REPORT No. PWMA 18/000/00/0304

DEPARTMENT: WATER AFFAIRS AND FORESTRY

Directorate: Water Resource Planning

# BREEDE WATER MANAGEMENT AREA

## INTERNAL STRATEGIC PERSPECTIVE

**VERSION 1**
**OCTOBER 2004**


**COMPILED BY:**

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UMVOTO

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DEPARTMENT OF
WATER AFFAIRS
& FORESTRY

**DEPARTMENT OF WATER AFFAIRS AND FORESTRY**

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# INTERNAL STRATEGIC PERSPECTIVE

***Version 1***

**October 2004**

Department of Water Affairs and Forestry
Directorate National Water Resource Planning

# BREEDE WATER MANAGEMENT AREA (WMA No 18)

# INTERNAL STRATEGIC PERSPECTIVE

## APPROVAL

| | | |
|---|---|---|
| **Title** | **:** | **Breede Water Management Area: Internal Strategic Perspective** |
| **DWAF Report No** | **:** | P WMA 18/000/00/0304 |
| **Consultants** | **:** | Ninham Shand in association with Umvoto Africa, Jakoet & Associates, and Tlou & Matji |
| **Report Status** | **:** | Version 1, October 2004 |
| **Version Controller** | **:** | Mr J Roberts (Catchment Manager Breede WMA) |
| **Date** | **:** | October 2004 |

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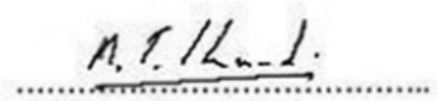
**STUDY TEAM: Approved for Ninham Shand**

G ENGLISH



MJ SHAND (Director)

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**Approved for Department of Water Affairs and Forestry**

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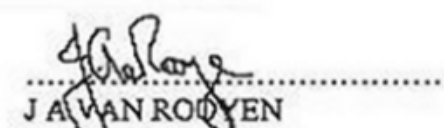
Project Manager



J A VAN ROOYEN
Manager: NWRP

## REFERENCE

This report is to be referred to in bibliographies as:

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## INVITATION TO COMMENT

This report will be updated on a regular basis until it is eventually superceded by the Catchment Management Strategy. Water users and other stakeholders in the Breede River WMA and other areas are encouraged to study this report and to submit any comments they may have to the Version Controller (see box overleaf).

## ELECTRONIC VERSION

This report is also available in electronic format as follows:

- DWAF website:
  - Intranet: http://dwaf-www.pwv.gov.za/documents/
  - Internet: http://www.dwaf.gov.za/documents/
- On CD which can be obtained from DWAF Map Office at:
  157 Schoeman Street, Pretoria (Emanzini Building)
  +27 12 336 7813
  mailto:apm@dwaf.gov.za

  or from the Version Controller (see box overleaf)

The CD contains the following reports (all available on DWAF website)

- Breede WMA Internal Strategic Perspective (*This Report*)
  (Report No: P WMA 18/000/00/0304)
- The National Water Resource Strategy, First Edition, 2004
- The Breede WMA - Overview of Water Resources Availability and Utilisation
  (Report No: P WMA 18/000/00/0203)
- The Breede WMA – Water Resources Situation Assessment
  (Report No: P WMA 18/000/00/0101)

## LATEST VERSION

This report is a living document and will be updated on a regular basis. If the version of this report is older than 12 months, please check whether a later version is not available.

This can be done on the DWAF website: http://www.dwaf.gov.za/documents/

or by contacting the Version Controller (see box overleaf)

# VERSION CONTROL

## BREEDE WMA
## INTERNAL STRATEGIC PERSPECTIVE

| | |
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| Version 1 | October 2004 |
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| Current Version Controller | J Roberts<br><br>DWAF Bellville Office<br>17 Strand Street<br>Bellville<br>7530<br><br>021 950 7100<br>RobertJ@dwaf.gov.za |

(The most significant amendments included in the latest version will be indicated here)

# BREEDE WMA

## INTERNAL STRATEGIC PERSPECTIVE

## EXECUTIVE SUMMARY

### 1. INTRODUCTION

The Breede Water Management Area (WMA) is situated in the south-west corner of South Africa. It derives its name from the largest river within its boundaries, namely the Breede River. The WMA is bounded by the Indian Ocean to the south, the Olifants/Doorn WMA in the north-west, the Berg WMA in the west and the Gouritz WMA in the east. It falls entirely within the Western Cape Province.

### 2. WATER LEGISLATION AND MANAGEMENT

The **National Water Act** of 1998 (NWA) is the principal legal instrument relating to water resource management in South Africa. It is now being incrementally implemented. The NWA introduces far-reaching concepts such as the **National Water Resource Strategy** (NWRS), the First Edition of which will be published in the first quarter of 2004. This NWRS is being progressively developed to set out policies, strategies, objectives, plans, guidelines, procedures and institutional arrangements for the protection, use, development, conservation, management and control of the country's water resources.

The delegation of water resource management from central government to catchment level, as provided for in the NWA, will be achieved by establishing a Catchment Management Agency (CMA) for each WMA and each CMA will progressively develop a Catchment Management Strategy (CMS), within the general framework set by the NWRS. Until such time as the CMA is established and is able to manage the water resources within the WMA according to its CMS, the Regional Offices (ROs) of the Department of Water Affairs and Forestry (DWAF) will continue to manage water resources according to the Internal Strategic Perspective (ISP).

### 3. INTERNAL STRATEGIC PERSPECTIVES

This document presents DWAF's Internal Strategic Perspective (ISP) or view on how it intends managing the water resources within the Breede WMA during the period leading up to the establishment of a CMA and the development of a CMS by the CMA. The ISP will inter alia provide a consistent basis for the Western Cape Regional Office to process requests for new water use licences.

After internal approval, the Department will obtain comment on the ISP from local authorities, Water User Associations (WUAs), other water related organisations and the public. This will take place through the RO's established liaison structures (forums) and through normal contact with water users in the execution of its duties. This ISP document will be updated periodically

until the CMA for the Breede WMA is fully functional and has prepared a CMS. All updates to the document will be authorised by the RO, and the task of managing version control will be the function of the Catchment Manager for the Breede WMA.

The ISP has been compiled by referring to policy documentation, legislation, regional planning, departmental guidelines and relevant water related studies, and is also based on interviews and communications with DWAF's regional managers, as well as staff in relevant Head Office directorates.

The yield balances quoted in this report are based on the findings of the Breede River Basin Study (Ref 8) and on the Breede WMA Report (Ref 9), for those areas lying outside of the Breede River catchments. The Breede WMA Report was compiled as part of the NWRS process.

The ISP does not assume to address all possible issues. This is a living document and further improvements will be made and strategies developed as new issues arise.

## 4. INTEGRATED WATER RESOURCE MANAGEMENT

As part of the implementation of Integrated Water Resource Management (IWRM), in line with the requirements of the NWA, DWAF is following a process that will include:

- development of the ISPs;
- verification of existing lawful use;
- determination of water availability at acceptable confidence levels; and
- determination of Ecological Reserves at high confidence levels.

An iterative and interactive process will also follow where public participation will play a role in determining water resource and water use reconciliation options. This will be handled by DWAF until the CMA can take over.

The following aspects of water resource management will be encompassed within the broad process of IWRM:

- caring for the environment and where possible, enhancing ecological integrity;
- keeping society at the forefront of all decision making;
- affording the correct level of attention to addressing water quality issues in relation to both surface and groundwater;
- managing groundwater as an integral part of the total water resource;
- taking cognisance of the recreational and social use of dams and rivers; and
- forging ways to improve co-operative governance with other authorities towards more effective water resource management.

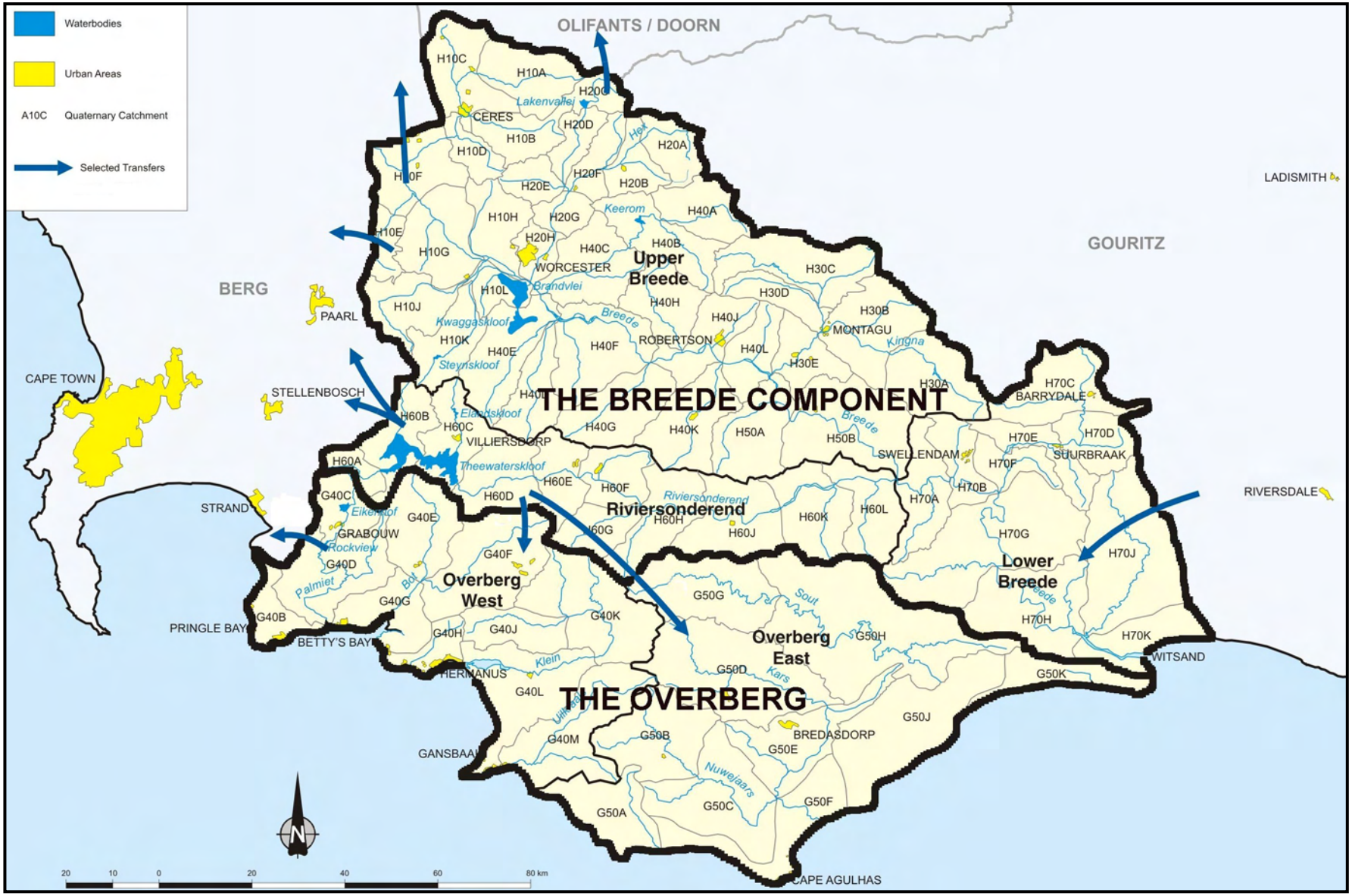


**Figure E1: The two components of the Breede WMA and their sub-areas**

## 5. SUB-AREAS OF THE BREEDE WMA USED IN THE NWRS

For the purposes of reviewing the available yield, the Breede WMA was divided into two components, namely the Breede Component and the Overberg (see Figure E1). Each component was further sub-divided into smaller sub-areas, three in the Breede and two in the Overberg. These five sub-areas within the WMA correspond with the so-called areas of interest used in the NWRS.

To facilitate the identification of issues and concerns, the Breede component was further sub-divided into eight sub-areas, and the Overberg into six. This is discussed in Chapter 6 of this report.

## 6. TOPOGRAPHY, RAINFALL AND LAND-USE

The topography of the Breede WMA varies considerably from east to west, with consequential impact on the climate of the region. Rainfall is highest in the mountainous regions in the south-west where the mean annual precipitation is as high as 3 000 mm per annum, whilst the central and north-eastern areas receive as little as 250 mm per annum. There is intensive irrigation in the Breede and Riviersonderend River valleys (Breede component of the WMA) as well as in the extreme west of the Western Overberg, notably in the Palmiet River catchment.

## 7. ECONOMIC ACTIVITY

Irrigated agriculture, wheat cultivation and associated activities such as processing and packaging are the primary economic activities in the Breede WMA. The contribution of this WMA to the national Gross Domestic Product (GDP) is less than 1%, and is among the lowest in the country. There is a 19% unemployment rate which is significantly better than the national average of 29%.

## 8. POPULATION

Of the total population of 382 400, estimated in 1995 (Ref 9), 66% reside in urban and peri-urban areas and 34% in rural areas. No significant population increase is anticipated, although there will be a small increase in the coastal towns and a continuation of seasonal influx, notably during summer holiday periods.

## 9. CONSERVATION FEATURES

The Breede River estuary and the estuaries of the Overberg Rivers are of ecological importance. In 1986 the Heuningnes estuary was proclaimed a RAMSAR site. The Papenkuils wetland has been impacted on by activities within its catchment, notably the diversion of water upstream of it for irrigation purposes.

## 10. WATER RESOURCE MANAGEMENT PERSPECTIVE OF THE BREEDE RIVER COMPONENT

The Breede River component (see Figure E1) corresponds with the scope of the BRBS, on which much of the information used in this ISP has been based. There are three sub-areas used to describe the water availability, water requirements and yield balance, namely :

- The Upper Breede sub-area
- The Lower Breede sub-area
- The Riviersonderend sub-area

### 10.1 Regional Water Supply Schemes in the Breede River Catchments

A major inter-basin transfer takes place between the Breede and Berg WMAs via the Riviersonderend-Berg-Eerste River Government Water Scheme, which also supplies water for irrigators in the Riviersonderend sub-area and to the Overberg Water Board schemes in the Overberg. Of the total scheme yield of 234 million $m^3$/a (1 in 50 year assurance of supply), an average annual net transfer of 161 million $m^3$/a takes place into the Berg WMA. Via this scheme, a further 6,5 million $m^3$/a is transferred, namely 4 million $m^3$/a to the Overberg and 2,5 million $m^3$/a to the Lower Breede sub-area. The largest beneficiary in the Berg WMA is the City of Cape Town (CCT). Irrigators in the Berg and Eerste River catchments also have an allocation out of this scheme. Four other small transfer schemes out of the Breede River component total approximately 12 million $m^3$/a, of which 2,5 million $m^3$/a is into the Olifants/Doorn WMA via the Inverdoon Canal. The remaining 9,5 million $m^3$/a is transferred into the Berg WMA via the Artois Canal (4 million $m^3$/a), the "Gawie-se-Water" Scheme (5 million $m^3$/a), and about 0,5 million $m^3$/a to Franschhoek.

### 10.2 Urban Water Supply Schemes in the Breede River Component

Urban water requirements constitute approximately 5% of the total water requirement in the Breede River component of the WMA. This is primarily supplied out of schemes owned and operated by local authorities. Water conservation and demand management offers potential towards meeting future urban requirements, as well as the development of small supplementary groundwater schemes.

### 10.3 Irrigation Supply in the Breede River Component

95% of the total water requirement is for irrigation. Based on checks undertaken in the Hex River catchment, it appears that registered irrigation information (WARMS) is reasonably accurate. Results in the Hex River catchment were within 3% of independent assessments undertaken as part of the BRBS, adding confidence to estimates of actual water use by irrigation.

## 10.4 Waterworks

Stettynskloof Dam (Worcester) is the only dam of significant size that is owned by a local authority, and for which the primary purpose is urban water supply. Of the dams supplying water for irrigation, Greater Brandvlei Dam (firm yield of 155 million $m^3$/a) is the largest, and has spare storage capacity of 133 million $m^3$. This offers potential for increasing the yield via pumping out of the Breede River. Other large dams supplying irrigation include :

- Lakenvallei and Roode Elsberg Dams of the Sanddrift Government Water Scheme (firm yield of 9 million $m^3$/a)
- Keerom Dam (firm yield of 3,8 million $m^3$/a)
- Elandskloof Dam (firm yield of 12 million $m^3$/a)
- Buffeljags Dam (firm yield of 11 million $m^3$/a)

Farm dams collectively provide about 83 million $m^3$ of storage.

## 10.5 Water Availability for Year 2000

The water availability estimate for the Breede River component, at a 98% assurance of supply is shown in Table E1.

**Table E1: Water Availability in the Breede River Component (million $m^3$/a, Year 2000)**

| Resource Category | Upper Breede | Riviersonderend | Lower Breede | Total |
|---|---|---|---|---|
| Gross Surface Water Resource Yield | 428 | 262 | 59 | **749** |
| Less Impact on Yield of: | | | | |
| Preliminary Ecological Reserve | 16 | 0 | 0 | **16** |
| Invasive Alien Plants | 25 | 13 | 7 | **45** |
| River Losses | 5 | 0 | 0 | **5** |
| **Net Surface Water Resource** | **382** | **249** | **52** | **683** |
| Plus Groundwater | 94 | 5 | 4 | **103** |
| Plus Return Flows | 85 | 10 | 7 | **102** |
| **Total Local Yield** | **561** | **264** | **63** | **888** |
| Transfers In | 0 | 0 | 14 | **1** |
| **TOTAL** | **561** | **264** | **77** | **889** |

Uncertainties affecting the water availability estimate include :

- riverine and estuarine Reserve determinations are preliminary;
- rain gauging in the high rainfall regions is not adequate and impacts on the reliability of hydrology.

The impact of climate change on future estimates of water availability will need to be taken into account.

## 10.6 Water Requirements for Year 2000

The estimates of current water requirements for the Breede River component of this WMA are shown in Table E2.

**Table E2: Water Requirements in the Breede River Component (million $m^3/a$, Year 2000)**

| Category | Upper Breede | Riviersonderend | Lower Breede | Total |
|---|---|---|---|---|
| Irrigation | 495 | 91 | 72 | **658** |
| Urban | 23 | 2 | 1 | **26** |
| Rural | 4 | 2 | 1 | **7** |
| Impact of Afforestation on Yield | 0 | 1 | 0 | **1** |
| **Total Requirements** | **522** | **96** | **74** | **692** |
| Transfers Out | 22 (1) | 168 (2) | 0 | **177** (3) |
| **TOTAL** | **544** | **264** | **74** | **869** |

1) Made up as follows: **4** million $m^3/a$ IBT to Berg WMA via Artois Canal, plus **5** million $m^3/a$ IBT from "Gawie-se-water" to Berg WMA, plus **2,5** million $m^3/a$ IBT to Olifants/Doorn WMA (via the Inverdoorn Canal), plus **10** million $m^3/a$ surplus water from freshening releases.

2) Made up as follows: **161** million $m^3/a$ from Theewaterskloof to Berg WMA, plus **0,6** million $m^3/a$ to Franschhoek (Berg WMA), representing the net transfer from the Breede River component to the Berg WMA after accounting for the Wolwekloof and Banhoek Diversions in the Berg WMA, into the Breede WMA during winter months. In addition, transfers of **4** million $m^3/a$ to Overberg, plus **2,5** million $m^3/a$ to Lower Breede also take place.

3) Made up as follows: **161** million $m^3/a$ IBT from Theewaterskloof to Berg WMA, plus **4** million $m^3/a$ IBT to Berg WMA via Artois Canal, plus **5** million $m^3/a$ IBT from "Gawie-se-water" to Berg WMA, plus **0,6** million $m^3/a$ IBT to Franschhoek, plus **2,5** million $m^3/a$ IBT to Olifants/Doorn WMA (Inverdoorn Canal), plus **4** million $m^3/a$ to Overberg region.

In terms of estimates of current water requirements, the main concern is that water use outside of controlled irrigation areas is less certain than water use within them. It is estimated that approximately 25% of the total current irrigation activity lies outside of government controlled schemes and Water User Associations (WUAs).

Future uncertainties in estimating water requirements include :

- the impact of climate change
- the impact of changes in land-use
- the impact of water conservation and demand management

## 10.7 Reconciling Current Water Requirements and Availability

The current yield balance within the Breede River component is estimated to be a surplus of 20 million $m^3/a$, as shown in Table E3.

**Table E3: Reconciliation of Water Requirements and Availability in the Breede River Component (million $m^3$/a, Year 2000)**

| Description | | ISP SUB-AREAS | | | Total |
|---|---|---|---|---|---|
| | | Upper Breede | Riviersonderend | Lower Breede | |
| Available Water | Local Yield | 561 | 264 | 63 | **888** |
| | Transfers In | 0 | 0 | 14 | **1** |
| | **Total** | **561** | **264** | **77** | **889** |
| Water Requirements | Local Requirements | 522 | 96 | 74 | **692** |
| | Transfers Out | 22 | 168 | 0 | **177** |
| | **Total** | **544** | **264** | **74** | **869** |
| **Balance** | | **17** | **0** | **3** | **20** |

The 20 million $m^3$/a surplus lies in Koekedouw Dam (3 million $m^3$/a), Stettynskloof Dam (14 million $m^3$/a) and Buffeljags Dam (3 million $m^3$/a). The former two dams are not owned by the Department. However, the Department will endeavour to influence the owners into making any long-term surpluses available for use by resource poor farmers.

## 10.8 Water to Resource Poor Farmers

There have not been many examples of historically disadvantaged people emerging from their current situation on the basis of agricultural water use. Information on the actual water use by the established resource poor farmers (2 200 ha) is not readily available. The same is true for the 29 projects currently being implemented on an additional 1 900 ha.

The Department favours a joint venture approach in the establishment of resource poor farmers, so as to benefit from the skills and technical support from existing commercial farmers.

## 10.9 Future Water Requirements

It is estimated that after allowing for a 30% saving through water demand management, the urban water requirement will increase by only 17 million $m^3$/a by 2030. The BRBS has identified that it is economically viable to expand irrigation up to an additional water requirement of 140 million $m^3$/a. On the other hand, the future water requirements in the Berg WMA could increase by about 260 million $m^3$/a by 2025. Consequently, there will be competition for any future yield developed in the Breede River catchments. Some sharing of the Breede resources is recommended.

## 10.10 Reconciliation Interventions

Over and above the development of new water resources, there are other important interventions that must be considered, namely :

**(a)** ***Verification of Existing Lawful Use***

Some water could potentially be returned to the system once this process has been concluded.

**(b)** ***Water Conservation and Demand Management***

Savings of between 30 and 40% are achievable in the urban sector. In the agricultural sector, on-farm irrigation techniques are generally efficient in this region. The main opportunities to save water lie in the maintenance and upgrading of water conveyance and distribution systems as well as improved management of releases from dams (notably Greater Brandvlei Dam).

**(c)** ***Trading of Existing Water Use Authorisations***

Trading of existing authorisations is a way of shifting water towards more beneficial use or higher paying use, without increasing total volume demand.

**(d)** ***Clearing of Invasive Alien Plants***

Although total removal of the current 46 000 ha of invasive alien plants is not realistic, very important gains can be made through clearing. Priority areas include the upper reaches of the Riviersonderend and Upper Breede sub-areas. The use of bio-control presents a cost-effective and sustainable form of control.

## 10.11 Development of Groundwater Yield Potential

Further abstraction out of the alluvial aquifers should be cautiously considered due to the direct interaction with surface water flow. There is a great deal of groundwater which only has weak links to surface water and can be abstracted without significantly impacting on surface water yields.

Currently, approximately 103 million $m^3/a$ is abstracted from groundwater sources, much of which is from the alluvial aquifers. The Table Mountain Group Aquifer holds significant potential and is being investigated by the CCT as an option to augment their existing sources of supply. Within the Ceres catchment (Upper Breede sub-area), groundwater abstraction currently exceeds what is considered to be sustainable abstraction. Groundwater is also extensively used in the Hex River catchment. The BRBS has estimated that there is in excess of 300 million $m^3/a$ of additional groundwater that could theoretically be abstracted on an environmentally sustainable basis. Notwithstanding that practical constraints in developing the resource would significantly reduce this potential, a resulting additional yield potential in the order of 100 million $m^3/a$ is considered to be a reasonably conservative estimate.

## 10.12 Development of Surface Water Yield Potential

The BRBS concluded that through the development of approximately 400 million $m^3$ of additional storage, it would be economically viable to develop between 90 and 140 million $m^3/a$ of additional surface water yield. The range is dependant on the ecological water requirements associated with the particular ecological classes for the rivers and the estuary. It is important to note that to achieve the upper limit of 140 million $m^3/a$, the recommended classes (with the exception of the Riviersonderend River) would be in place, but all invasive alien plants would need to be removed. Until the ecological classes for the rivers and the estuary have been decided upon, the water resources will be managed according to the current classes (i.e. the status quo). Furthermore, these potential yields assume that the use of groundwater potential within, or in close proximity to river channels is considered as surface water use.

## 10.13 Potential New Schemes

**(a)** ***Developing Yield for In-catchment Use***

The Augmentation of Greater Brandvlei Dam, through the utilisation of its spare storage capacity is considered the optimum large scheme for in-basin development. Over and above the existing installed pumping capacity (5 $m^3/s$) from the Breede River (Papenkuils Pump Station) into the dam, additional pumping capacity (if installed) of 15 $m^3/s$ could yield an additional 33 million $m^3/a$. The Unit Reference Value (URV) for this scheme is estimated at R0,15/$m^3$. URVs are used for a comparative assessment of the financial costs of scheme options. The lower the URV, the more affordable the scheme.

The second most favourable option for in-catchment development appears to be a 10 m raising of Buffeljags Dam which could double its current yield (from 11 to 22 million $m^3/a$). The URV for this scheme is estimated at R0,75/$m^3$.

**(b)** ***Developing Yield for Water Transfer***

The two preferred options identified in the BRBS are the Michell's Pass Diversion and the Upper Molenaars Diversion.

The Michell's Pass Diversion involves the construction of a 10 m high weir on the Dwars River in the Upper Breede sub-area, and the diversion of water from it via a canal into the catchment of the Klein Berg River, from where the water would flow into Voëlvlei Dam. A potential yield of 53 million $m^3/a$ has been estimated and this could either be utilised by the CCT or users in the rapidly developing West Coast region, or some combination of both. The URV for this scheme is estimated at R0,11/$m^3$. The impact of this scheme on the current and potential yield of Greater Brandvlei Dam will need to be investigated during the Western Cape Reconciliation Strategy Study, to be undertaken by the Department in 2005.

The potential Upper Molenaars River Diversion has been estimated to yield about 27 million $m^3/a$. It would involve pumping water from a diversion site on the river to the

existing pipeline leading through the Huguenot Tunnel. From there the water would either gravitate to the existing Wemmershoek Dam or, alternatively, to the Berg River Dam (currently under construction). For the Wemmershoek option, a URV of R0,82/$m^3$ has been estimated. The impact of this scheme on the existing diversions into Greater Brandvlei Dam will be investigated during the Western Cape Reconciliation Strategy Study.

A third option involving the transfer of water from Greater Brandvlei Dam by pumping to Theewaterskloof Dam was considered less favourable than the Michell's Pass and Upper Molenaars River Diversions. The financial cost (URV of R1,14/$m^3$) and environmental concerns (water quality) are limitations in terms of this option.

### 10.14 Allocating Future Developed Yield

Water resource managers face important challenges with respect to the allocation of potential yield that might be developed in the Breede River component of this WMA. There will be significant competition for water, both from in-catchment irrigation potential and from urban growth in the Berg WMA (notably the CCT and the West Coast). How much might become available will be influenced ultimately by the ecological water requirements, which in turn will depend on the river classifications.

In the interim, planning will be based on the assumption that the Upper Molenaars and Michell's Pass Diversion schemes appear to be most suitable for water transfer. Similarly, the Greater Brandvlei Augmentation Scheme and the raising of Buffeljags Dam appear suitable for in-catchment irrigation expansion.

### 10.15 Water Quality

The natural geology (shales) and agricultural practices contribute to the salinity problem in the Breede River, which impacts on water quality for irrigation. Salinity levels are currently managed as far downstream as the Zanddrift weir, through freshening releases of about 22 million $m^3$/a out of Brandvlei Dam. The BRBS recommends that the current practice be maintained but that modelling of other options should be undertaken. New irrigation development should be appropriately sited to best avoid exacerbating the salinity problem.

## 11. WATER RESOURCE MANAGEMENT PERSPECTIVE OF THE OVERBERG

For the purpose of describing the water availability, water requirements and yield balance within the Overberg, the figures published in the NWRS are used. These are considered the most reliable to date. The two sub-areas (see Figure E1) correspond with the so-called areas of interest used to describe the Overberg in the NWRS.

## 11.1 Regional Water Supply Schemes in the Overberg

An inter-basin transfer takes place out of the Palmiet River (Overberg West) into the Upper Steenbras Dam (Berg WMA), via the Palmiet Pumped Storage Scheme. The average annual volume transferred is 22,5 million $m^3$/a and this is utilised by the CCT.

The Overberg Water Board operates the Ruensveld West and Ruensveld East Schemes, which abstract water from the Riviersonderend River. The water is treated and distributed to rural users and for stockwatering. Collectively, the transfers from the two Ruensveld Schemes total about 4 million $m^3$/a.

## 11.2 Urban Water Supply Schemes in the Overberg

With the exception of some domestic water supplied by the Ruensveld Schemes, local sources (surface and groundwater) meet the urban water requirements in the Overberg. The only dam in the Overberg primarily supplying water to urban users is the De Bos Dam, owned and operated by the Overstrand Municipality (Hermanus).

## 11.3 Irrigation Supply in the Overberg

Of the 11 400 ha of irrigated land in the Overberg, 11 300 ha lies in the Overberg West sub-area, and much of that is concentrated in the Palmiet River catchment. This is irrigated out of dams on the Palmiet River, of which Eikenhof Dam with a capacity of 29 million $m^3$ is the largest.

## 11.4 Water Availability for Year 2000

The water availability estimate for the Overberg at a 98% assurance of supply is shown in Table E4.

**Table E4: Water Availability in the Overberg (million $m^3$/a, Year 2000)**

| Resource Category | Overberg West | Overberg East | Total |
|---|---|---|---|
| Gross Surface Water Resource | 121 | 3 | **124** |
| Less Impact on Yield of | | | |
| Preliminary Ecological Reserve | 2 | 0 | **2** |
| Invasive Alien Plants | 31 | 2 | **33** |
| River Losses | 0 | 0 | **0** |
| **Net Surface Water Resource** | **88** | **1** | **89** |
| Groundwater | 3 | 1 | **4** |
| Return Flows | 8 | 0 | **8** |
| **Total Local Yield** | **99** | **2** | **101** |
| Transfers In | 2 | 2 | **4** |
| **TOTAL** | **101** | **4** | **105** |

The main uncertainty associated with the estimate of current availability is the fact that Reserve estimates remain preliminary at this stage.

## 11.5 Water Requirements for Year 2000

The estimates of current water requirements are shown in Table E5.

**Table E5: Water Requirements in the Overberg (million $m^3$/a, Year 2000)**

| Category | Overberg West | Overberg East | Total |
|---|---|---|---|
| Irrigation | 64 | 0 | 64 |
| Urban | 8 | 2 | 10 |
| Rural | 2 | 2 | 4 |
| Impact of Afforestation on yield | 5 | 0 | 5 |
| **Total Requirements** | **79** | **4** | **83** |
| Transfers Out | 23 | 0 | 23 |
| **TOTAL** | **102** | **4** | **106** |

Uncertainties in estimating future water requirements are the same as those described in Section 10.6 of this executive summary.

## 11.6 Reconciling Current Water Requirements and Availability

The Overberg West has a shortfall of 1 million $m^3$/a and the Overberg East is in balance, resulting in an overall shortfall of 1 million $m^3$/a for the Overberg as a whole.

## 11.7 Reconciliation Interventions

The potential reconciliation interventions within the Overberg are :

- Water conservation and demand management, including water re-use
- Exploiting groundwater resources
- Clearing of invasive alien plants

## 11.8 Development of New Surface Water Supply Schemes

In terms of in-catchment development, abstraction of surplus winter water into off-channel storage facilities is an option that can be considered in certain rivers within the Overberg.

The Palmiet River offers further potential for the development of additional yield (about 25 million $m^3/a$), subject to the Reserve requirement of the Palmiet River and estuary. This could potentially be used to augment the Western Cape Water Supply System.

### 11.9 Water Quality

With the exception of the Palmiet River and the headwaters of certain rivers of the Overberg West, naturally occurring salinity is prevalent throughout the Overberg. No specific interventions are necessary as irrigation expansion of any significance is unlikely, outside of the Palmiet catchment.

## 12. REVISED INPUTS TO THE NWRS

Chapter 5 presents the water requirements, water availability and yield balance inputs that are required for the NWRS. No new information is introduced and the purpose of Chapter 5 is to facilitate easy updating of the NWRS, by presenting the information in the same format as that used in the NWRS.

## 13. THE TEN STRATEGIC WATER RESOURCE MANAGEMENT REQUIREMENTS OF THIS ISP

The strategies contained in this document were developed to give effect to the NWA and the NWRS.

The ten broad strategic groups cover all currently identified water management activities of the DWAF RO and the requirements of the NWA and the NWRS. These are:

**(i) Yield balance and reconciliation** strategies address the need relating to the existing uncertainties and information gaps in the availability of surface water and groundwater, the water requirements and the possible reconciliation interventions (WC/DM, removal of invasive alien plants, water trading, for example), and the potential for the development of the groundwater resource in the Breede WMA. Four strategies were developed, namely:

- ⇨ Water Availability
- ⇨ Water Requirements
- ⇨ Reconciliation of Water Supply and Demand
- ⇨ Groundwater Utilisation

**(ii) Water resource protection** strategies address the need to achieve the protection of water resources to ensure their continuing availability for human use by leaving enough water of appropriate quality in rivers and streams to maintain their ecological functioning. This will be achieved by classification of freshwater bodies and determination of their human and ecological Reserves, setting resource quality objectives for freshwater bodies, addressing solid waste management, pollution control, sanitation and salinity. The following three strategies were developed:

- ⇨ Reserve and Resource Quality Objectives
- ⇨ Estuaries and Wetlands
- ⇨ Water Quality Management

**(iii) Water use management** strategies address the objectives of equity of access to water, and sustainable and efficient use thereof. This will be achieved through conditions of water use imposed through authorisations. These will include general authorisations (GAs) to manage water use, verification of the legality of existing water use, processing and issuing of new water use authorisations, possible re-allocation of water and changing land use. Six water use management strategies have been developed, namely:

- ⇨ General Authorisations
- ⇨ Verification of Existing Lawful Use
- ⇨ Allocation and Licensing
- ⇨ Compulsory Licensing
- ⇨ Changing Land-use : Forestry
- ⇨ Changing Land-use : Clearing of Invasive Alien Plants

**(iv) Water conservation and demand management** strategies are required as a prerequisite before considering augmentation of water supply by developing physical infrastructure. Attention needs to be devoted to managing the demand for water, encouraging the efficient and effective use thereof, minimising loss or waste of water and creating a water conservation and demand management culture within all water management and water services institutions, and among water users. These strategies will address urban and agricultural conservation measures and water demand management. The following two strategies have been developed:

- ⇨ Water Services : Water Conservation and Demand Management
- ⇨ Agricultural Water Conservation and Demand Management

**(v) Integration and co-operative governance** strategies address the establishment and nurturing of co-operative relationships with other South African Government Departments, local authorities and water service providers for co-operative data collection, information sharing, sharing of visions and plans, capacity building and support and co-operative making of joint decisions. This strategy further aims to alleviate poverty by addressing the inequities of the past relating to water, *inter alia* relating to resource poor farmers and by support rendered to water related land reform initiatives. Two strategies were developed, namely:

- ⇨ Support to Resource Poor Farmers
- ⇨ Co-operative Governance

**(vi) Institutional development and support** strategies address the fundamental transformation of water resources management and governance, to appropriate and representative regional and local institutions. One strategy has been developed, namely :

- ⇨ Supply to Local Authorities

**(vii)** The **Social** strategy addresses the importance of DWAF highlighting the social aspects of its agenda. These are already very clear in the quest for equity, in support for resource poor farmers, in the water supply and sanitation programme, and in the poverty alleviation drive, but it is nevertheless very important that DWAF never loses sight of its social responsibilities.

**(viii) Waterworks development and management** strategies address the challenges associated with the contribution from private dams towards meeting the Reserve. The recreational opportunities on State owned dams are also addressed. Two strategies were developed, namely:

- ⇨ Management of Reserve Releases from Private Dams
- ⇨ Recreation on Dams and Rivers

**(ix) Monitoring and information management** strategies address the monitoring of, collection of and data capturing of water resource related information from surface freshwater bodies and groundwater. Resulting information will enable the introduction of water billing and will ensure compliance with water authorisation conditions and the control of all water users. Issues relating to information systems and information access and requirements are also addressed. The following two strategies were developed:

- ⇨ Abstraction Control Monitoring
- ⇨ Monitoring Networks and Data Capture

**(x) Implementation strategies** address the need for a consolidated approach within DWAF to the implementation and ongoing management of the ISP process. This will formalise the implementation, so that delegated responsibilities and a programme of implementation can be drawn up according to priorities set in the ISP. The ISP is a developing process and the document will be reviewed on a regular basis. Strategies will be amended, updated or added so as to achieve the management objectives for the Breede WMA. One strategy was developed, namely:

- ⇨ ISP Implementation

Under each of these main strategy groups, the specific strategies particular to the Breede WMA have been identified and developed. 24 strategies have been developed. As additional strategies are identified through the implementation process (including feedback from stakeholders), this document will be updated by the Department.

For each strategy, the following aspects are addressed:

- ***Management objectives*** in terms of the envisaged solutions for the Strategy;
- ***Situation Assessment*** stating the relevant issues, problems, uncertainties and gaps in information;
- ***Strategic Approach*** as to a correct management procedure or solution to a problem in terms of the DWAF's management perspective for the ISP-area;
- ***Management Actions*** required to implement the strategy and the responsible organisations or persons;
- ***Responsibility and Priority***. The responsible implementing authority and the priority for implementation in terms of the ISP rating system (1 – 5, where 1 is of highest priority).

# BREEDE WMA

# INTERNAL STRATEGIC PERSPECTIVE

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## PART 1 – INTRODUCTION AND OVERVIEW

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| | |
|---|---|
| ASR | Aquifer Storage Recovery |
| BRBS | Breede River Basin Study |
| BWP | Berg Water Project |
| CCAW | Co-ordinating Committee for Agricultural Water |
| CCT | City of Cape Town |
| CMA | Catchment Management Agency |
| CMS | Catchment Management Strategy |
| CNCB | Cape Nature Conservation Board |
| DEADP | Department of Environmental Affairs and Development Planning |
| DEAT | Department of Environmental Affairs and Tourism |
| DECAS | Department of Environment Affairs, Culture and Sport |
| DWAF | Department of Water Affairs and Forestry |
| EWR | Ecological Water Requirements |
| GAs | General Authorisations |
| GDP | Gross Domestic Project |
| IDP | Integrated Development Plan |
| ISP | Internal Strategic Perspective |
| IWRM | Integrated Water Resource Management |
| ℓ/c/d | litres per capita per day |
| $m^3/a$ | cubic metres per annum |
| $m^3/s$ | cubic metres per second |
| MAP | Mean Annual Precipitation |
| MAR | Mean Annual Runoff |
| mg/ℓ | milligrams per litre |
| NWA | National Water Act |
| NWRS | National Water Resource Strategy |
| RO | Regional Office (DWAF, Western Cape Regional Office) |
| SFRA LAAC | Streamflow Reduction Activities Licence Assessment Advisory Committee |
| SUP | Sustainable Utilisable Potential |
| TINWA | Team for Implementation of the National Water Act |
| TMG | Table Mountain Group |
| WCDM | West Coast District Municipality |
| WC/DM | Water Conservation and Demand Management |
| WCSA | Western Cape System Analysis |
| WCWSS | Western Cape Water Supply System |
| WfW | Working for Water |
| WMA | Water Management Area |
| WRPM | Water Resources Planning Model |
| WRSA | Water Resources Situation Assessment |
| WSA | Water Service Authorities |
| WSAM | Water Situation Assessment Model |
| WSDP | Water Services Development Plan |
| WSP | Water Service Provider |
| WTW | Water Treatment Works |
| WUA | Water User Association |
| WWTW | Wastewater Treatment Works |
| x $10^6$ $m^3/a$ | million cubic metres per annum |

# GLOSSARY OF TERMS

| | |
|---|---|
| AQUIFER | A saturated permeable geologic unit that can transmit significant (economically useful) quantities of water under ordinary hydraulic gradients. (Specific geologic materials are not innately defined as aquifers and aquitards, but within the context of the stratigraphic sequence in the subsurface area of interest.) |
| ASSURANCE OF SUPPLY | The reliability at which a specified quantity of water can be provided, usually expressed either as a percentage or as a risk. For example "98% reliability" means that, over a long period of time, the specified quantity of water can be supplied for 98% of the time, and less for the remaining 2%. Alternatively, this situation may be described as a "1 in 50 year risk of failure" meaning that, on average, the specified quantity of water will fail to be provided in 1 year in 50 years, or 2% of time. |
| BASIN | The area of land that is drained by a large river, or river system. |
| BIOTA | A collective term for all the organisms (plants, animals, fungi, bacteria) in an ecosystem. |
| CATCHMENT | The area of land drained by a river. The term can be applied to a stream, a tributary of a larger river or a whole river system. |
| COMMERCIAL FARMING | Large scale farming, the products of which are normally sold for profit. |
| COMMERCIAL FORESTS | Forests that are cultivated for the commercial production of wood or paper products. |
| CONDENSATION | The process whereby water is changed from a gas (water vapour) into a liquid. |
| CONFINED AQUIFER | An aquifer that is physically located between two aquitards. The water level in a well tapping a confined aquifer usually rises above the level of the aquifer. |
| CONTAMINANT | Any physical, chemical, biological, or radiological substance or matter in the water. |
| DEFICIT | Describes the situation where the availability of water at a particular assurance of supply is less than the unrestricted water requirement. |
| DISCHARGE AREA | The area or zone where groundwater emerges from below the surface. The outflow maybe into a stream, lake, spring, wetland, etc. |

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| ECOLOGICAL IMPORTANCE | A measure of the extent to which a particular species, population or process contributes towards the healthy functioning of an ecosystem. Important aspects include habitat diversity, biodiversity, the presence of unique, rare or endangered biota or landscapes, connectivity, sensitivity and resilience. The functioning of the ecosystem refers to natural processes. |
| ENVIRONMENTALLY SENSITIVE AREA | A fragile ecosystem which will be maintained only by conscious attempts to protect it. |
| FORMAL IRRIGATION SCHEME | The term applies to a scheme where water for irrigation purposes is stored in a dam controlled by DWAF or an Irrigation Board and supplied in pre-determined quotas to irrigators registered under the scheme. |
| GREY WATER | Any water that has been used in the home, such as water from the bath, shower, washing machine, and bathroom sink, but not from toilets and the kitchen sink, is referred to as "grey water". Grey water can be used for other applications around the home, such as garden irrigation. |
| GROUNDWATER | Water in the sub-surface, which is beneath the water table, and thus present within the saturated zone. In contrast, to water present in the unsaturated or vadose zone which is referred to as soil moisture. |
| HYDRAULIC GRADIENT | The difference in hydraulic head between two measuring points within a porous medium, divided by the distance between the two points. |
| HYDRAULIC HEAD | The fluid potential for flow through porous media largely comprised of pressure head and elevation head. This satisfies the definition of potential in that it is a physical quantity capable of measurement (such as with manometers, piezometers, or wells tapping the porous medium), where flow always occurs from regions of higher values to regions of lower values. |
| INTERBASIN TRANSFER | Water transferred from one WMA to another. |
| MEAN ANNUAL RUNOFF | Frequently abbreviated to MAR, this is the long-term mean annual flow calculated for a specified period of time, at a particular point along a river and for a particular catchment and catchment development condition. In this report, the MARs are based on the 70-year period October 1920 to September 1990 inclusive. |
| NON-POINT SOURCE OF POLLUTION | Contaminates found in water from a source that cannot be specifically defined. For example contamination resulting from municipal runoff or agricultural infiltration. |
| OPPORTUNISTIC IRRIGATION | Irrigation from run of river flow, farm dams, or compensation flows released from major dams. As storage is not provided to compensate for reduced water availability in dry years, areas irrigated generally have to be reduced in dry years. |

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| PERMEABILITY | The portion of the proportionality constant of hydraulic conductivity, which is a function of porous medium alone. Permeability is an intrinsic property, which is a function of mean grain diameter, grain size distribution, sphericity and roundness of grains and the nature of grain packing. |
| POINT SOURCE OF POLLUTION | Contaminants found in water that can be readily identified from a specific source such as a leaking underground storage tank. |
| POLLUTION | Any substance, natural or synthetic, that degrades water quality to such a degree that water is not suitable for a particular use. |
| POTABLE WATER | Water, which is free from impurities that may cause disease or harmful physiological effects, such that the water is safe for human consumption. |
| QUATERNARY CATCHMENT | The basic unit of catchment area used in the WR90 series of reports published by the Water Research Commission and also in this report. The primary drainage regions are divided into secondary, tertiary and quaternary catchments. The quaternary catchments have been created to have similar mean annual runoffs: the greater the runoff volume the smaller the catchment area and vice versa. The quaternary catchments are numbered alpha-numerically in downstream order. A quaternary catchment number, for example R30D, may be interpreted as follows: the letter R denotes Primary Drainage Region R, the number 3 denotes secondary catchment 3 of Primary Drainage Region R, the number 0 shows that the secondary catchment has not, in this case, been sub-divided into tertiary catchments, and the letter D shows that the quaternary catchment is the fourth in sequence downstream from the head of secondary catchment R30. |
| RECHARGE AREAS | Areas of land that allow groundwater to be replenished through infiltration or seepage from precipitation or surface runoff. |
| RESERVOIR | The lake formed behind a dam wall. In this report the colloquial term dam is generally used for reservoir. |
| RESOURCE QUALITY | The quality of all the aspects of a water resource including:<br><br>(a) the quantity, pattern, timing, water level and assurance of instream flow; (b) the water quality, including the physical, chemical and biological characteristics of the water; (c) the character and condition of the instream and riparian habitat; and (d) the characteristics, condition and distribution of the aquatic biota. |
| RESOURCE QUALITY OBJECTIVES | Quantitative and verifiable statements about water quantity, water quality, habitat integrity and biotic integrity that specify the requirements (goals) needed to ensure a particular level of resource protection. |

| | |
|---|---|
| RIVER SYSTEM | A network of rivers ranging from streams to major rivers and, in some cases, including rivers draining naturally separate basins that have been inter-connected by man-made transfer schemes. |
| SALINITY | The concentration of dissolved salts in water. The most desirable drinking water contains 500 ppm or less of dissolved minerals. |
| SATURATED ZONE | The subsurface zone below the water table where pores within the geologic matrix are filled with water and fluid pressure is greater than atmospheric. |
| SUB-CATCHMENT | A sub-division of a catchment. |
| SURFACE WATER | Bodies of water, snow, or ice on the surface of the earth (such as lakes, streams, ponds, wetlands, etc.). |
| $10^6$ $m^3/a$ | 1 million cubic metres of water in one year. |
| TRANSPIRATION | The process by which plants give off water vapour into the atmosphere. |
| TURBIDITY | A measure of water cloudiness caused by the amount of suspended matter in the water |
| UNCONFINED AQUIFER | (a.k.a. water table aquifer) - An aquifer in which the water table forms the upper boundary. The water level in a well tapping an unconfined aquifer will rise only to the level of the water table within the aquifer. |
| UNSATURATED ZONE | (See vadose zone) |
| WATER IMPORTS | Water imported to one drainage basin or secondary sub-catchment from another. |
| WATER TABLE | The surface on which the fluid pressure in the pores of a subsurface porous medium is exactly atmospheric. |
| WATER TRANSFERS | Water transferred from one drainage basin or secondary sub-catchment to another. Transfers in are synonymous with water imports. |
| YIELD | The maximum quantity of water obtainable on a sustainable basis from a dam in any hydrological year in a sequence of years and under specified conditions of catchment development and dam operation. |