CHAPTER 7: WATER BALANCE AND RECONCILIATION STRATEGIES

Four strategies have been identified for development, namely:

7.1 Water Availability
7.2 Water Requirements
7.3 Reconciliation of Water Supply and Demand
7.4 Groundwater Utilisation

7.1 WATER AVAILABILITY STRATEGY

Management Objective

This strategy addresses the knowledge, assumptions and unknowns about the current and future availability of water in the WMA. This is an important component of determining reliable yield balance estimates on which to manage the WMA's water resource.

Situation Assessment

(a) Current Situation

In this first version of the ISP, estimates of water availability in the Breede River component of the WMA are based on the findings of the Breede River Basin Study (BRBS), which is the latest available source of information for that area. In the Overberg catchments, the NWRS figures, derived from DWAF's Breede WMA Report, represent the best available information. These two sub-regions are analysed independently in chapters 3 and 4, whilst availability for the whole WMA is presented here.

The extent to which the surface water resource can be exploited is affected by how much water has to remain in the aquatic ecosystems (the Reserve). A grand total of 990 million m^3/a is estimated to be available in the Breede WMA, after allowing for the 18 million m^3/a impact on yield of the preliminary Reserve (16 million m^3/a in the Breede River component and 2 million m^3/a in the Overberg). The impact of the Reserve is based on the current ecological classes of the rivers and the estuary. The impact on yield of invasive alien plants totalling 78 million m^3/a has also been allowed for (45 million m^3/a in the Breede River component and 33 million m^3/a in the Overberg).

(b) Future Yield Potential

Referring to Table 3.9.1, between 90 and 140 million m^3/a of surface water yield can be cost effectively developed in the Breede River component, depending on the Reserve scenario considered. The Michell's Pass Diversion (maximum yield of 53 million m^3/a) and Upper Molenaars Diversion (maximum yield of 27 million m^3/a) schemes appear to be the most suitable options for water transfer to the Berg WMA and especially the CCT. Greater Brandvlei Dam Augmentation (maximum yield of 33 million m^3/a) and raising Buffeljags Dam (11 million m^3/a) appear to be the most viable schemes for in-catchment development. In the Overberg it may be possible to develop an additional 25 million m^3/a in the Palmiet River, through constructing a dam at the Upper Campanula site.

The BRBS has shown a significantly higher impact of invasive alien plants (45 million m^3/a) on water availability in the Breede River component than previously estimated in the NWRS. Removal of invasive alien plants to "free-up" this 45 million m^3/a available would be required in order to realise the 140 million m^3/a potential of Reserve Scenario 3, shown in Table 3.9.1.

Decisions regarding the ecological classes are fundamental to meaningful determinations of water availability from surface resources. For example, if the Riviersonderend River were to be rehabilitated from its current Class "E" to the recommended Class "D", this would equate to an average annual impact on yield of 85 million m^3/a in the Riviersonderend sub-area. Much of this would need to be met out of releases from the already fully allocated yield in Theewaterskloof Dam, and this impact would have to be recovered elsewhere.

Groundwater use must take its rightful place as an increased future source of supply. Groundwater offers potential for increased utilisation throughout the WMA, with the exception of most of the Ceres sub-area, and a cautionary approach to be adopted in the Hex River catchment, where extensive groundwater use (20 million m^3/a) may impact on surface water supplies. Through the BRBS it was estimated that there is in excess of 300 million m^3/a of potentially available groundwater yield. Some of this (particularly if abstracted in close proximity to streams and rivers) would have a direct interaction with surface water flow and can be considered as the same resource. Access to remote drilling sites, borehole depths required to reach the resource, and the number of boreholes required to abstract large volumes of groundwater, all play a role in the feasibility of groundwater abstraction. Despite these challenges, groundwater offers a viable option for development. Should it be practical to develop 30% of this resource (considered reasonable by groundwater specialists), the resulting additional yield would exceed 100 million m^3/a within the Breede River component. Achieving the maximum out of groundwater will require

monitoring to improve estimates of utilisation potential, determination of groundwater Reserve requirements, understanding the interdependence between the surface and groundwater resource, and optimisation of opportunities for conjunctive water use.

There are other sources of water such as re-use (treated effluent use), return flows and desalination of poor quality surface and groundwater, about which adequate knowledge is essential in order to enable meaningful availability estimates to be made.

Rain gauge data (reliability, record length and spatial distribution) in the high rainfall mountainous areas poses a particular concern in terms of accurate hydrological modelling. Surface flow gauging is reasonable but will need to be improved as pressure on resources increases and ever tighter management is required.

It has been estimated that by 2015, the impact of global warming is likely to reduce streamflow in the Western Cape by 10%. This in turn will impact on the assurance of supply from water supply schemes.

Specific issues and concerns relating to the reliability of the hydrology have been identified:

- The rainfall gauging network is inadequate for accurate modelling purposes, particularly in the high rainfall regions from which much of the runoff in the Breede River catchments is generated.
- A number of long-term rain gauges have been closed.
- The interaction between surface water and groundwater is not well understood and is of particular importance in understanding the recharge of the alluvial aquifers from which much of the current groundwater abstraction in the Breede River component takes place.
- The impact of climate change on the surface and groundwater resource will need to be taken into account in the analysis of future yield determinations.
- A better understanding of the role of snowmelt in recharge would also improve resource analysis.
- In the Breede WMA land-use changes such as the removal of invasive alien plants and reduced commercial forestry will also impact on the availability of water. Refer to the Forestry Strategy (9.5) and the Removal of Invasive Alien Plants Strategy (9.6).

Strategic Approach

The methodology used to determine the impact of invasive alien plants in the Breede River component should be extended to cover all catchments of the WMA in which the removal of invasive alien plants is a priority.

The Department will continue to implement efforts to better understand the long-term effect of climate change on rainfall and on hydrology. Additional rain gauging stations in targeted high rainfall areas will be established to enable data collection in support of more reliable rainfall:runoff catchment modelling. Also the dynamics of aquifer recharge and the associated impacts of climate change need to be considered in future water resource planning.

The future availability of additional water from the Breede River component will be based on the assumptions that:

- The recommendations of targeted areas for invasive alien plant removal (Strategy 9.6) will be implemented.
- Until decisions on the ecological classes of the rivers are finalised, the Reserve and Resource Quality Objectives Strategy (8.1) recommends that the water resources be managed according to their current classes (status quo).

Management Actions

The following actions are required:

- ⇨ Address the diminishing rainfall gauging network to avoid loss of valuable input data for reliable rainfall:runoff modelling. The Region should continue to indicate needs and propose improvements to the network, along with an implementation plan.
- ⇨ Establish additional rain stations in the high rainfall areas of the Breede River component and the Palmiet River catchment.

- ⇨ Identify required improvements to flow gauging throughout the WMA. List and implement these on an ongoing basis.
- ⇨ Update the hydrology at regular intervals, bringing added knowledge of the impacts of climate change and snowmelt.
- ⇨ Research the interaction between surface water and groundwater, with particular emphasis on the dynamics between the TMG and the alluvial aquifers.
- ⇨ Implement the methodology used in the BRBS for re-determining the impact on yield of invasive alien plants in the rest of the WMA.
- ⇨ Until otherwise determined, manage the water resources according to their current ecological classes.

Responsibility and Priority

The implementation of the **Water Availability Strategy** is the responsibility of the RO, in consultation with the Directorate: NWRP. It is of **Priority 2** (high) due to its relevance to the water resource planning for the Western Cape as a whole.

7.2 WATER REQUIREMENTS STRATEGY

Management Objective

This strategy addresses the knowledge of, and uncertainties about assumptions relating to the current and future water requirements in the Breede WMA. The objective is to improve on our knowledge and understanding of the requirements which in turn will improve on the reliability of the yield balance.

Situation Assessment

In this first version of the ISP, estimates of current water requirements for the Breede River component are based on the findings of the BRBS, which is the latest available source of information for that area. In the Overberg catchments, the NWRS figures represent the best available information.

The current total water requirement from within the Breede WMA is estimated at 971 million m^3/a, of which 196 million m^3/a is transferred out of the WMA. Of the total in-catchment water requirement (775 million m^3/a), 93% is for local irrigation, most of which is within the Breede River component. Extensive irrigation also takes place in the Overberg West (64 million m^3/a), most of which is in the Palmiet River catchment.

From checks done in the Hex sub-area, registered irrigation requirements (WARMS) compared well with the actual water requirements determined independently in the BRBS. There is therefore a degree of confidence in the registered water use within government controlled schemes and WUAs. It is important to note that the water requirements presented in Chapter 3 (the Breede River component) are based on estimates of actual water use (BRBS). In contrast, the water requirements in the Overberg (from the NWRS) are based on allocations, some of which may not have as yet been exercised. The Western Cape Regional Office (DWAF) has indicated that there does not appear to be much water "tied-up" in unexercised allocations in the Breede WMA. There are a few exceptions. These are 4,5 million m^3/a allocated to (and paid for), but unused by irrigators in the Groenland Irrigation Board, out of the privately owned Eikenhof Dam (Palmiet River), and 14 million m^3/a surplus in the Stettynskloof and Fairy Glen Dams at Worcester (Breede Valley Municipality).

Limited growth in water requirements is anticipated in the Overberg and local supply schemes will suffice in meeting these. In the Breede River component, the potential future water requirements could well exceed the potential surface water availability of between 90 and 140 million m^3/a (depending on the Reserve scenario). All this water could be used for in-catchment development alone. The same is true in terms of the future requirements by the CCT. However, not all potential yield developed in the Breede River component would be accessible for transfer purposes. A logical sharing of this future potential is recommended.

DWAF is in the process of commissioning a Reconciliation Strategy Study for the Western Cape. This will consider the possibility of transfer of more water from the Breede WMA. Once this study has been undertaken, more detailed feasibility studies will be commissioned to evaluate comparisons between potential sources of supply in the Berg WMA and those in other areas such as the Breede WMA. Only then will final decisions be possible.

Ever increasing temperatures (global warming) will have an impact on water requirements in the Western Cape and should be taken into account when developing hydrological system models, to assess the impacts of future water requirement scenarios.

Strategic Approach

Best use will be made of the latest water requirement information as this becomes available. This has been undertaken in this ISP by drawing on the key findings of the BRBS. In so doing the required input to the NWRS, as tabled in Chapter 5 of this ISP will be continually improved and used in supporting management decisions in this WMA. The approach is to continually improve knowledge of requirements and to make use of this improved information. Allowance must be made for climate change and the impact thereof on water requirements.

Registration of water use has been captured on DWAF's Water Authorisation and Registration Management System (WARMS) and the sources identified from which these requirements must be supplied. The only way that the requirement can then change is through issuing of a licence(s) and that will also be known information. Allocations for future irrigation requirements are therefore in the hands of the licensing authority (now DWAF). Issuing

irrigation licences is a re-active process and the rate of requests can also be estimated and planned for. Urban future use on the other hand will depend on demographics and economics and must be estimated and monitored for forward planning.

The BRBS provides an improved assessment of water requirements in the Breede River component of this WMA. Through the ISP these must be taken into account in the development of a detailed strategy for improving the reliability of the current and future water requirements in the Breede WMA, as part of the Western Cape Reconciliation Strategy Study to be undertaken by the Department.

Management Actions

The following general actions are required:

- ⇨ Update the requirements at regular intervals using best available information.
- ⇨ Make allowance for increased water requirements as a direct result of climate change.
- ⇨ Keep a watchful eye on water use trends through monitoring and ensure that all observations are brought to the attention of the resource planners.
- ⇨ Improve the sophistication of input data for future requirement estimates by incorporating elements such as population, standard of living (as reflected in individual water use), economic activity, etc.

Responsibility and Priority

The implementation of the Reliability of the Water Requirements Strategy is the responsibility of the RO, in consultation with the Directorate: NWRP. It is of **Priority 2** (high) due to its relevance to the water resource planning for the Western Cape as a whole.

7.3 RECONCILIATION OF WATER SUPPLY AND DEMAND STRATEGY

Management Objective

To match the water requirements in the Breede WMA with adequate supply in such a way that growth is not unreasonably constrained nor the environment and long-term future of the WMA in any way compromised. From the broader regional perspective any proposed future expansion of commercial irrigation in the Breede WMA should be weighed up against the potential transfer of more water from the Breede WMA to urban users in the Berg WMA.

Situation Assessment

There is currently a small surplus of 20 million m^3/a is available in the Breede River component and a 1 million m^3/a shortfall in the Overberg. It must be remembered that these yield balance estimates are based on the current ecological classes and corresponding preliminary Reserve estimates. Of the surplus in the Breede River component, 3 million m^3/a is available in Koekedouw Dam (Ceres), 14 million m^3/a in the Stettynskloof and Fairy Glen Dams (Worcester) and 3 million m^3/a in Buffeljags Dam. The Allocation and Licensing Strategy (9.3) makes recommendations on the allocation of this available surplus.

Reconciliation interventions to be implemented within the Breede WMA are listed below. The relevant strategies within this ISP are also referred to by number in parenthesis:

- Water re-use (10.1),
- WC/DM - leakage control, abstraction control (monitoring), urban and industrial savings, conveyance losses in the irrigation sector (10.1 and 10.2),
- Step-wise water pricing to reduce water demand (10.1 and 10.2),
- The increased utilisation of groundwater - notably from the alluvial and TMG Aquifers (7.4),
- Licensing (9.3) and the Verification of Existing Lawful Use (9.2) which includes the prosecution of any unlawful users and return of this water to the common pool,
- Water Trading (9.3),
- Removal of invasive alien plants (9.6),
- Water quality management - improved salinity management and reduced freshening releases (8.3),
- Compulsory licensing - a drastic measure to reduce existing allocations, the need for which will ultimately be determined by the Reserve requirement and perhaps to a lesser extent the provision of water to the resource poor (9.4). At this stage compulsory licensing has a low priority in this WMA.
- The construction of new water resource infrastructure and development of schemes.

Strategic Approach

To support decisions on allocating water in the next 10 years, the options presented in Table 3.11.1 will be investigated. The needs of the CCT and the need for continuing development in the Breede WMA (particularly the requirements of equity through supply to resource poor farmers) will be considered. Development opportunities are suggested to provide water towards both of these needs.

With the Overberg being in balance and a surplus in the Breede River component, the current situation is such that there is not much reconciliation to be done at all. However the future development within the Breede WMA and the Western Cape as a whole, will introduce new challenges in terms of sharing the Breede WMAs water between in-catchment development and urban water use in the Berg WMA.

Taking the needs of the Berg WMA into account and the fact that further irrigation development in the Breede WMA is economically viable, the various augmentation options must be considered for phased implementation with immediate effect. Options must be evaluated sooner rather than later due the time frames of such studies which can take five years or more to complete. Groundwater must take its rightful place and conjunctive use of surface and groundwater investigated in parallel with surface water resources.

The immediate focus should lie with the implementation of WC/DM (see Strategies 10.1 & 10.2), ongoing clearing of invasive alien plants (Strategy 9.6), water pricing, and water trading (Strategy 9.3). The Reconciliation Strategy Study for the Western Cape Water Supply System (WCWSS) to be undertaken in 2004/2005 should thereafter be updated on a regular basis as research and information inputs become available.

Within the Breede River component, the following scheme options and interventions form the basis of the suggested options for this WMA (refer to Allocation and Licensing Strategy - 9.3);

(a) Potential Transfer Schemes (80 million m^3/a)

- Michell's Pass diversion (maximum yield of 53 million m^3/a)
- Upper Molenaars diversion (maximum yield of 27 million m^3/a)

(b) In-catchment Development (60 million m^3/a)

- Brandvlei augmentation (maximum yield of 33 million m^3/a)
- Raise Buffeljags Dam (11 million m^3/a)
- Smaller schemes (16 million m^3/a)

The Reconciliation Strategy Study will provide more informed direction regarding possible combinations of schemes, their impacts on one another and at what scale they could be implemented. This will be considered for a range of possible Reserve implementation scenarios.

Within the Overberg it is estimated that a further 25 million m^3/a could be developed out of the Palmiet River via a new dam at the Upper Campanula site, whilst still meeting preliminary Ecological Water Requirements. Storage could be provided (for the option of transfer) through raising the Lower Steenbras Dam (Berg WMA).

It is not expected that all of these options will and must be developed during the next 10 years. The key principle is that the resource will be shared between transfers to the Berg WMA and in-catchment development. The proposed schemes are presented as the most immediately appropriate opportunities for investigation. Significant additional volumes of groundwater could also be developed, particularly from within the deeper TMG source.

Management Actions

The following actions are required:

- ⇨ Undertake the WCWSS Reconciliation Strategy with a well-structured participation process,
- ⇨ Update the WCWSS Reconciliation Strategy at approximately 2 yearly intervals as new information becomes available from studies and from monitoring,
- ⇨ Develop a policy on the re-use of treated wastewater,
- ⇨ Formulate scenarios for reconciling future supplies and demands,
- ⇨ Carry on with implementation of effective WC/DM measures,
- ⇨ Prioritise studies required to reduce uncertainties (as listed in this ISP), as well as to improve cost estimates and yield figures for specific development options,
- ⇨ Review the impact of invasive alien plants in the Overberg catchments (with priority to the western Overberg) in line with the methodology adopted for the Breede River component during the BRBS.
- ⇨ The further development of the Brandvlei Augmentation Scheme must be discussed with the CCAW and determined when it will be required, who will benefit from it and who will finance it.

Responsibility and Priority

The development and implementation of a **Reconciliation of Water Supply and Demand Strategy** is the responsibility of the Directorate: NWRP together with the Regional Office (RO) and the Directorate Options Analysis. This is of **Priority 2** - High. Immediate implementation is necessary to enable future schemes to be timeously planned with confidence.

7.4 GROUNDWATER UTILISATION STRATEGY

Management Objective

The objective of this strategy is to promote the conjunctive development of groundwater and surface water resources in an Integrated Water Resources Management (IWRM) framework within the Breede WMA. This requires considerable additional reliance on groundwater supplies. The strategy also addresses the uncertainties, assumptions and critical gaps in the hydrogeological database. Central to this objective is the development of a better understanding of groundwater - surface water interaction, which by its nature defines part of the groundwater Reserve.

A further objective is the need to develop operating rules for groundwater abstraction that meet legal requirements, and which are regularly adjusted as suggested by monitoring.

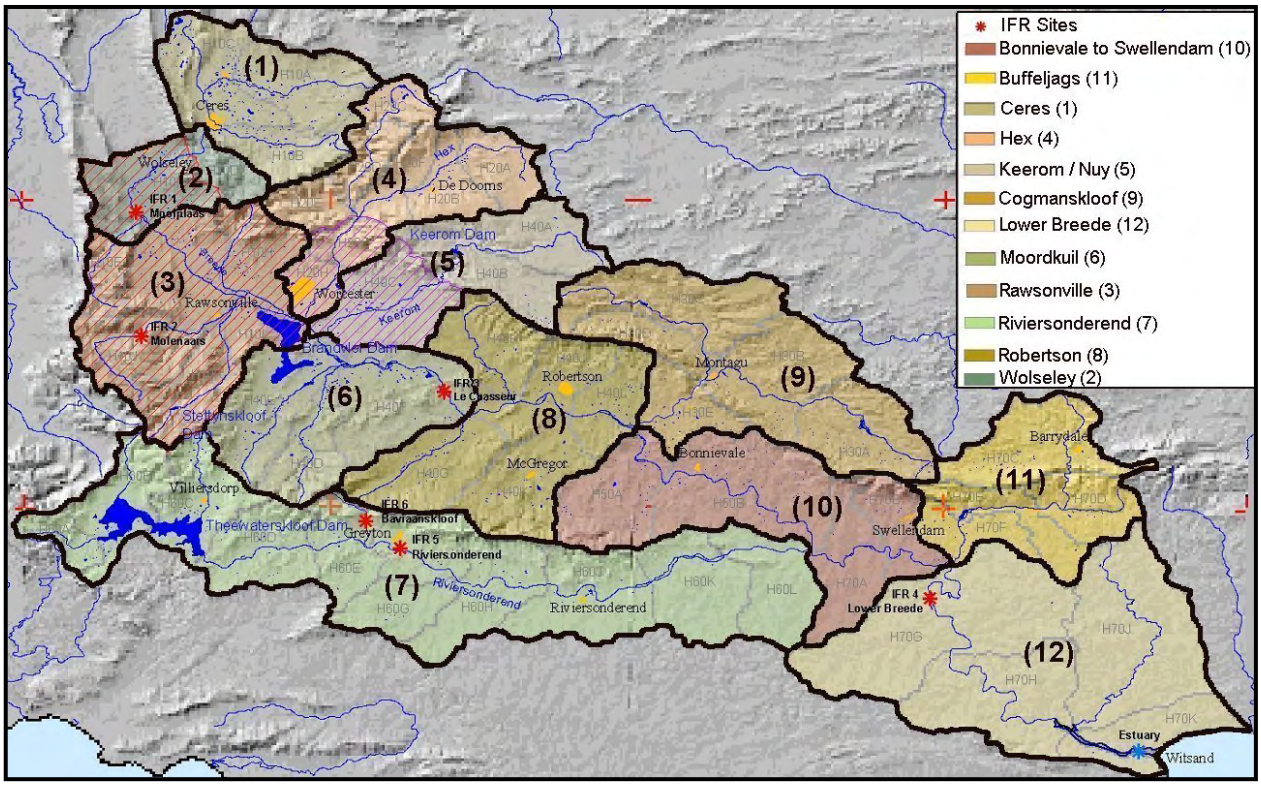
Situation Assessment

Current groundwater use in the Breede WMA is estimated to be 107 million m^3/a of which 103 million m^3/a takes place in the Breede River catchments, most of which supplies irrigation from farmers' boreholes. About 4 million m^3/a is used in the Overberg catchments for domestic and stock-watering purposes. The BRBS estimates that after allowing for groundwater contribution to baseflow, and taking recharge potential into account, there remains a theoretical sustainable abstraction potential in excess of 300 million m^3/a. This is over and above current groundwater use. Table 7.4.1 provides a breakdown of current groundwater use and the remaining theoretical potential within twelve sub-areas in the Breede River catchments. The geographical extent of these sub-area is shown on Figure 7.4.1.

Table 7.4.1: Current Groundwater Use and Potential (million m^3/a)

Area	Quaternary Catchments	Registered Groundwater Use	Remaining Sustainable Potential	Aquifer
Ceres	H10A-C	18	0	TMG and Bokkeveld
Wolseley	H10D, F	7	5	Aluvium and Malmesbury
Rawsonville	H10E, H-L	25	61	Aluvium and Malmesbury
Hex	H20A-H	20	25	TMG and Bokkeveld
Keerom/Nuy	H40A-C	3	23	TMG, Bokkeveld and Malmesbury
Moordkuil	H40D-F	7	3	TMG and Bokkeveld
Robertson	H40G-L	4	29	Bokkeveld and Malmesbury
Cogmanskloof	H30A-E	14	18	TMG and Bokkeveld
Bonnievale to Swellendam	H50A-B, H70A-B	1	2	TMG and Bokkeveld
Buffeljags	H70C-F	2	5	TMG and Bokkeveld
Riviersonderend	H60A-L	2	121	TMG and Bokkeveld
Lower Breede	H70G-J	0	25	Bokkeveld
TOTAL		**103**	**317**	

(Ref : BRBS, Groundwater Reserve Determination Report)



(Ref : BRBS, Groundwater Reserve Determination Report)

Figure 7.4.1: Sub-areas for which Groundwater Potential was assessed in the BRBS

Referring to Table 7.4.1, there are three main sources of groundwater in the Breede River catchments, namely :

(i) The alluvial sources, with very strong and direct surface water interaction.
(ii) The fractured rock aquifers (Bokkeveld and Malmesbury) with a lesser spatial interaction.
(iii) The Table Mountain Group Aquifers, some of which are deep and confined.

Abstraction out of the alluvial aquifers is considered to be equivalent to surface water use. There is a complex recharge dynamic within the alluvium involving recharge out of the TMG Aquifer and from surface water. As such, site specific monitoring of the impacts of abstraction out of the alluvium must form an important component of any further development of that resource.

The CCT is currently investigating sites in the catchment of Theewaterskloof Dam (Riviersonderend) for possible augmentation of the City's water supply. The TMG Aquifer in the Riviersonderend area holds significant potential for development.

It is important to refer to the constraints associated with groundwater abstraction from deep aquifers, like the TMG. These are described in Section 3.9.5, of Chapter 3.

Specific concerns in terms of groundwater utilisation include:

(i) over allocation of groundwater in the H10A-C quaternaries of the Ceres catchment;
(ii) the salinisation of underlying aquifers that discharge into the Breede River (possible impact of irrigation return flows);
(iii) the impact of untreated agricultural effluent (discharged or used for irrigation) on the alluvial aquifer and on the rivers. The interaction between the alluvium and the rivers in the Middle Breede catchment may be resulting in cross contamination;
(iv) saline intrusion of primary coastal aquifers (sea water intrusion due to poor management/over-abstraction);
(v) limited groundwater Reserve determinations have been undertaken - notably none in the Overberg;
(vi) limited groundwater monitoring;

(vii) there is limited understanding of the interaction between surface water and groundwater;
(viii) the only documentation related to baseflow contribution in this WMA is found in the Groundwater Resources of the Republic of South Africa maps and in the BRBS;
(ix) potential wasted groundwater arising from artesian boreholes as a result of these not being capped;
(x) monitoring of groundwater levels is based on individual borehole monitoring, whilst more advanced and available technology (radar for example) has not yet been investigated, for possible implementation.

Strategic Approach

Groundwater is an exceptional resource and extremely important in the Breede WMA. It must therefore be given very high management priority and appropriate matching resources.

It must be recognised that surface water sources have become quite limited in the Breede WMA, and much of that which is developed, is for transfer out of this WMA. Surface water can also only be used within the geographical reach of the schemes. Groundwater on the other hand has a wide extent of potential utilisation. If properly managed, and carefully used, it can have a small impact on surface water baseflow and on other users.

The approach in this WMA is therefore to :

(i) manage the alluvium water as if it were surface water;
(ii) promote the use of groundwater as an available resource which can be developed by towns, businesses and farms, always conditional on an assessment of the possible impact on surface water and other users.
(iii) consider the TMG as potential for some in-catchment use but also as a source for possible water transfer to the Berg WMA.

It will be up to local authorities and landowners to develop groundwater resources for use in the Breede WMA (excluding the TMG). Licences would be issued to those individuals or institutions developing the resource. Whilst attention and preference should be given to equity, given that groundwater is largely place-bound, water cannot be reserved for this purpose.

Sustainability is central to the use of groundwater and users will be required to monitor boreholes and manage abstractions within set parameters. Where severe impacts are detected and other sources or users are clearly being affected, DWAF should retain the prerogative to revise the conditions of use as permitted in the licence.

The Department will initiate further studies on an ongoing basis to refine the estimates of aquifer recharge, sustainable abstraction volumes, and to assess groundwater quality. This will contribute to a quantitative approach to groundwater allocation, management of the groundwater Reserve, and selection of appropriate conjunctive water resource management scenarios. This should be undertaken at a scale of 1:50 000 mapping and must take into account utilisation of aquifer storage, groundwater quality, seasonal and annual climate and usage patterns, and the existing surface water yield and potential for development of additional yield.

It is critically important that the Department expand the monitoring network for groundwater resource assessment and evaluation, thus integrating both surface and groundwater, and ecological monitoring in the NWA context. Advancements in available monitoring technology need to be considered. It is necessary to document what parameters are monitored at each site, how often the site is monitored, and that the monitoring results be interpreted and used to improve groundwater management. Refer also to the Monitoring Networks and Data Capture Strategy (15.2).

Independent groundwater monitoring initiatives such as that undertaken by WUAs in the Hex River valley are to be supported and encouraged by the RO and present a valuable opportunity to expand the local scale understanding of the flow regimes of the aquifers.

The Department cannot postpone applications received for new groundwater abstraction on the basis that it needs to first better understand the groundwater resource. In areas where the resource is currently understood to be stressed (Ceres sub-area) licences will not be issued. However, in other areas the decision must ultimately be based on how much protection is required, both in terms of surface water base flow and the impacts on other users. The suggested approach (refer to Allocation and Licensing Strategy – 9.3) is that best use be made of available expert knowledge

and the findings of the BRBS, to map groundwater protection zones. This mapping can then be used to guide decisions on new groundwater abstraction licence applications.

National and Regional Management Actions

The following management actions are required at regional and national level:

Groundwater Management and Regulation Actions

- ⇨ Design and implement an appropriate database and information management system to promote the interpretation of data, revision of regulatory criteria and guidelines for management of different aquifers.
- ⇨ Undertake training of DWAF hydrogeological staff in order to instil confidence in abilities and use of tools in licence application evaluation.
- ⇨ Evaluate the cumulative impact of generally authorised groundwater use on regional groundwater tables and groundwater Reserve flows and revise GAs regularly, as may be required (refer also to the General Authorisation Strategy - 9.1).
- ⇨ Artesian boreholes must be capped to reduce wasteful discharge unless they are specifically required for providing continuous flow.
- ⇨ The mapping of availability and of groundwater use should be undertaken and regularly updated as better information becomes available.

Groundwater Reserve Actions

- ⇨ Evaluate the worth of developing a transient model for Reserve determination that takes into account preceding and predicted climate patterns as well as the aquifer storage. This will promote the management of surface and groundwater as an integrated resource.

Groundwater Monitoring Actions

- ⇨ Design and implement a monitoring network with immediate effect that is based on current best understanding of surface and groundwater interactions with a plan and purpose to upgrade, expand as data, insight and information become available.
- ⇨ Local and/or regional changes in the piezometric gradient will be determined through monitoring. Regional monitoring of confined artesian basins is essential and urgent.
- ⇨ Integrate the surface, groundwater and ecosystem monitoring such that ongoing interpretation upgrades the network design, surface water and groundwater interaction understanding and facilitates responsible and informed decision-making.
- ⇨ Design and implement an Aquifer Protection and Recharge Protection Strategy.
- ⇨ Integrate the Water Quality Monitoring data into the groundwater database. This is in order to protect groundwater resources and to implement any RQO measures.
- ⇨ Expand the groundwater quality monitoring network to ensure that water quality and potential contamination from diffuse and point sources can be monitored at the appropriate intervals and to ensure that monitoring data of a physical and a chemical nature is interpreted and used in water resource management decisions;
- ⇨ Explore the use of radar technology to measure regional changes in groundwater level, rather than remaining reliant on borehole data. The Breede WMA is an ideal area in which to carry out a pilot study of this kind due to the current extensive use of groundwater and the potential for future abstraction.

Impact on Ecosystems Actions:

- ⇨ From the data obtained from the above actions, evaluate the following:
  - o the impact of groundwater abstraction and climatic patterns on headwaters and discharge sites at specific river reaches of perennial rivers;
  - o the relationships between, recharge and discharge/abstraction from different aquifers and runoff using past and predicted climate patterns. Use at least monthly and in stressed areas daily data and continuous flow records in selected catchments;
  - o the impact of current abstraction practice on the Groundwater Reserve levels using the past and future monitoring data collected by DWAF.

Breede WMA Specific Management Actions

The following management actions specific to the Breede WMA are required:

- ⇨ Establish Preliminary Groundwater Reserves in the Overberg catchments and the Comprehensive Groundwater Reserve in selected catchments of the Breede River, where groundwater use is extensive (Ceres, Hex and Upper Breede for example).
- ⇨ Verify actual groundwater use in the Breede WMA and document the source (for example, alluvial, Bokkeveld, TMG, etc.).
- ⇨ Investigate options with the WUAs in the Ceres catchment to curtail groundwater abstraction to within sustainable levels.
- ⇨ Cautiously consider licence applications for further groundwater abstraction in the Hex River catchment.
- ⇨ Monitor primary coastal aquifers and stop over-abstraction so as to reduce the risk of saline intrusion.
- ⇨ Develop a clear set of principles for the utilisation of groundwater in the Breede WMA and the issuing of licences.
- ⇨ Implement the groundwater management actions recommended in the General Authorisation Strategy (9.1), of this ISP.

Responsibility and Priority

The implementation of the **Groundwater Utilisation Strategy** is the responsibility of the RO in co-operation with the Directorate : NWRP and Directorate : Options Analysis. It is of **Priority 3** (medium) and studies are to be implemented on an ongoing basis to determine viable options for long-tern application.

CHAPTER 8: WATER RESOURCE PROTECTION STRATEGIES

Three strategies have been identified for development, namely:

8.1 Reserve and Resource Quality Objectives
8.2 Estuaries and Wetlands
8.3 Water Quality Management

8.1 RESERVE AND RESOURCE QUALITY OBJECTIVES STRATEGY

Management Objective

The objective of this strategy is to address how (i) implementation of the Reserve in the WMA will affect the availability of water to other users, (ii) how the authorisation of licence applications will impact on the Reserve, and (iii) the uncertainties relating to the current procedures for Reserve determination.

Situation Assessment

Before a licence is issued a Reserve must be determined and the impact of the licensed use considered. In the absence of a river classification system (currently being developed), a preliminary Reserve based on a preliminary classification is determined. The process of undertaking many individual Reserve determinations can be time consuming and resource intensive.

Any one of the three methods (desktop, intermediate or comprehensive) can be used and the selection of which method is determined by the level of risk that can be accepted in terms of the results and also by the available data required as input to each method.

A) Surface Water

During the BRBS intermediate level Reserve determinations were undertaken at a total of six sites along the Breede River, Riviersonderend River and their tributaries. An intermediate level determination was also undertaken for the Breede River estuary. These determinations provide site-specific recommendations of the ecological river classes. Table 3.9.1 of Chapter 3 presents the three scenarios investigated during the BRBS and the potential yield development associated with each.

In terms of water availability and regional water resource planning, the most significant decision regarding river classification in the Breede WMA centres around the Riviersonderend River. The resulting shortfall that would occur (85 million m^3/a) were the river to be improved from its current Class "E" to a recommended Class "D" would result in the need for drastic measures to be taken to provide for this at very high social and financial costs. These include the development of new schemes by the CCT to offset the impact on the already fully allocated yield out of the Riviersonderend (Theewaterskloof Dam), and compulsory licensing.

It is important to note that if the recommended Class "D" in the Riviersonderend River were not implemented, the recommended Ecological Water Requirements for the Lower Breede River and its estuary, could still be met from within the Breede River itself. Under this status quo scenario, compulsory licensing in the Breede River component becomes a low priority.

The potential future yield development in the Breede River component, for each of the three scenarios considered is:

Scenario 1 : Recommended classes, with current levels of invasive alien plant infestation
The exception being the Riviersonderend River which is assumed to be retained at its current Class "E" (potential yield = 90 million m^3/a)

Scenario 2 : Reduced classes with current levels of invasive alien plant infestation
(potential yield = 115 million m^3/a)

Scenario 3 : Recommended classes, with removal of all invasive alien plant infestation
The exception being the Riviersonderend River which is assumed to be retained at its current Class "E" (potential yield = 140million m^3/a)

Within the Overberg, the classifications adopted in the NWRS vary between the numerous coastal rivers. Current preliminary river classifications vary between "C" and "D" in the Overberg West sub-area and between "B" and "D" in the Overberg East sub-area. From the preliminary Reserve determinations, the impact on yield reported in the NWRS is 2 million m^3/a for the Overberg West and zero for the Overberg East. Subsequent to these determinations, an updated approach for desktop determinations has become available. If this updated approach is implemented in the Overberg catchments, the Reserve is likely to increase and the available yield in those catchments (and the

WMA as a whole) may correspondingly further reduce. This is likely to be further exacerbated once a desktop method is implemented to undertake estuarine Reserve determinations in the estuaries of the Overberg, which are currently not accounted for.

In addition to the Preliminary Reserves undertaken to date, the Ecological Water Requirement developed for surface flow in the Palmiet River could be developed into a Reserve. However, the work done to date on the estuary has not been according to Reserve principles and can therefore not readily be upgraded to an Estuarine Reserve requirement. However, current knowledge pertaining to the Palmiet estuary suggests that it receives abundant flow and is unlikely to have an impact on the yield of the Palmiet River. The Ecological Water Requirement of the lower Palmiet River is likely to be the controlling factor.

B) Groundwater

In the BRBS intermediate level groundwater reserve determinations were undertaken in two areas, namely:

- between Wolseley and Greater Brandvlei Dam
- Between Worcester and the Nuy valley

In a separate study, an intermediate level determination had been undertaken for the Hex River catchment (H20). Reserve determinations in twelve areas covering the remainder of the Breede River component were undertaken at desktop (rapid) level. The detailed results can be reviewed in the BRBS and are not repeated here. The overall conclusion is that whilst there remains significant opportunity for groundwater development in most of the Breede River component, registered groundwater use in the Ceres sub-area is already in excess of what is considered sustainable. Groundwater use in the Hex River catchment is extensive (20 million m^3/a) and there is significant competition for water by farmers.

In the upper and middle reaches of the Breede River, the interaction between the alluvium and the river, and the respective contribution to baseflow and recharge is not well understood.

Strategic Approach

The long-term implementation of river classification and the consequential impact on the potential to develop water resources requires further investigation and debate. In the interim, current ecological classes should be maintained for the purpose of managing the resource.

The construction of new schemes aimed solely at providing for the Reserve is not a viable approach considering the high value of water to the Western Cape region. The way forward is to continually evaluate the Reserve and its impact on yield development. This opportunity will present itself when undertaking feasibility studies into development options, identified through the Reconciliation Strategy Study.

Where ad-hoc Reserve determinations are required, these will have to be based on best available information, using the rapid or intermediate approach until such time as data has been accumulated to support more comprehensive methods.

Management Actions

The following actions are required:

⇨ In the short-term, manage the water resources in the Breede WMA at their current ecological classes (i.e. the status quo).

⇨ Complete the Western Cape Reconciliation Strategy Study and undertake the recommended feasibility studies arising from it. This process will ultimately be the driver in reaching decisions on changes to the ecological classes.

⇨ The following further actions will support the two broad strategic actions mentioned above.

- As a lower order of priority to the Breede River component, focus on the estuaries of the Overberg catchments, making use of the desktop method currently being adapted for undertaking preliminary estuarine Reserve determinations.

- Reserve determinations require additional resources and these must be assigned. In making the case for these resources it may be necessary to determine the extent of need, delays, cost of delays and what functions the Regions would be able to perform instead of head office staff, etc.
- Review the RDM policy to take into consideration the concept of localised "sacrificial" and "conservation-worthy" sub-systems. An example in this WMA being Riviersonderend River.
- Investigate the financial and social implications of restoring the Riviersonderend River to a Class "D" taking into account the need to meet the future water requirements of the Western Cape region as a whole.
- Public participation will be required to debate the impacts of various Reserve implementation scenarios against the benefits to the region of further development.
- Implement a river classification matrix for all rivers in this WMA to facilitate rapid decision making in terms of the level of Reserve determination required for rivers of varying ecological importance. The classification will also have a bearing on the minimum discharge standards required for each specific class of river.

Responsibility and Priority

The implementation of the **Reserve and Resource Quality Objectives Strategy** is the responsibility of RO in conjunction with the Directorate: RDM. This is of **Priority 1** (very high) in the Breede River component to enable confident future water resource planning for the Western Cape.

8.2 ESTUARIES AND WETLANDS STRATEGY

Management Objective

The objective of this strategy is to ensure that the estuaries and wetland of the Breede WMA receive sufficient freshwater to maintain their ecological health and function. At the moment there is insufficient data to be sure of Reserve requirements and this strategy aims to see this gap being filled. Estuaries also need to be prioritised in terms of importance as regards preservation.

Situation Assessment

The estuaries of the Overberg include the Palmiet (G40D), Buffalo (G40D), Bot (G40G), Onrus (G40H), Klein (G40L) and the estuary of the Heuningnesvlei (G50F). Invasive alien plants severely impact on the flow regime of both the Heuningnesvlei and therefore its estuary at De Mond, declared a RAMSAR site in 1986. Invasive alien plants also impact on the Zoetendalsvlei (G50C) and its associated wetland. These estuaries and wetlands have not been studied to the same level of detail as the Breede River estuary and no Reserve determinations have been undertaken on them. However some estuary water requirement work has been undertaken on the Palmiet River estuary, the Bot River estuary, the Klein River estuary and the Uilkraals River estuary. Based on in-stream-flow requirement studies undertaken to date, the Palmiet estuary currently receives more than sufficient water of good quality. Future potential development of yield in that catchment will take the needs of the estuary into account.

In the Breede River component, the Breede River estuary is still in a relatively good condition and remains sensitive to changes in water quality and reduced flows. It is important from a floral, piscifaunal (fish) and avifaunal (bird) perspective and very highly rated in terms of the risk to it from impacts of upstream catchment development.

The Papenkuils Wetland has become vulnerable as a result of upstream agricultural activities including the diversion of Papenkuils Wetland inflow into Greater Brandvlei Dam. The problems include both reduced water availability and retention. This wetland contains a variety of wetland and terrestrial flora that are worthy of conservation and are not conserved elsewhere in the WMA. As discussed in the Reserve and Resource Quality Objective Strategy (8.1), intermediate level Reserve determinations were carried out for the Papenkuils Wetland during the BRBS. The results, although not very reliable due to insufficient data, are the best available. The results indicate that the present ecological status category of the wetland is a "declining C", contrasting with its ecological importance rating of "B/C". This implies that steps must be taken to rehabilitate the functioning of the wetland. In particular, the interaction between the surface and groundwater resource is an important dynamic of the Papenkuils Wetland and will need to be further investigated.

The rivers of the Overberg catchments are all relatively short reach rivers. This means that any impact upstream is likely to affect their estuaries. The Onrus River estuary for example is regularly polluted as a result of sewage spills occurring in the peak season, due to a reticulation system incapable of accommodating peak loads. Estuaries are not only reliant on base flow but also require flood peaks to scour them and maintain their dynamics, something that cannot easily be supported where in-channel storage dams were developed, again especially a problem on short-reach rivers.

Diffuse pollution from surface water runoff finds its way into the coastal lakes at Kleinmond, which are connected to the Bot River Lagoon. Prior to the influx of holidaymakers, the local authority breaks the naturally occurring bund between coastal lakes and the Bot River estuary, and accumulated pollution from the coastal lakes is flushed into the estuary. Key stakeholders (Overstrand Municipality, WCNCB and the RO) have been involved in drafting a System Management Plan to address the problem.

There is as yet no rapid / desktop method available for carrying out first-estimate Reserve determinations for estuaries and wetlands. Consequently, it is not possible to assess licence applications on these rivers with any degree of confidence in terms of the potential impacts that they may have on the estuary or wetland.

Strategic Approach

The Estuarine Reserve requirement and its impact on the assessment of potential yield is of particular concern when evaluating yield water balance and reconciliation estimates. The strategic approach by the Department will be to develop and implement a modified desktop method for Estuarine Reserve determinations, to provide at least a first estimate. Loopholes in data will then be identified and appropriate monitoring implemented to gather the necessary data. Once sufficient data is available, more comprehensive estimates will be undertaken.

The priority of each of the wetlands and estuaries in terms of defining their ecological condition and the level of Reserve determination required for each, should be determined through a workshop type environment making best use of expert knowledge and available reports.

Where applications are considered for the development of catchment storage, and where this is on short reach rivers feeding estuaries, the recommended option will be the use of off-channel storage. This will allow for conditional abstraction such that low flows and flood peaks can be maintained for inflow to estuaries.

Within social and economic constraints, DWAF will seek best possible strategies to optimise water for maintaining the wetlands and estuaries.

Management Actions

The following actions are required:

- ⇨ Implement the Management Actions of the Reserve and Resource Quality Objectives Strategy.
- ⇨ The rapid / desktop level method for the determination of Estuarine Reserve requirements needs to be finalised, taking into account methods used on five provisional Estuarine Reserve estimates which have been done in other parts of the country.
- ⇨ Initiate workshops and invite specialist debate to determine an order of priority and a Reserve determination level for each estuary and wetland in this WMA. As a starting point consider the Heuningnes, Onrus and Bot estuaries as a provisional order of priority, also taking into account the work already done on the Breede estuary.
- ⇨ Implement further studies to understand the optimum flow requirements of the Papenkuils wetland and investigate the diversion of Breede River main channel flow into the wetland, to meet those requirements.
- ⇨ The Management Plan for the Bot River lagoon developed co-operatively between key stakeholders should be finalised and implemented. Refer also to Co-operative Governance Strategy (11.2).

Responsibility and Priority

The implementation of the **Estuaries and Wetlands Strategy** is the responsibility of the RO in consultation with the RDM office. It is of **Priority 2** (high).

8.3 WATER QUALITY MANAGEMENT

Management Objective

Water quality needs to be appropriately managed to ensure that there is water of acceptable quality available to meet the needs of the environment and of all users in the Breede WMA. Salinity concentration and nutrient content must be reduced to the most practically manageable levels. This strategy aims to address the problems associated with water quality in the Breede WMA and to recommend steps that can be taken to improve the quality where problems currently exist.

Situation Assessment

In terms of water quality, the predominant problem throughout much of the Breede WMA is one of salinity. The Bokkeveld shales introduce naturally occurring salinity to the Middle and Lower Breede River. Water quality is generally good in the uppermost reaches of the Breede River tributaries, but becomes increasingly more saline in a downstream direction. All the rivers of the Overberg region are exposed to salinity as a result of the geology, with the exception of the Palmiet River sub-area, in which the water quality is good. Where irrigation is intensive, return flows aggravate the salinity problem through the leaching of salts into the rivers. Nitrogen and phosphorous loading from washoff of fertilisers is also of some concern. Point source pollution also has an impact on water quality, but to a far lesser extent than salinity in the Breede WMA.

Salinity

The Middle and Lower Breede River carries the brunt of salinisation, receiving naturally saline water and irrigation return flows. The water quality eventually becomes unsuitable for agricultural use due to increasing salinity, in a downstream direction. The current management approach is to introduce freshening releases (approximately 22 million m^3/a) from Greater Brandvlei Dam. These releases serve to manage salinity levels as far downstream as the Zanddrift canal off-take near Bonnievale.

Increased freshening releases could further reduce salinity but this is a water intensive solution. A more radical proposal is to convey all water to users via an independent canal or pipeline, rather than via the river channel itself, although this would be capital intensive and would ultimately consign the lower reaches of the river to the role of a salt drain.

Some natural freshening takes place downstream of the Riviersonderend River confluence and again downstream of the Buffeljags River confluence as a result of better quality water arising from those two catchments. The salinity levels in the headwaters of the Riviersonderend River are low but increase marginally downstream due to agricultural practices. To date it has not been considered necessary to make freshening releases out of Theewaterskloof Dam into the Riviersonderend River.

Point Source and Non Point Source Pollution

Polluted runoff from inadequately serviced dense settlements and industrial point discharges poses a risk of pollution to the water resource. This is a problem with regard to the informal settlement at Grabouw and surrounding industries. Here pollution poses a threat to the water quality of the Klip River (a tributary of the Palmiet). The local authority (Theewaterskloof Municipality) is planning an additional 1500 RDP houses despite the fact that there are already insufficient services to cater for the existing population, and raw sewage spills from the reticulation network into the Klip River are not uncommon. This type of problem is however not widespread within the Breede WMA.

The problems associated with the management of diffuse pollution in the Bot River Lagoon are discussed in the Estuaries and Wetland Strategy (8.2) and a Management Plan is being drafted by the RO in consultation with all stakeholders.

Discharge of treated sewage effluent, management of solid waste and the activity of irrigating with inadequately treated industrial wastewater (typically winery effluent) are further water quality concerns. The Department has found that, within the Breede WMA, the situation with regard to sewage discharge is of concern in some the coastal towns where WWTW and reticulation system capacities are exceeded during peak season (notably Onrus and Kleinmond). Other WWTWs that are reaching their design capacity include Ashton and Gansbaai.

The use of soak-away facilities along the banks of, or in close proximity to the Breede River (lower reaches), is the current means of disposing of domestic sewage in that area. Seepage from these soak-aways finds its way into the river. Conservancy tanks would be the preferred alternative but the local authority does not, at the moment, have the necessary resources to service that type of facility.

The direct use of water from irrigation canals (for domestic purposes) by farm workers living in close proximity to the canals is of concern. This is worsened by the return of wastewater to the canals and the impact on other users further downstream.

Managing Solid Waste

Many towns operate their own small solid waste disposal sites, some of which are situated in close proximity to rivers. For example the McGregor SWDS lies adjacent to the Korings River. The site is no longer in use but has yet to be rehabilitated. Disposal of fruit waste at Ceres and Wolseley poses a threat to the local groundwater resource. The SWDS in Ceres is due to be closed. An alternative regional SWDS is proposed at Wolseley.

Strategic Approach

More than 90% of the total irrigation requirement in the Breede WMA lies within the Breede River basin, in which salinity in the middle and lower reaches is of concern. Although the Palmiet River catchment (Overberg West) is also extensively irrigated, the water quality is good. As such, the priority for salinity management currently lies in the Breede River component and should remain so.

For the purposes of improving crop quality and yield in the Middle Breede River, the possibility of lowering the target salinity limits at the Zanddrift canal off-take in certain months should be considered. Meaningful short-term salinity alleviation could be achieved through the construction of return flow interceptor drains and storage ponds. The accumulated saline water could then be released during periods of high flow to take advantage of the dilution effect, coupled perhaps with a less water intensive release strategy from Greater Brandvlei Dam. Given the levels of salinity, agricultural return flows into the Breede River are highly undesirable and should be minimised or eliminated.

A management action that can be immediately implemented, without having to undertake any construction of infrastructure, is to actively discourage the development of irrigation in areas producing highly saline return flows. This information is available within the Breede River component, based on the soils investigations carried out during the BRBS. These areas should be demarcated. DWAF and the future CMA should exert influence against further irrigation development in the demarcated areas. Measures could include the conditional approval of new water use licences; penalties for offences in terms of water use regulations or licensing conditions, and a pricing strategy that would allow for an increased price of water in demarcated areas.

Co-operative governance between the Department and local authorities must be focussed on the problems associated with the quality of effluent from all WWTWs, the management of solid waste and the provision of adequate services to informal settlements. In terms of improved future management of solid waste, the use of larger regional solid waste disposal sites should be encouraged and smaller sites closed and rehabilitated.

The failure to provide adequate household water to farm workers will not be tolerated and farm owners should be held accountable for his.

Management Actions

The following actions are required in terms of *Salinity Management:*

- ⇨ Demarcate areas with high salt generating potential in the Middle Breede and use these to screen new water use licence applications.
- ⇨ Strict rules for the application of fertilisers should be developed together with, and implemented by, the Department of Agriculture to reduce nitrogen and phosphorus loads in rivers.
- ⇨ Implement a feasibility level design and costing to evaluate the following potential salinity alleviation options that have already been investigated at reconnaissance level:

    (i) the potential of intercepting saline return flows for release during periods of high flow with improved dilution;
    (ii) the option of intercepting saline water in evaporation ponds with recovery and disposal of salt;
    (iii) the best possible sites for interceptor drains to capture saline return flow;
    (iv) the potential water saving through reduced freshening releases from Greater Brandvlei Dam in conjunction with the use of interceptor drains;

The following actions are required in terms of *Point Source and Non-Point Source Pollution Management:*

- ⇨ All dischargers are to be identified, licensed and registered, and once the waste discharge pricing strategy is in place, charged for discharging into rivers.
- ⇨ DWAF needs to assess the current total cumulative impact of current waste discharge.
- ⇨ Resource quality objectives for rivers must be defined and these objectives must not be exceeded.
- ⇨ The recently proposed GAs (containing more restrictive water quality requirements) for irrigation with treated effluent need to be implemented and compliance monitored through the WUAs.
- ⇨ Procedures to be developed and implemented by operators of WWTW for emergency control of spillages, power failure, mechanical breakdown.
- ⇨ DWAF is investigating whether methods can be invoked against non-compliant authorities, in cases where co-operative governance is unsuccessful.
- ⇨ Evaluate the existing pollution control mechanisms of wineries and industry and revise standards.
- ⇨ Farm owners must ensure that adequate services are provided to communities residing on their farms.
- ⇨ Implement the dense settlement strategy (DWAF/DANIDA), drawing on co-operative governance with local authorities, with particular focus on the informal settlements at the town of Grabouw.

Responsibility and Priority

The implementation of the **Water Quality Management Strategy** is the responsibility of the RO in conjunction the Water Resource Planning Systems and the Waste Discharge and Disposal Directorates. It is of **Priority 2** (High).

CHAPTER 9: WATER USE MANAGEMENT STRATEGIES

Six strategies have been identified for development, namely:

9.1 General Authorisations
9.2 Verification of Existing Lawful Use
9.3 Allocation and Licensing
9.4 Compulsory Licensing
9.5 Changing Land-Use: Forestry
9.6 Changing Land-Use: Clearing of Invasive Alien Plants

9.1 GENERAL AUTHORISATIONS STRATEGY

Management Objective

Appropriate General Authorisations (GAs) can simplify the management of the water resources of the Breede WMA. This strategy aims at putting such appropriate GAs in place, but also at ensuring regular review and amendment of existing GAs should circumstances change.

Situation Assessment

GAs have been introduced to allow conditional water use, without the need for a licence. Although no licence is necessary, the use under a GA must still be registered. GA protocols are available for surface and groundwater abstraction, storage, irrigation with treated effluent, effluent discharge, and solid waste disposal. The most recent GA protocol to be developed is for river channel modifications, such as the construction of culverts. Proposals have been made and are under review.

In the Breede WMA revised GAs have been recently proposed. The proposed GAs for surface water and groundwater abstraction are shown on Figures 9.1.1 and 9.1.2 respectively.

Surface Water GAs

The RO has proposed more restrictive GAs for surface water abstraction throughout the Breede WMA. The currently gazetted GAs and the proposed changes are as set out below:

- **Current** gazetted GA for surface water abstraction = 25 *l*/s:
    - for irrigation of up to 25ha of land at 6000 m^3/ha/a or;
    - for purposes other than irrigation, 100m^3/d (on any given day);
    - storage is limited to 50 000 m^3.
- **Proposed** GA for surface water abstraction = 15 *l*/s:
    - not exceeding 150 000 m^3/a;
    - storage is limited to 50 000 m^3.

Groundwater Abstraction GAs

The proposed GAs for groundwater abstraction are more restrictive than those currently gazetted. Of notable mention are the following quaternaries that had been generally authorised and are now proposed for exclusion:

- Ceres sub-area: H10C
- Tradouw sub-area: H70F

Current GAs for groundwater abstraction consist of four classes, namely 0, 60, 300 and 750 m^3/ha/a. The proposed GAs (see Figure 9.1.2) contain five classes of abstraction, namely 0, 45, 75, 150 and 400 m^3/ha/a and allow for up to 20m^3/d to be abstracted by small industrial users.

In those few quaternary catchments where relaxations have been proposed, the proposed increase in the permissible abstraction rate, is less than 100 m^3/ha/a.

To date the proposed GAs described above and shown on Figures 9.1.1 and 9.1.2 have yet to be approved.

Irrigation with Industrial Waste Water

Currently GAs for irrigating with industrial wastewater allow for up to 50 or 500 m^3/day (per user per property) to be used, depending on the water quality. Water quality criteria form part of that GA and where necessary, treatment is required to meet those criteria. However, users of up to 10 m^3/d (per user per property currently) need not register their use. In the Breede WMA the decision has been taken to stop any new irrigation using untreated wastewater. The large-scale irrigators are complying with this. However, small operators (such as small wineries) are more difficult to monitor and the potential cumulative impact on water quality is of concern. The most significant GA changes proposed are:

- Any person irrigating with any volumes of wastewater will have to register their use before commencement of irrigation, and water quality criteria in terms of treatment required, are now more restrictive;
- Upper limits of 50, 500 and 2000 m^3/d for irrigating with effluent, each with associated water quality criteria, have been proposed.

Through the proposed changes, better control and management of the extent of this activity will be possible, whilst encouraging the re-use of treated wastewater through the higher daily irrigation limit of up to 2000 m^3/d, subject to meeting specific water quality criteria.

Strategic Approach

GAs currently play an important role in easing the burden of licensing many small users of surface and groundwater in the Breede WMA, and can continue to do so. The limits and conditions of GAs need to be reviewed annually as has recently been done by the RO officials. Revisions must take the extent of new water use under GAs, and the anticipated increase in Reserve requirements into account. It is important that the effects of these GA changes are monitored to facilitate improved management decisions during subsequent reviews. The current proposals include greater restrictions on both surface water and groundwater abstraction.

Some relaxation in the limits for groundwater abstraction is possible. This is in line with the broad strategy of increased groundwater utilisation in much of the Breede WMA, with the exceptions of the Ceres catchment and limited further groundwater use in the Hex River catchment. GAs should not be issued at the scale of the WMA, or even at sub-area scale, and annual reviews must look to quaternary level detail. Local knowledge of the RO officials has been effectively applied in the proposed changes and this approach should be encouraged. The RO should be authorised to amend GAs directly.

If properly managed and monitored, the controlled activity of irrigating with treated wastewater can remain generally authorised and used to encourage increased water re-use.

Management Actions

The following actions are required:

- ⇨ Further changes to GAs for surface water abstraction could include an authorisation for seasonal abstraction only (during periods of high flow) into off-channel storage (the capacity of which is already limited under GA to 50 000 m^3).
- ⇨ Implement a programme of annual review of all GAs.
- ⇨ Implement the proposed GAs for river channel modification.
- ⇨ Implement a short term monitoring initiative/census to establish the actual extent and impact of all irrigation with, and all direct discharge of agricultural effluent under GA.
- ⇨ Develop a "code of practice" for handling and treating winery wastewater with specific conditions attached to the industry.
- ⇨ Seek authority to amend GAs at Regional level.

Responsibility and Priority

The implementation of the **General Authorisations Strategy** is the responsibility of the RO, in conjunction with the Directorate: Water Abstraction and Instream Use. It is of **Priority 2** (High).

Figure 9.1.1: Latest Proposed General Authorisations for Surface Water Abstraction

Figure 9.1.2: Latest Proposed General Authorisations for Groundwater Abstraction

9.2 VERIFICATION OF EXISTING LAWFUL USE

Management Objective

The objective of this strategy is to verify existing lawful water use, ensure correct registration on WARMS and ensure that unlawful use is discontinued. Verified existing lawful use will form the basis for payment of catchment management charges.

Situation Assessment

Verification of existing lawful use is an important step to ensure that the correct volumes are registered for payment of catchment management charges, the actual requirements are accurately known, and that any unlawful users discontinue use, thus returning this water to the system.

The processes involved take place in the following sequence:

i Registration – users must indicate how much water they use, and start paying for that use but this does not confer any rights of allocation. The registration process is complete in the Breede WMA;
ii Validation – DWAF checks the registered use to confirm that it is actual use, and may alter the volume registered if found otherwise;
iii Verification – DWAF checks and decides on the lawfulness of the actual use;
iv Lawful use is registered on WARMS;
v Users pay for that registered use, which now has the status of "allocated use".

It is a statutory obligation that all water users (excluding Schedule 1 users) register their use. Registration of both surface and groundwater users is required, and includes Stream Flow Reduction Activities and those users who utilise water under GA. In the Hex River sub-area, a hydrocensus carried out by the Department found registered water use to be within 3% of actual water use estimates made as part of the BRBS. This adds confidence to the initial indications that registered water use in the Breede WMA is a reasonable reflection of actual use. Registration, now complete in this WMA, does not, however, serve as a check on the lawfulness of the use.

Verification of existing lawful use serves the following functions:

- to reconcile registration, identify and correct errors,
- to take water out of the hands of unlawful users and return this to the system,
- to determine long-term water use,
- to ensure lawfulness of continued water use,
- forms an important input to compulsory licensing in catchments prioritised for that process.

Where unlawful users are identified, they will be required to stop using this water. This may put some volume of water back into the system, making it available for legitimate claims, including the meeting of the Reserve and redressing inequities. Unlawful water use is currently understood to be more probable in the following areas of the Breede WMA than in others:

⇨ In the Hex River catchment where there is intense demand for available water and the extent of water use from farmers' own sources, run of river and groundwater is not well quantified. Some of this may be unlawful use.
⇨ Outside of WUAs, use and lawfulness is not well established throughout the Middle Breede. On the tributaries, farmers abstract much of the summer flow and as much winter water as their infrastructure can accommodate.
⇨ There is substantial groundwater abstraction (unconfirmed estimates of up to 50 million m^3/a have been suggested) out of the alluvium in the Worcester/Rawsonville area of which only 25 million m^3/a is registered.
⇨ To the north of the Langeberg Mountains (Tradouw sub-area) there are illegal dams and illegal groundwater developments.

- ⇨ In the Bot\Swart and Lower Breede sub-areas, registration exceeds the extent of actual water use from the surface water resource.

The extent of unexercised but nevertheless 'lawful' allocations within the areas of jurisdiction of WUAs is not significant in this WMA.

Strategic Approach

Policing to target and identify unlawful water users is resource intensive and will require special staffing and budget. It is cost effective to ensure that lawful use is correctly quantified and paid for, and unlawful use is returned to the system.

Through the process of registration and verification, the Department is identifying unlawful water users, who will be held accountable for this. If the particular catchment is in deficit, then the use must stop. However, if there is a surplus after the Reserve and equity requirements have been met, then the user may apply for a licence.

A prioritisation strategy for identifying the most critical areas for verification must be developed. This should be focussed on those areas in which it is currently perceived that water use violations might be prevalent and where such use will most impact on the Reserve, and on the availability of water to other users reliant on the same resource. Cognisance must also be taken of the importance of the Riviersonderend and Palmiet River catchments in their provision of water for both in-catchment and water transfer purposes. The following order of priority should be used as an initial basis for implementing the verification process.

Proposed time frames and order of priority to complete the verification process (provided by the Region)

5 Years	*10 Years*	*15 Years*
1) Palmiet	6) Upper Breede	11) Klein
2) Hex	7) Middle Breede	12) Bot/Swart
3) Riviersonderend	8) Tradouw	13) Uilkraals
4) Onrus	9) Lower Breede	14) Overberg East
5) Ceres	10) CBR Kingna	

In order to give effect to the NWA, an example should be made of unlawful water users and tough decisions applied to them so as to return the component of unlawful water use to the system.

Where existing allocations have yet to be exercised, a strategic approach should be developed and implemented in which users may be (i) required to relinquish the allocation, or (ii) keep the allocation if they pay for it, or (iii) use the water within a specified time frame (say five years for example), or (iv) trade that water. They should not be entitled to hold onto it indefinitely.

Management Actions

The following actions are required:

- ⇨ Ensure that all users have registered their use. This is largely complete in the Breede WMA.
- ⇨ The RO should consult the guidelines developed by DWAF Gauteng RO in which a strategy has been drafted for implementing actions against unlawful users, and take appropriate action against them.
- ⇨ Set up a process to:
  - o verify existing use according to guidelines made available from the Directorate: Water Abstraction and Instream Use.
  - o determine lawfulness of use according to these guidelines.
  - o develop a strategy to act on unexercised allocations.
- ⇨ WUAs must ensure that their members are acting in compliance with the conditions of their water use authorisations.

Responsibility and Priority

The implementation of the **Verification of Existing Lawful Use Strategy** is the responsibility of the RO in conjunction with the Directorate Water Abstraction and Instream Use. It is of the highest priority (**Priority 1**).

9.3 ALLOCATION AND LICENSING STRATEGY

Management Objective

The objective is the implementation of a streamlined and improved strategy to assist the RO in reaching decisions on licence applications and when required, to attach appropriate conditions to licences.

Situation Assessment

(a) *The Current Situation*

The current available surplus in the Breede WMA is 19 million m^3/a. The incremental yield balances are shown on Figure 9.3.1. In the Upper Breede sub-area there is approximately 17 million m^3/a available out of:

- Koekedouw Dam: 3 million m^3/a
- Stettynskloof Dam: 14 million m^3/a

In Koekedouw Dam (owned by the Koekedouw WUA) the water is allocated to the WUA and the town of Ceres but the allocation has yet to be fully exercised. Similarly in Stettynskloof Dam (owned by the Breede Valley Municipality), the water is allocated to the town of Worcester but is not yet fully taken up. The urban water demands have yet to grow to a point where this water is required.

Figure 9.3.1: The Current Available Surplus in the Breede WMA

In the Lower Breede sub-area the 3 million m^3/a currently available is from surplus in Buffeljags Dam, near Swellendam.

In terms of making an assessment on the possible issuing of any new licences, the smaller management units (sub-areas) shown on Figures 6.1 and 6.2 of Chapter 6, are referred to.

Ceres Sub-Area

There is no further run-of-river yield available for abstraction in this sub-area. Surplus winter water that is available in H10D has been earmarked for the proposed Michell's Pass Diversion Scheme (water to the CCT) and is not available for further irrigation development. Approximately 3 million m^3/a of allocated but unexercised water is available in Koekedouw Dam. The high cost of water from that dam has been one of the reasons that a number of commercial farmers have been liquidated and the farms transferred to resource poor farmers.

Extensive use is already made of groundwater and the BRBS indicates that current registered groundwater use exceeds the sustainable annual abstraction potential within H10A-C. Further development of the groundwater resource in quaternaries H10A-C should not be considered.

Hex Sub-Area

The yield from the Sanddrift Irrigation Scheme is over-allocated, largely due to over optimistic estimates of yield from that scheme. As a result water is supplied at relatively low assurances of supply and there is intense competition for the available water. Conditions governing the release of compensation water from Roode Elsberg Dam have long been the source of disputes between water users in the Upper and Lower Hex River Valleys. The RO is currently evaluating a licence application for a possible dam at Osplaas (H20B) for both irrigation and for

provision of water to the town of De Doorns. The conditions attached to the Osplaas Dam licence require that a portion of the yield is allocated for the establishment of resource poor farmers in the area.

Farm dams throughout the Hex sub-area are filled in winter from excess flow and licences for additional winter abstraction under such conditions could be considered. Approximately 20 million m^3/a of surface water and 20 million m^3/a groundwater is used. The groundwater resource is already extensively developed and further licences should be cautiously considered until the Reserve has been finalised and approved. An intermediate level Reserve determination was completed in 2003.

Upper Breede and Middle Breede Sub Areas

There is a surplus of 14 million m^3/a in Stettynskloof Dam arising from allocations to the town of Worcester which have not been taken up. The dam was owned by the Worcester Municipality and now falls under the Breede Valley Municipality.

There is significant opportunity to utilise groundwater in the Upper Breede. However caution should be exercised when considering licences for further abstraction out of the alluvium, until the recharge dependency of the alluvium on summer base-flow (understood to be provided to a large extent by groundwater out of the TMG) is better understood. Site-specific conditions of every application for groundwater abstraction will need to be considered in addition to the status of the Reserve.

Lower Breede

The available surplus of 3 million m^3/a is that in the Buffeljags Dam, and offers the opportunity to establish resource poor farmers in the area. Issuing of new licences for surface water abstraction can be considered in this sub-area but should be restricted to abstraction of excess winter water into off-channel storage facilities. It is not anticipated that there will be a marked increase in the use of groundwater due the high salt content rendering the water unsuitable for irrigation.

Riviersonderend

There has been interest expressed by potential resource poor farmers for establishment at Riviersonderend and Genadendal. This sub-area is, however, currently in balance and as such, only abstraction of surplus winter water (to off-channel storage) and groundwater should be considered.

Water trading with existing irrigators and purchasing of lei-water from towns are options to consider in terms of developing resource poor farmers in the Riviersonderend sub-area. Some groups have already been established at Villiersdorp and water has been provided through trading with the Elandskloof and Vyeboom WUAs.

CBR Kingna Sub-Area

There is no scope for further development of irrigation from surface water outside of existing irrigation schemes.

Tradouw Sub-Area

There is very little further opportunity for issuing new licences to abstract surface water in the northern region (H70C-E). In the south (H70B & H70F) additional licences can be considered for the abstraction of surplus winter water only, to off-channel storage. No additional abstraction of surface water should be considered in summer. There is some potential for establishing resource poor farmers in the area through water supplied out of Buffeljags Dam, with significant opportunity becoming available if the dam is raised for further irrigation development.

The coastal catchments of the Overberg West and Overberg East

With the exception of Palmiet sub-area, the general approach regarding issuing new licences for surface water abstraction is that no new licences throughout the Overberg catchments should be considered for abstraction during summer. Most of these rivers support ecologically sensitive estuaries, for which there is not sufficient estuarine data available to support even a very preliminary desktop type Reserve assessment. Before issuing of additional licences can be considered, an estimate of the estuarine Reserve must at least be possible and that Reserve must be sustained. In the interim, the use of off-channel storage with abstraction of surplus winter water can be considered.

(b) The Future Situation

In the Overview chapters (3 and 4) and in the Water Availability Strategy (7.1) potential schemes were identified that could be developed within the Breede River component to realise potential yields of between 90 and 140 million m^3/a. In the Palmiet River catchment, 25 million m^3/a could potentially be developed. The licensing of agricultural water would depend on the sources of development funding, but would inevitably include a large equity component.

Strategic Approach

Based on the current available water resource, the following broad strategic approaches to the issuing of new licences are relevant in this WMA:

- The current surplus of 17 million m^3/a in the Koekedouw and Stettynskloof Dams should remain available for meeting the growing urban water requirements in Ceres and Worcester.
- The abstraction and off-channel storage of surplus winter water can be considered;
- Water quality permitting, the increased use of groundwater can be considered in much of the WMA.

Provided that developments are shown to be economically viable, support equity initiatives (resource poor farmers) and embrace the concepts of WC/DM, conditional licensing of water use should not be unnecessarily constrained. However the option of limiting the issuing of new licences to abstraction during periods of surplus flow and the use of off-channel storage will be necessary.

Supporting information on the impacts of groundwater abstraction on river flow is a prerequisite in support of applications for approval of new licences. Groundwater appears to offer great potential for abstraction particularly in the Upper Breede. The interaction between the groundwater and surface water resource (the groundwater Reserve) is not yet well understood. Whilst it is not necessary to delay processing of abstraction licences, the decision must be ultimately based on how much protection is required both in terms of surface water and for a particular aquifer. Before the comprehensive groundwater Reserve has been determined, the suggested approach is that best use be made of the BRBS and of available expert knowledge to map protection zones, from which guidance on decisions for new groundwater abstraction licences be sought.

Licences for water trades will be considered, particularly where the trades are within the same sector or from a low value to a high value sector, benefiting both society and economy. Trades within the same catchment are also more likely to be licensed.

Catchment specific approaches to licensing in each sub-area are offered under the situation assessment in this strategy.

The strategic approach in the medium term (next 10 years) towards allocating potential yield that could be developed in the Breede WMA is as follows:

- The potential allocation to the CCT of 80 million m^3/a from the potential Michell's Pass diversion (53 million m^3/a) and Upper Molenaars diversion (27 million m^3/a) is seen as the most effective and necessary use of this water and this opportunity should not be foreclosed. Realising this potential is dependant on the Reserve scenario ultimately implemented.

- Through the potential Brandvlei Augmentation Scheme (33 million m^3/a), possible raising of Buffeljags Dam (11 million m^3/a), and small scheme development (16 million m^3/a), 60 million m^3/a could become available for in-catchment use in the Breede River component. Realising this potential will depend on the Reserve scenario, the relative impacts of upstream diversions on the existing (and potential) yield of Brandvlei Dam, and the extent of invasive alien plant removal.

Reserve scenarios, scheme options and the impact of invasive plants on potential schemes will be investigated during the Reconciliation Strategy Study. In the interim, the aforementioned schemes should be considered as the most likely to warrant further investigation.

The Palmiet River has been identified as a possible option to further augment the WCWSS and/or for provision of water to the town of Grabouw and/or for supplying the coastal towns of the western Overberg. Further irrigation development is possible from unexercised allocations out of existing dams (Eikenhof and Arieskraal Dams, for example). Any irrigation expansion from new resources must include the establishment of resource poor farmers.

Management Actions

The following actions are required:

- ⇨ Consider applications for new licences in accordance with the recommendations in this situation assessment.
- ⇨ Until a comprehensive groundwater Reserve has been determined, implement workshop type discussions to make best use of current knowledge for mapping groundwater protection zones and developing guidelines for issuing new licences.
- ⇨ Inform the CCAW of the potential to augment the yield of Greater Brandvlei Dam and establish when the scheme would be required, who would benefit from it and who would pay for it.
- ⇨ Engage in co-operative governance with all relevant authorities so as to establish their future water requirements out of the available surplus from their own resources (notably Worcester and Ceres).
- ⇨ Through the CCAW, identify opportunities for future resource poor farmer development and the anticipated associated water requirements.

Responsibility and Priority

The implementation of the **Allocation and Licensing Strategy** is the responsibility of the RO in conjunction with the Directorate: Water Abstraction and Instream Use and the Directorate: Water Allocation. It is of **Priority 1** importance (highest).

9.4 COMPULSORY LICENSING STRATEGY

Management Objective

The objective of this strategy is to prioritise those areas within this WMA where the re-allocation of available water may become necessary through compulsory licensing.

Situation Assessment

The need for compulsory licensing is primarily to:

- address situations in which more water has been allocated to users than is actually available, with deficits, even during normal years if all users were to make full use of their allocations;
- address past inequitable distributions of water by redistributing water so that previously disadvantaged landholders and potential users are also able to receive a fair share;
- meet the needs of the Reserve (both ecological and basic human needs).

Based on the interim strategic approach that the water resources will be managed according to their current ecological classes, the Reserve requirements in the Riviersonderend will be met from present day flow conditions, with no impact on the yield of Theewaterskloof Dam. The priority for compulsory licensing is therefore considered to be low in this WMA. This could however change, depending on the Reserves that are ultimately set. A potential shortfall of up to 85 million m^3/a in the Riviersonderend sub-area alone has been identified if that river is to be rehabilitated to an ecological Class "D" from its current Class "E".

Over-abstraction by registered groundwater users in very localised areas (H10A-C quaternaries of the Ceres catchment for example) can be halted through compulsory licensing but it would be better if this could be resolved though negotiation, and the WUAs are encouraged to resolve this problem amongst their users.

Strategic Approach

The option of providing water from schemes in the Breede WMA to urban users in the Berg WMA must be kept open for the benefit of the regional economy in the Western Cape. The Riviersonderend and the Palmiet Rivers are currently important, and will remain important in this regard.

Given the historic inequities in water allocations within the Breede WMA, the 3 million m^3/a of available surplus in the Buffeljags Dam should be earmarked for the establishment of resource poor farmers. Worcester must assess its future urban water requirements. DWAF should encourage Worcester to support the establishment of resource poor farmers, though the provision of any surplus water from their current sources of supply. To allocate any current available surplus to further expansion of the existing commercial farming system would in all likelihood give rise to later enforced compulsory licensing for equity purposes, with current users having existing allocations reduced without any compensation.

Compulsory licensing, where this entails the curtailment of use of water by some in order to meet the needs of others (in the Breede these others would be the Reserve, and perhaps more water to equity) is not something to undertake lightly. All alternative sources of supply need first to be explored. In the Breede WMA the opportunities for increasing the availability of water include: Verification of existing lawful use (with a lower allocation perhaps resulting), the clearing of Invasive Alien Plants, and WC/DM. Reserve demands may also possibly be limited by adopting current ecological classes in certain rivers, where higher ecological classes have been recommended (notably the Riviersonderend River).

The situation of aquifer over-abstraction in the Ceres catchment should be addressed amongst the users within the WUA and compulsory licensing should be the last resort required to resolve this. This principle should be applied to other areas where local water stresses are encountered.

Management Actions

The following actions are required:

- ⇨ The Comprehensive Reserve determination (and associated public participation) will need to be completed before a decision on the need for implementing any compulsory licensing in this WMA can be taken.
- ⇨ Where there is over utilisation, WUAs must be encouraged to curtail use amongst their members.

Responsibility and Priority

The implementation of the **Compulsory Licensing Strategy** is the responsibility of the Directorate: Water Allocation and the Directorate: National Water Resource Planning. Nationally this is of highest priority (**Priority 1**). In the Breede WMA the implementation of compulsory licensing is currently considered to be **low**, subject to the Reserve ultimately selected for implementation.

9.5 CHANGING LAND-USE: FORESTRY

Management Objective

The primary objective of this strategy is to facilitate the processes required to address the decommissioning of commercial forestry operations in the Breede WMA.

Situation Assessment

Commercial forestry in the Breede WMA is largely confined to the upper reaches of the Riviersonderend and Overberg (Palmiet) sub-areas. Table 9.5.1 shows the estimated areas of forestry within the Breede WMA.

Table 9.5.1: Forestry in the Breede WMA

Sub-Area	Area (ha)	Reduction in runoff (million m^3/a)	Reduction in yield (million m^3/a)
Unit	**ha**	**million m^3/a**	**million m^3/a**
Upper Breede	831	0.9	0.2
Riviersonderend	746	1.4	1.1
Lower Breede	752	1.9	0.3
Overberg East	0	0.0	0.0
Overberg West	4 467	9.1	4.6
Total	**6 796**	**13.4**	**6.2**

The decommissioning of much of the commercial forestry industry will release water and this may allow for trading of existing authorisations currently held by the commercial forestry operators, of which SAFCOL holds the predominant market share. There may also be some new applications by other forestry operators for water use licences to develop new plantations.

SAFCOL is closing their Nuweberg, Grabouw, Lebanon and Grootvadersbos plantations. Of significance is the situation in the Overberg West, particularly in the Palmiet River catchment, where much of the current impact on yield (+4 million m^3/a) could eventually become available for alternative use.

Operators of licensed plantations may have some claim to water arising out of the closure of the plantations. On the other hand, where these plantations are on State owned land, the State may insist that the water be returned to it. If so it could be made available for other users, notably the Reserve, resource poor farmers or emerging growers.

The following issues/concerns have been identified:

- For each proposed change in land-use, a site-specific investigation is required, which is time-consuming. The core principle is that there should be no negative impact on other downstream users.
- Where SAFCOL (existing lawful user) is decommissioning its forestry operation and felling its plantations in the Western Cape, this forestry is on State Land and the proposed future use of this land is still uncertain.
- The State is also the sole shareholder in SAFCOL and could therefore presumably influence any attempt to trade water rights.
- Soil suitability has yet to be determined in the Palmiet sub-area where it is proposed that resource poor farmers will be established on some of the land currently under forestry plantations.

Strategic Approach

Applications for forestry will be treated as any other application for water use, recognising the fact that forestry water use cannot be curtailed as for other users. Forestry effectively takes what water is available at a 100% assurance. If there is water available for use then establishing emerging forestry growers and/or resource poor farmers will receive first priority.

Management Actions

The following actions are required:

- ⇨ A co-operative governance decision is required regarding the decommissioning of SAFCOL and the use of the State owned land (RO in conjunction with Department of Environmental Affairs and Development Planning, Department of Agriculture and local authorities).
- ⇨ Liaison with SAFCOL and the SFRA LAAC (Stream Flow Reduction Activities Licence Assessment Advisory Committee) to discuss whether there are any water use rights attached.
- ⇨ The availability of water resulting from changes between certain land-use types needs to be studied on an area-specific basis.
- ⇨ RO to develop plans and procedures for re-allocation of water which becomes available from changing land-use, taking assurances of supply into consideration.
- ⇨ Registration and licensing of all commercial afforestation to be completed.
- ⇨ The SFRA LAAC should be approached for input to this strategy.
- ⇨ Soil investigations will need to be undertaken where land is cleared, before planning the establishment of resource poor farmers.

Responsibility and Priority

The implementation of the **Changing Land-Use – Forestry** Strategy is the responsibility of the RO in conjunction with the Directorate: Water Abstraction and Instream Use. It is of low priority (**Priority 4**) in terms of the Breede River component but at a higher priority (Priority 2) for the western Overberg (particularly the Palmiet and Bot River sub-areas).

9.6 CHANGING LAND-USE: CLEARING OF INVASIVE ALIEN PLANTS

Management Objective

The goal is to optimise benefits to the water resource through the clearing of invasive alien plants. The first objective is to ensure that WfW and other initiatives responsible for the clearing of invasive alien plants are fully aware of the water resource management priorities. WfW must work closely with water resource managers in both planning and action.

Situation Assessment

Table 9.6.1 shows the estimated areas of invasive alien plants at an equivalent 100% density for the Breede WMA. The actual area invaded is actually much larger but this is expressed as an equivalent area of 100% invasion density.

Table 9.6.1: The Extent of Invasive Alien Plant Infestation in the Breede WMA

Sub-Area	Natural MAR	Condensed area	Reduction in runoff	Impact on yield (1 in 50 Yr)
Unit	**(million m^3/a)**	**ha**	**million m^3/a**	**million m^3/a**
Upper Breede	1092	26 000	34	25
Riviersonderend	432	13 500	17	13
Lower Breede	279	6 500	10	7
Overberg East	110	109 000	60	2
Overberg West	480	63 000	61	31
Total	**2393**	**218 000**	**182**	**78**

The Breede River component

The BRBS has indicated that the estimated 46 000 ha (equivalent condensed area) of invasive alien plant infestation has an impact on the yield of the Breede River component of 45 million m^3/a. Whilst in reality complete removal may be difficult to achieve there remains enormous benefit in containing the spread, both from a water resource and social (job creation) perspective. From a water resource perspective, it is required that this 45 million m^3/a be made available through clearing in the Breede River component if the full potential of the catchment to deliver an additional 140 million m^3/a of yield is to be realised (refer also to Scenario 3 in Table 3.11.1). Clearing of alien plants in the Riviersonderend sub-area has been underway for many years and clearing projects have also been initiated in the Ceres and Upper Breede sub-areas (H100 quaternaries) where there is extensive infestation.

In order to make best use of available funds and to maximise the impact of clearing, it is necessary to define those areas in which the most benefit will be achieved. The following order of priority is based purely on the cost of clearing and on the resulting benefit in terms of unlocking surface water runoff. This was determined in the BRBS. (Refer to Figures 6.1 and 6.2 to identify the management units/sub-areas).

High priority

The CBR Kingna, Ceres, and Middle Breede sub-areas.

Medium priority

The Hex sub-area, the catchments upstream of Theewaterskloof Dam (H60A-C) and the quaternaries H50A-B in the vicinity of Bonnievale.

Lower priority

The Riviersonderend sub-area (downstream of Theewaterskloof Dam), the Upper Breede sub-area and the three quaternary catchments (H70C-E) upstream of Buffeljags Dam in the Tradouw sub-area. Also the remaining catchments of the Tradouw sub-area and the Lower Breede sub-area.

This prioritisation should be reviewed to take into account the relative social and natural environmental benefits that would accrue in the sub-areas. Should the spread of invasive alien plants throughout the WMA be allowed to continue unabated, the impacts on the water resource catchments of the WMA will be disastrous. The severity of the problems that could arise as a result of a "no-interference" scenario is illustrated in the BRBS in which it is estimated that the present condensed invaded area of 46 000 ha could triple in size by 2020, and cover about 250 000 ha by 2040. Removal of invasive alien plants is therefore an important reconciliation intervention in the Breede WMA, and one that has long been identified as a very cost effective means of unlocking water and of protecting the water resource.

In the mountain catchments, pines and hakea species generally occur, while acacias and eucalyptus predominate in riparian zones. Developed land is generally uninvaded, although riparian zones on farms are often a major problem.

The Overberg Catchments

Within the Overberg catchments, an estimated 33 million m^3/a of run of river yield (1 in 50 year) is lost to invasive alien plants (NWRS). Of this, the impact in the Overberg West is 31 million m^3/a and that in the drier Overberg East, 2 million m^3/a. The impacts have not been studied to the same level of detail as in the Breede River component. The estuaries and wetlands of the Overberg East catchments are particularly impacted by invasive plant infestation. The 1 in 50 year surface water yield is estimated at only 3 million m^3/a in the Overberg East of which 66% (2 million m^3/a) is lost to invasive alien plants. Clearing of invasive alien plants offers the potential to provide for the Reserve. The Kars and Nuwejaars Rivers in the Overberg East, feed the Heuningnes Estuary and clearing in those rivers could generate freshening flows.

Throughout the WMA, the aquatic environment would benefit substantially from low flows that are regained through the clearing of invasive alien plants, as would the potential yield available from those catchments. Besides the direct benefits that will be derived from continuing and intensifying the clearing efforts, other social and ecological benefits have considerable economic value. Commercial opportunities exist through which clearing operations on private land could be encouraged. These include the utilisation of cleared vegetation for pulp or charcoal production.

Strategic Approach

The Wetlands and Estuaries Strategy (8.2) makes recommendations on the ranking of the estuaries in terms of ecological importance. This same order of priority could be used as a starting point for prioritising clearing efforts in the Overberg catchments. Ultimately however, the priority must lie within the Breede River component, where water resource development for in-catchment requirements, establishment of resource poor farmers, augmenting supply to urban users in the Berg WMA and providing for the Reserve in the Breede River and its estuary are all important aspects from both a local and regional development perspective.

The clearing of invasive alien plants within the Breede River component should be programmed according to the order of priority listed in the situation assessment of this strategy. However it is also recommended that the existing clearing programmes in the Riviersonderend (notably those upstream of Theewaterskloof Dam) and Upper Breede catchments be continued, and preferably intensified, so as to not forgo the investment already made in those areas. Early attention should be given to clearing efforts in the catchments with lighter infestations, particularly the Cogmanskloof, Ceres and Middle Breede sub-areas, before these areas become densely invaded. Prevention is always better than cure, and very, very much cheaper.

Based on the potential benefits of clearing, particularly in terms of making water available within the Breede WMA, a vibrant invasive alien plant clearing programme must be maintained in this WMA. A situation approximating total eradication is required in the Breede River component. Bio-control is the most cost effective approach for most species and should be introduced wherever possible.

Management Actions

The following actions are required:

- ⇨ Improve estimates of the impact on yield of alien plant infestation outside of the Breede River component (Overberg, Palmiet) taking into account the methodology used in the BRBS.
- ⇨ Consider the provision of incentives to private landowners for clearing invasive alien plants. A major incentive would be to allow land-owners to use some or all of the water released through clearing practices on own land.
- ⇨ Ensure that catchment management charges are applied equitably and effectively towards invasive alien plant clearing, with the ultimate goal being the removal of all invasive alien plants.
- ⇨ WfW need to: (i) complete invasive alien plant mapping and interpretation from 2001 aerial photography, and (ii) reconcile the mapped information against actual field surveys to verify its accuracy.
- ⇨ Monitor the impacts of clearing of invasive alien plants – water yield, sedimentation and quality.
- ⇨ Prepare a clearing strategy in the Breede WMA from a water resource management perspective. This should include priority areas, a strategy of prevention by tackling less invaded areas and thus avoiding the densification of populations, together with support for bio-control initiatives.
- ⇨ Water resource priorities should be discussed with WfW and the implementation strategy aligned with these, and other needs.

Responsibility and Priority

The implementation of the **Changing Land-Use: Clearing of Invasive Alien Plants Strategy** is the responsibility of the RO in conjunction with the Directorate: Working for Water as well as the Directorate: Water Abstraction and Instream Use. In light of the potential of clearing as a cost effective reconciliation intervention, this strategy is of the highest priority - **Priority 1**.