important industrial area. There is sufficient water available for present needs due to an existing water transfer scheme from the Thukela River that supplements the water in the Goedertrouw Dam on the Mhlathuze River, and provides for the high level of assurance of supply demanded by Richards Bay industries. This transfer scheme is not fully utilized, and was also designed for an increase in capacity. The Mfolozi River north of Richards Bay is relatively undeveloped and could be further developed as a source of water for Richards Bay, but this will be a significant undertaking and there are a number of complex considerations, including the need for greater inflow into Lake St Lucia which could be brought from the Mfolozi, and water shortages in Mtubatuba, which already draws on the Mfolozi. A reconciliation strategy study for the uMhlathuze Local Municipality, which includes the town of Richards Bay, will start early in 2010. This will also be informed by the All Towns Reconciliation Study investigation of Mtubatuba.

A1.8 Bloemfontein area

The Caledon-Modder transfer scheme is used to supply water to the Mangaung Local Municipality (which includes Bloemfontein), Botshabelo, Thaba 'Nchu, and smaller users. Although the existing system can provide sufficient water to the users to even beyond 2025, short-term shortages are experienced due to severe siltation problems in the Caledon part of the system, as well as to limitations in the internal distribution system and insufficient balancing storage. Water quality

problems are also frequently reported at certain critical points in the system. A study for the Mangaung Municipality, *Development of Reconciliation Strategies for Large Bulk Water Supply Systems: Greater Bloemfontein Area*, was started in February 2009. Stage 1 of the strategy should be completed by March 2010, and the final strategy a year later.

A1.9 East London area

Planning studies

The *Development of a Reconciliation Strategy for the Amatole Bulk Water Supply System* serving the Amatole area, which includes East London (Buffalo City Municipality (BCM)), King William's Town and most of the Amatole District Municipality area, was initiated in 2005 and completed in March 2008.

Managing demand

The Amatole Water Supply System (Amatole System) consists of six major dams in various rivers, two owned by the Buffalo City Municipality and four by the Department. All the departmental dams are operated by Amatola Water, whilst the BCM's dams are managed by the City itself. A consequence of this dual system of operation is that the water is not used optimally. The Department completed the Wriggleswade Dam on the Kubusi River to augment the BCM water supply in 1991, but to date this dam has not been integrated into the System due to the BCM's perception that their own sources supply cheaper water. The result is that BCM operates its own dams at a very high risk of failure. The Reconciliation Strategy study recommended that one set of operating rules should be developed for the system to be operated to the best benefit of all the users. This exercise is now underway.

The scenario accepted for planning purposes was that the population will grow from about 644 000 (2001 census figure) to 703 000 in 2015 whereafter it will decline to 690 000 in 2030. In-migration has slowed down dramatically and HIV/Aids has a very high impact in this area.

The present total water requirements are estimated at 86 million m^3/annum (2005) and will rise to about 127 million m^3/annum in 2030, mainly due to increased service levels of water supply and sanitation. Existing water resources yield about 95 million m^3/annum. Water use efficiency measures should be implemented to reduce water losses and requirements, and could delay the need for further augmentation of the supplies significantly. There is significant potential for the re-use of

treated water, and the desalination of seawater is a long-term alternative source. There is also some potential for the development of additional surface water resources, and the necessary feasibility studies will be initiated in the near future.

A Strategy Steering Committee for the area will also be established towards the middle of 2009 to oversee the implementation of the Reconciliation Strategy.

Reference

- *Development of a Reconciliation Strategy for the Amatole Bulk Water Supply System, March 2008. Report no P WMA 12/R00/00/2608.*

A1.10 Potchefstroom-Klerksdorp area

This area comprises the Potchefstroom and the Matlosana Local Municipalities.

The Klerksdorp area is being supplied from the Vaal River System and the future growth in use will be supplied from there. The Department supplies raw water in bulk from the Vaal River System to Mid-Vaal Water. Mid-Vaal Water purifies the water and supplies it to the local authorities and other users in its supply area. Mid-Vaal Water has also started procedures to utilise dewatered mine water.

The Potchefstroom area is being supplied from the Mooi River. When that resource is fully utilised, Potchefstroom could also be supplied from the Vaal River, either directly or possibly by Mid-Vaal Water.

The Vaal River System is described in depth under the Gauteng area in paragraph A1.1.

Reference

- *Vaal River System Large Bulk Water Supply Reconciliation Strategy: Executive Summary. Report P RSA C000/00/4406/09*

A1.11 George-Mossel Bay area

Planning studies

The *Outeniqua Coast Water Situation Strategy Study* was initiated in 2005 and completed in March 2008.

Managing demand

The main finding from this study, after updating the hydrology for the area and taking the ecological Reserve into consideration, is that the water situation is under control at the moment but that the high seasonal influx of tourists into the coastal resorts places huge pressure on the local municipalities to supply peak water requirements. Peak demand coincides with the dry summer months and can bring about seasonal deficits because of the lack of adequate storage. Water reconciliation strategies were developed for each of the major towns, i.e. Mossel Bay, George and Knysna, all falling under the Eden District Municipality. George Local Municipality has already appointed consultants to investigate augmentation schemes and they are considering either the raising of the Garden Route Dam or building a new dam on the Malgas River. Knysna Local Municipality is investigating increasing abstraction from existing run-of-river schemes and increasing storage facilities. Mossel Bay Local Municipality's immediate urgent water needs that cannot be supplied by their own resources will be met by an increased allocation from the Department's Wolwedans Dam. Various interventions have been identified to augment Mossel Bay's future water supplies, such as implementing water efficiency measures that will reduce the requirements, raising the Klipheuwel Dam, supplying PetroSA with suitably treated effluent for some of their process water, and developing groundwater resources to meet the requirements of the communities to the west of the town.

Reference

- *Outeniqua Coast Water Situation Study, 15 December 2007. Report No P WMA 16/000/00/0407*

A1.12 Nelspruit-Bosbokrand area

This area includes the Mbombela and Bushbuckridge Local Municipalities.

The Nelspruit area, which falls under the Mbombela Local Municipality, gets its water from the Crocodile River. This system is already stressed and Nelspruit/ Kanyamazane is at the limit of its water allocation. Initial surveys indicate that there is large scope for improvements in water use efficiency in the area, and this should be the first action taken by the Mbombela Municipality to overcome their water shortage. The domestic water use in the area is also small in relation to irrigation water use and it should be relatively easy to obtain irrigation water for urban use through water trading. A study to investigate the feasibility of new dams on the Crocodile River has also already started. A comprehensive

Water Allocation Reform programme is in progress in the Inkomati Water Management Area. This translates into a review of all water use in the Crocodile River. The studies accompanying the Water Allocation Reform process will give a much better understanding of the water resource, and will provide the tools to evaluate different water use scenarios.

The Bosbokrand area was largely dependent on its water from the Sand River. This river is over-utilized and the Injaka Dam was built in the adjacent Mariti River (a tributary of the Sabie) to augment the water supply to Bosbokrand. Forestry plantations in the upper Sand River catchment were also removed with the objective of increasing yield. The completion of Injaka Dam made sufficient water available, but distribution is not yet adequate. The network to distribute this water is progressively being implemented. Whilst water is sufficient to meet current needs in the Bosbokrand area a revision of the hydrology of the Sabie shows that there is no surplus available for allocation to other users. Water use efficiencies in the agricultural sector will be necessary in the longer term if domestic supplies are to be sustained.

A1.13 Welkom-Kroonstad area

This area is included in the Matjhabeng and Moqhaka Local Municipalities.

The Welkom/ Virginia area is being supplied from the Vaal River system and the future growth in use will be supplied from there. The Department supplies raw water in bulk from the Vaal River System to Sedibeng Water. Sedibeng Water purifies the water and supplies it to the local authorities and other users in its supply area.

The Vaal River System is described in greater detail under the Gauteng area in paragraph A1.1.

Kroonstad sources its water from the Vals River. There are frequent water supply problems and investigations are underway to determine whether this is a management or resource problem. If the latter, increasing the Vals River abstraction or piping water from the Vaal River will be investigated.

Reference

- *Vaal River System Large Bulk Water Supply Reconciliation Strategy: Executive Summary. Report P RSA C000/00/4406/09*

A1.14 Kimberley area

Kimberley is part of the Sol Plaatjie Local Municipality.

Kimberley is being supplied from the Vaal River System and the future growth in use will be supplied from there.

The Vaal River System is described in depth under the Gauteng area in Annexure A1.1.

Reference

- *Vaal River System Large Bulk Water Supply Reconciliation Strategy: Executive Summary. Report P RSA C000/00/4406/09*

A1.15 Mafikeng-Lichtenburg area

This area is included in the Mafikeng and Ditsobotla Local Municipalities.

Botshabelo Water supplies Mafikeng with potable water. The current sources of supply are the Grootfontein and Molopo springs, supplemented by Setumo Dam, which is hardly utilised because of water quality problems emanating from urban/ industrial return flows.

Mafikeng town has a high per capita consumption indicating inefficient utilisation. The implementation of Water Conservation and Water Demand Management (WC/WDM) measures is essential.

A study in close liaison with the North West Province is about to start with the development of a water reconciliation strategy for the Mafikeng area. One of the options that will be investigated is to supply this area from the Vaal River System. Some of the smaller towns along the route may then also be supplied from the Vaal River System. Vaal System water will however be very costly and this will only be provided if WC/WDM and the search for groundwater do not relieve the pressure on resources.

Groundwater from the local water-rich dolomitic formations is the source of water for Lichtenburg and should be sufficient for the future if carefully managed.

A1.16 Thohoyandou-Giyani area

This area is included in the Thulamela and the Greater Giyani Local Municipalities.

Thohoyandou is supplied with water from the Vondo Dam. Water shortages were experienced from time to time, but the recently completed Nandoni Dam was built to alleviate this problem. The water purification works at Nandoni Dam is currently under construction and on completion will be able to supply sufficient water to Thohoyandou well into the future.

Water to Giyani is supplied by the Middle Letaba Dam. This dam also supplies water to the Waterval/ Elim/ Vleyfontein area situated close to Louis Trichardt in the Luvuvhu River catchment, upstream of the Albasini Dam. The demand for water from the Middle Letaba Dam exceeds the yield. There is, however, a lot of wastage that can be reduced in the Giyani area, and once the water purification works at Nandoni Dam have been completed this dam will be used for Waterval/ Elim/ Vleyfontein, taking some of the pressure off the Middle Letaba Dam and easing the supply to Giyani. The area under irrigation from the Middle Letaba Dam may also have to be substantially reduced to improve domestic supplies. Investigations have shown that the construction of additional storage on the Little and Middle Letaba Rivers would add very little to the system yield and is therefore not economically feasible.

Due to the high use and slightly below average rainfall during the past rainy season the water level in the Middle Letaba dam has dropped to between 6 to 11%. Another dry summer and the dam could be emptied. This is a serious concern and requires immediate action. The Department together with the Local Authorities and Water User Authorities are implementing actions to prevent a serious immediate crisis, stabilise the situation and prevent future occurrences of this nature. These actions ranges from water restrictions, groundwater development, and the implementation of Water Conservation and Water Demand Management measures.

Consideration may have to be given to the linking of further parts of the present Middle Letaba Dam supply area to Nandoni Dam. This will be informed by “Development of Reconciliation Strategies for Selected Towns in the Northern Region” study (part of the All Towns Reconciliation Study), which will confirm the water requirements from the Luvuvhu River Government Waters Scheme (including Nandoni Dam) supply area.

A1.17 Polokwane area

Polokwane Local Municipality is currently supplied by Lepelle Northern Water from the Dap Naudé and Ebenezer dams on the Great Letaba River and from the Flag Boshielo Dam on the Olifants River. Water is also supplied to Polokwane from the sand aquifer in the Sand River, which is being recharged with return flows from the Polokwane wastewater treatment works.

The De Hoop Dam is currently under construction on the Steelpoort River, a tributary of the Olifants River. The dam should be completed during 2012, with partial impoundment planned to start in the spring of 2010. A pipeline will be constructed from the De Hoop Dam along the Middle Olifants River to the Olifantspoort Water Treatment Works near Lebowakgomo, from where potable water will be supplied to Polokwane by Lepelle Northern Water. Water for existing and new platinum mines along the eastern limb of the Bushveld Igneous Complex will also be supplied from this pipeline. Another pipeline from the De Hoop Dam will supply water for domestic use to the Nebo Plateau. It is envisaged that the Department will supply water from the De Hoop Dam for the operation of Eskom's proposed hydropower pumped-storage scheme in the proximity of the De Hoop Dam. This is a non-consumptive use.

Mokopane is currently supplied with water from the Doorndraai Dam and groundwater from the Planknek well field. Potgietersrus Platinum mine gets purified wastewater from the Polokwane wastewater treatment works by means of a pipeline specifically constructed for this purpose.

It is expected that new mines will be established in the Mokopane area and it is also expected that Mokopane will grow significantly. Provision has been made for this allocation from Flag Boshielo Dam, and a pipeline is planned from Flag Boshielo to supply the required water.

There are, however, strong indications that the growth in the water requirements of this area and others that are also supplied by the Olifants River system will, soon after the completion of the De Hoop Dam, further increase and exceed the availability of water from the supply system. There is therefore an urgent need for additional new resources to augment the supply, as well as for management actions that can bring future water requirements into line with available resources.

The Department is now embarking on a strategic level study, *Development of a Reconciliation Strategy for the Olifants River*

Water Supply System, to determine all the possible options to ensure a continuing supply of water for the growth and development of this important part of the country. This study is similar to the other major metro and system studies already undertaken or underway. The options that will be investigated are, inter alia, the more efficient use of water, the transfer of water allocations from existing users to new use through trading, the building of another dam, transfer of water from adjacent catchments, as well as further exploration of groundwater. This will aimed at addressing the future requirements of all users that could potentially be supplied from the Olifants River system.

DWA will develop these water resource strategies in an open process and will fully involve the public. The first order water resource strategies will be available by the middle of 2010. A Strategy Steering Committee will be appointed to monitor implementation.

A1.18 Newcastle area

Water for the Newcastle area comes from the Buffalo River (Thukela System) and the Ntshingwayo Dam in this river. The Ntshingwayo Dam is not fully utilized and Newcastle thus has enough water for the foreseeable future. There is potential for further dam development close to Newcastle, should more water be required for industrial development.

A1.19 Umtata area

This area is included in the King Sabata Dalindyebo Local Municipality.

Mthatha has been identified for urban renewal in the Mzimvubu Development Project, a Presidential Icon Project driven by the Eastern Cape Provincial Government and supported by the Department. As water losses and wastage in the town are unacceptably high, and the water quality of effluent from the WWTW discharged to the Mthatha River is very poor, a water conservation and demand management strategy needs to be developed and implemented urgently.

The water situation for the town of Mthatha was investigated in the Mtata Basin Study, completed by the Department in 2001. The Internal Strategic Perspective for the Mzimvubu to Mbashe area used the information assembled in that study.

The relatively large Mtata Dam can supply much more water than the Mthatha area can use for its growth and development in the foreseeable

future. In the meantime water from the dam is used non-consumptively for hydro-power generation.

A1.20 Phalaborwa area

This area is included in the Ba-Phalaborwa Local Municipality.

Phalaborwa is currently supplied with water by Lepelle Northern Water using allocations from the Blydepoort Dam (Blyde River, a tributary of the Olifants) from the Olifants River itself, abstracted at the Phalaborwa Barrage. The Phalaborwa Mining Company has changed its mining methods and has moved from an opencast to an underground operation. This requires less water and the mine has changed the water management on its premises and is recycling its process water. The mine also has a zero-effluent policy that is strictly applied.

Whilst surplus water is currently available for development in the Phalaborwa area the likely increase in the water requirements of this area needs to be investigated. This investigation is to be covered by the Olifants Reconciliation Strategy Study, discussed under A1.17 Polokwane.

A1.21 Thabazimbi and Lephalale area

The Thabazimbi area, along with mines south of Thabazimbi, is supplied by Magalies Water from the Vaalkop Dam. Lephalale is expected to grow significantly as the centre of new coal mining and power generation activity. Sasol is also investigating the possibility of establishing a coal-to-liquid fuel plant in the area and this would require 80 million m^3 of water per annum.

Treated effluent released into rivers will serve as the source of water for further mining and urban requirements. As noted in more detail in Section A1.1, the Crocodile (West) River reconciliation study shows that enough water will be available to supply water to Magalies Water for the growth in the mining sector as well as for domestic purposes in the Thabazimbi and Lephalale area.

Reference

- *The Development of a Reconciliation Strategy for the Crocodile West Water Supply System: Executive Summary. Report No. P WMA 03/000/00/3909*

A1.22 Bethlehem-Harrismith-Phuthadithjaba area

This area is included in the Dihlabeng and Maluti a Puhofung Local Municipalities.

Bethlehem has developed local sources but is now being supported from the Lesotho Highlands Water Project where water released from the tunnel flows past the town. With such a seeming abundance of water available the challenge will be to ensure that water is used efficiently.

Harrismith gets water from local dams on the Wilge River with support from the Sterkfontein Dam, where water transferred from the Thukela River to the Vaal River System is stored. Water use efficiency will also have to get special attention in Harrismith.

Phuthaditjhaba has local resources in the Fika Patso and Metsi Matso dams. These dams can no longer cope with the current water requirements. A project has commenced through the Regional Bulk Infrastructure Grant, to create capacity in the Greater Harrismith area water supply system to accommodate future residential and industrial developments in Phuthaditjhaba. This area will then also effectively be supplied from the Sterkfontein Dam.

A1.23 Tzaneen area

The Greater Tzaneen Local Municipality is supplied from the Tzaneen and Ebenezer dams on the Great Letaba River. Allocations from both these sources are fully utilised.

In 2006 a post-feasibility bridging study was initiated to facilitate decision-making and preparation for implementation of the *Groot Letaba River Water Development Project (GLeWaP)*. The aims of this project are to improve water supplies to communities in the Southern part of the Mopani District (which includes Tzaneen); to improve the water availability for the ecological system in the Groot Letaba River; to enable the establishment of resource poor farmers, and to stabilize commercial irrigation. The building of the Nwamitwa Dam and the raising of Tzaneen Dam, both on the Groot Letaba River, were at first proposed but further analyses have shown that the availability of water from these developments is substantially less than previously estimated, and further hydrological analyses will be necessary to support appropriate planning and development. Groundwater utilisation needs to be managed on a regional scale to ensure optimal use. The findings of the current study underscore that the potential for further water resource development in the Limpopo Province is very limited and the available water resources must be utilised very

efficiently, with losses managed to a minimum.

Reference

- *Groot Letaba River Development Project (GLeWap) Post Feasibility Bridging Studies. Technical study module: Main Report P WMA 02/810/00/0608/1*

A1.24 Saldanha area

The Saldanha area is mainly supplied with water from the Misverstand Dam, which forms the lower part of the Western Cape Water Supply System. Future supplies were considered in the Western Cape Reconciliation Strategy Study (see Cape Town area under A1.2).

The Department initiated a study for the West Coast District Municipality in 2002 after concerns were raised about the reliability of water supplies, as water requirements were growing at 10% per annum. The main recommendation from the study was that enough water could be tapped from the Misverstand Dam through more effective operation of the existing pumping station. It is the Department's view that there is enough water and sufficient capacity available in the infrastructure to supply the additional water required in the medium term. The WCDM has however recently commissioned a further feasibility study on the need for additional augmentation of supply resources. Output from this study will be moderated by the Department.

In July 2008 a project was started whereby the feasibility of artificially recharging the Langebaan Road Aquifer using surplus winter runoff from the Berg River, for abstraction in the dry summer months, is being investigated. The results from this study are expected by 2010.

Reference

- *The Western Cape Water Supply System Reconciliation Strategy Study: Executive Summary. Report No P WMA 19/000/00/0509*

A1.25 Upington area

This area is included in the //Khara Hais Local Municipality.

Upington receives its water from the Orange River and the future growth in use will be supplied from there.

A1.26 Ladysmith area

This area is included in the Emnambithi-Ladysmith Local Municipality.

The Ladysmith area gets its water from the Spioenkop Dam in the Upper Thukela River and from a pump station lower down in the river. The pump station and associated pipeline can be upgraded if more water is required.

There is surplus water available in the Upper Thukela River that can readily be diverted to Ladysmith.

ANNEXURE 2

INTERNATIONAL RIVER SYSTEMS

A note on the content

A brief description of international agreements covering the Incomati and Maputo, and the Limpopo River systems

INTERNATIONAL RIVER SYSTEMS

1. The Incomati and Maputo River Systems

The Incomati and Maputo River Systems are dealt with together because the international cooperation institution the Tripartite Permanent Technical Committee (TPTC) deals with them in this way. Mozambique, Swaziland and South Africa share these river systems. In South Africa the Incomati system consists of the Sabie, Crocodile and Komati Rivers and the Maputo system consists of the Usutu and Pongola Rivers.

The most recent Agreement that guides countries in water use is the so-called Interim IncoMaputo Agreement (IIMA) signed in 2002. Various joint studies are currently being undertaken by the three countries to facilitate implementation of the Agreement. Studies already initiated are:

- Water supply to the city of Maputo
- Information exchange
- Disaster management
- Operating rules
- Stakeholder participation
- Integrated Water Resource Management

In the Incomati system the Sabie River has recently been determined to be in balance, the Komati River is fully allocated, and the Crocodile River is over-allocated. South Africa does not always meet the cross border flow requirements set for the Komati and Crocodile Rivers. In the Catchment Management Strategy of the Inkomati CMA attention will have to be given to adjusting water use back to agreed levels in the Crocodile River. This adjustment will help provide the water needed by the ecological Reserve, which is not being met at the moment. The city of Maputo will soon be unable to meet water demands, with the Incomati system, for practical reasons, a preferred target of Mozambique for additional water for Maputo. Mozambique has also initiated procedures to complete the Corumana Dam in the Sabie River just downstream of the border with South Africa. Completion will entail raising the water level by installing crest gates, thereby inundating sensitive habitat in the Kruger National Park. Mozambique and South Africa are still in negotiation on the inundation.

In the Maputo system the Usutu River is more or less in balance in South Africa, and the Pongola River is not fully utilized yet, although all the surplus water in the system has been earmarked for use. Mozambique is sensitive about environmental releases from Pongolapoort Dam as it inconveniences people living and farming on river banks, but there are no other major water issues between the three countries at present.

2. The Limpopo

The 1700 km mainstem of the Limpopo forms parts of the border between South Africa and Botswana, and the entire border between South Africa and Zimbabwe, before entering the Indian Ocean through Mozambique.

After a long history of bilateral and multilateral agreements between parties, a Joint Permanent Technical Committee (JPTC) was established in 1983 between the Limpopo Basin States to make recommendations on matters of common interest. A multilateral agreement was signed in 1986 establishing a Limpopo Basin Permanent Technical Committee (LBPTC) to advise the parties on issues regarding the river. The most notable outcome of the JPTC framework was the 1991 Joint Upper Limpopo Basin Study (JULBS). This was a pre-feasibility study determining and evaluating the most successful and cost effective method of regulating the main stream. The study concluded that anticipated dam projects on the main river were not viable for both technical and economic reasons.

In 1996 South Africa and Mozambique established a Joint Water Commission (JWC), with advisory functions on technical matters relating their common rivers, including the Limpopo. In 2003 the Limpopo co-basin states formed the Limpopo Watercourse Commission (LIMCOM) to serve as the forum for the Limpopo basin countries, responsible for the management of the water resources of the Limpopo River. This Commission (still awaiting Zimbabwe ratification), will replace the Limpopo Basin Permanent Technical Committee. South Africa and Botswana signed an Agreement on Cross Border Water Supply on 17 July 2008 in Botswana and the JPTC has started discussions to implement this agreement.

South Africa dominates the basin in terms of land occupation and runoff contribution. No dams have been built on the Limpopo main river. However, many major dam projects have been implemented on its various tributaries. 45 large dams, 29 in South Africa, were built mainly for irrigation, domestic and industrial water supply, hydropower generation, and as flood mitigation structures. South Africa, the bulk user of the river and region's irrigator, is economically dependent on the river, and its demands are increasing. The Limpopo also supplies Eastern Botswana, and large irrigation schemes in southern Mozambique. In Zimbabwe, the river has been fully developed. There are substantial but poorly quantified flows in the Limpopo River. The assumption is therefore made that development along the Limpopo River has expanded to the limit of sustainability and that the water resource balances out the water use. The water requirement is estimated at 80 million m^3/a from the main stem of the Limpopo River. The registered water use indicates that 49 million m^3/a of the water abstractions from the Limpopo are from groundwater (i.e. from the alluvial aquifer) while the remaining 31 million m^3/a are from surface flow, although the

distinction between these two may not always be clear. The main stem of the Limpopo is, at best, in balance. Concerns have however been raised that over-exploitation of the alluvial aquifer could have long lasting negative impacts on the quantity and quality of the water.

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South Africa's overall approach towards the main stem of the Limpopo is to disallow any further water use licences from the river and from the alluvial aquifer, at least until the system is much better understood than is currently the case. One of LIMCOM's first tasks is the commissioning of a Joint Basin Study of the Limpopo River and the development of a water use agreement for the Limpopo Basin to allow better management of the river and prevent the over-utilisation. The commissioned a Scoping Study (1st Phase of the Joint Limpopo River Basin Study), starting in December 2008 and aimed at gathering information, assessing information gaps, defining the level of investigation and providing the work content for the detailed main study, scheduled to start in June 2009.

water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

A Situation Analysis 2009

Report No: P RSA 000/00/7809