SECTION 2 : STRATEGY TABLES

AMATOLE – KEI INTERNAL STRATEGIC PERSPECTIVE

STRATEGY TABLES

INTRODUCTION

The water resource management strategies presented in this **Section 2** of the Amatole – Kei ISP draw on the information detailed in the previous situation assessment chapters provided in **Section 1**. The strategies presented provide a basis for DWAF's management of the water resources of the area until such time as responsibility can be handed over to a Catchment Management Agency (CMA).

The approach adopted in developing these strategies is given in **Section 1, Chapter 1.3.2**. It has not been possible in this first phase of the ISP process to formulate all the details pertaining to every strategy, but rather to provide a framework for each strategy within which the details will be developed, both by DWAF and the CMA once it has been established.

The strategies are grouped under ten main headings. Where the need for certain strategies has been identified, but the information for a detailed situation assessment is lacking, future management action will be required to further develop those strategies. This applies specifically to the following areas:

- Improved knowledge regarding ecological water requirements (Reserves) is essential to determine the volumes of water available to users.
- The removal and/or licensing of invasive alien wattle plantations in the ISP area could affect the local rural economy. This is connected to a strategy for further commercial forestry in the area.
- Need for a comprehensive Soil Conservation Programme to be undertaken by the Department of Agriculture with the support of DWAF in order to protect the water resources from sediment runoff.
- Transfer of water from Ncora Dam to the Mbashe catchment for the generation of hydropower by Eskom and for the Ncora Irrigation Scheme.

STRATEGY NO. 1

YIELD BALANCE AND RECONCILIATION

Need for Yield Balance and Reconciliation Strategies

The various sectors within the Amatole – Kei ISP area have different overall water requirements and these requirements are generally at different levels of assurance of supply. The individual rivers in the sub-areas vary from stressed to unstressed catchments compared to the overall yield balance for the whole ISP area, which shows a surplus. Expected economic growth coupled with the need for urban expansion especially in the Buffalo City Municipality (BCM), and the revitalization and expansion of irrigation schemes in the former Ciskei and Transkei homeland areas will place further demands on the available water resources.

Yield balance and reconciliation strategies address the need to:

- ⇨ Clarify uncertainties and information gaps regarding the availability of surface water and groundwater.
- ⇨ Undertake detailed water requirement investigations including obtaining more accurate information on ecological Reserve requirements.
- ⇨ Develop and implement water reconciliation strategies for specific systems, geographical areas or water sectors. By far the most important strategy is for the Amatole Water Supply System (AWSS), which supplies BCM and some irrigation.
- ⇨ Implement compulsory licensing, if necessary.

The strategies further address the key elements of:

- Future water supply to the Queenstown/Sada region.
- The importance of irrigation as potentially the largest water user sector and one of the pillars for economic growth and poverty eradication.

Adequate amounts of water for urban, industrial and agricultural use at acceptable assurances of supply are required for BCM and Queenstown, rural towns and villages and for irrigation. This will require co-ordinated and timeous planning in order to meet future demands. Reference should be made to Strategy No. 3.1 (Water Allocations and Licensing) for additional information.

Relevant Identified Strategies

The following specific strategies have been developed:

1.1 Water Availability, Use and Reconciliation
1.2 Groundwater Resources
1.3 Reconciliation Strategy for Buffalo City
1.4 Reconciliation Strategy for Queenstown
1.5 Water Supply to Irrigation Schemes in Former Homeland Areas
1.6 Re-use of Water

1.1 WATER AVAILABILITY, USE AND RECONCILIATION

Management Objective

To identify and address the uncertainties, assumptions and gaps in the information/data and methods used to determine the water availability and water demands in the various catchments and systems of the Amatole – Kei ISP area.

Situation Assessment

Reference should be made to Reconciliation Strategies for Buffalo City and Queenstown (Strategy Nos. 1.3 and 1.4).

The accuracy of the yield of the surface water and groundwater resources is dependent on the **reliability of the available input data**, of which rain gauge data (reliability and record length), flow gauge data, water abstraction, and land use are the most significant. Changes in land use activity (including removal of invasive alien plants), transfer of water authorisations, re-use of water and utilisation of groundwater resources will introduce both quantity and quality impacts.

It is difficult to make important decisions regarding water allocations based only on broad brush modelling estimates unless there is reliable input data. At present most of the data available for the former Ciskei and Transkei areas precedes 1980 with very little data having been collated in the past twenty years. In addition there are only a few reliable flow gauges. The installation and maintenance of additional stream flow gauges and rain gauges must receive a high priority in the ISP area. **Water availability** is also very dependent on the classification of the various freshwater bodies in terms of the ecological Reserve requirements, which should be estimated to at least an intermediate level (refer Strategy No. 2.2). The pristine nature of many of the rivers in the ISP area will require high ecological Reserves, which will need to be more accurately determined and taken to public consultation in areas where water deficits arise.

In order to accurately define the yield balance in any particular catchment, it is necessary to estimate the present water demands and the most likely growth pattern in the future. The latter depends on accurate **water use** data in the catchments, which is often not available due to the lack of water meters in the water distribution systems, as well as the inaccuracy of water meters especially after a number of years of use. Future growth patterns in any area depend on an interaction between demographic, socio-economic, environmental and political factors, HIV/AIDS, amongst others, which are not always well understood and which change over the years. It is therefore important that water availability and water requirements and the subsequent yield balances are updated for each catchment on a regular basis. Historically this has not happened in this ISP area, apart from the Amatole and Upper Kei systems, with the result that yield balances in most of the catchments of the area are not accurately defined and are best estimates based on outdated data.

The Amatole Sub-area

The yield of the area was updated and extended as part of the Amatole Water Resources System Analysis (Phase II) in 1999 (**Ref. 4 and 26**). The system consists of seven dams viz. the Maden, Rooikrantz, Laing and Bridle Drift Dams on the Buffalo River, the Nahoon Dam on the Nahoon River and the Gubu and Wriggleswade Dams on the Kubusi River, an inter basin transfer tunnel, canals, purification works, pump stations and bulk supply pipelines.

The quantity of water available in the sub-area including inter-basin transfer from Wriggleswade Dam on the Kubusi River to the Buffalo and Nahoon catchments at a 98% assurance is 98 million m^3/a with 78 million m^3/a allocated for domestic, urban and industrial use plus an allocation of 20 million m^3/a for irrigation and afforestation. Based on the BCM Water Services Development Plan (**Ref. 5**), the high

growth scenario for water demand in the region shows a growth in domestic, urban and industrial use from 50 million m^3/a in 1996, to 69 million m^3/a in 2005, to 101 million m^3/a in the year 2015 ie an average annual growth of approximately 3,5% p.a. No growth in the irrigation sector is expected. The low growth scenario for water demand is marginally less than the above high growth figures (less than 1%). The high growth scenario for the BCM area is almost double the growth projected for the whole Amatole sub-catchment of 1,9% p.a. for the years 2000 to 2025 (**Ref. 8 - NWRS**). This is based on the fact that most economic growth opportunities and population growth will occur within the BCM area.

Based on these figures and without water conservation and demand management programmes (WCDM), water re-use or alien plant removal, the available raw water supply is expected to meet the demand on the system up to the year 2012, at which time additional raw water supplies will be required. This date may be delayed depending of growth in the area and if WCDM, water re-use and invasive alien plant removal efforts are implemented successfully. The largest unknown factors in establishing the reconciliation for the area and the timing for new raw water supplies are :

- The projected water requirement scenario for the area. The water requirements of industry (especially wet industries) still to be attracted and established in the new East London Industrial Development Zone (ELIDZ) and the growth of the urban sector within the BCM can only be roughly estimated at this stage.
- The effect of WCDM measures still to be implemented. It is estimated that water use could be reduced by a least 6 million m^3/a.
- The additional water due to invasive alien plant removal in the upper Buffalo and Kubusi catchments. Preliminary estimates show that an additional 1,3 million m^3/a may be made available for use.
- The viability of treated effluent re-use for industry. The ELIDZ developers are currently conducting a feasibility study on the supply of treated effluent (approx. 6 million m^3/a) from the East Bank Water Reclamation Works to the new ELIDZ.

Once the available water resources of the present system have been fully utilized, additional raw water could possibly be made available from one of the following identified surface water resources:

- Transfer of water from the Keiskamma River catchment to the Buffalo River catchment – from Sandile and Binfield Park Dams if these dams are not fully utilized for local use or abstraction weirs in the middle and lower reaches of the catchment.
- Further regulation (dam) of the Nahoon River.
- New dams and/or abstraction works on the Gqunube, Kwelera and Great Kei Rivers.

The available water resources from these conceptual proposals have not been studied in detail. Accurate flow gauging data should be collated for these rivers in preparation for such a study together with revised water demand estimates for the catchments. A flow gauging weir will be installed in the lower Kwelera River within the next twelve months. Water re-use options could compare favourably with these options.

Groundwater resources are not expected to make any impact on the volume of available water other than for small coastal and rural village supplies

The Keiskamma Sub-area

This sub-area is mainly located in the former Ciskei homeland and has not been studied in any detail for over twenty years, with the result that there is low confidence in the available information. In view of the important role that the river and its dams (Binfield Park, Sandile, Cata and Mnyameni) will play in the rehabilitation of irrigation schemes, economic growth and poverty alleviation in the region as well as being a possible future source of raw water for BCM, it is imperative that an accurate assessment is undertaken of the available water resources as well as the water requirements within the catchment based on up to date information.

Upper Kei Sub-area

The Upper Kei Basin Study (**Ref. 19**) was completed in 1993 and included a detailed investigation into the yield balance in the catchments of this sub-area. The Queenstown Regional Water Supply Feasibility Study (**Ref. 20**) was completed in 1997. A DWAF follow up study is currently being undertaken to reconsider reconciliation intervention options and to develop an implementation strategy. This study will be complete in March 2005. The recommendations contained in this study will then be implemented by the Chris Hani District Municipality. The already completed studies indicated the following yield balances:

Klipplaat/Oxkraal Catchment (S32D/E/F/H)
The present allocation for urban use from Waterdown Dam for Queenstown and Sada/Whittlesea is 8,25 and 4,2 million m^3/a respectively with a further allocation of 14,8 million m^3/a for irrigation. The actual yield of the dam (17,5 million m^3/a) is less than these allocations. Due to the fact that some of the allocation for irrigation is not currently used, no major water shortages have been experienced.

This situation could change with the revitalization of the Shiloh Irrigation Scheme, the taking up of existing allocations for other irrigation and for urban use in Queenstown, and by the fact that the ecological Reserve may be larger than is assumed at present.

The yield from Oxkraal Dam, which could be used to supplement the above allocations, is 5,5 million m^3/a. However, there is still a substantial shortfall in the ability of the system to meet the water allocations at the required assurance of supply. This is exacerbated by the water losses in the river downstream of the dam.

It should also be noted that there is substantial use of water upstream of Waterdown Dam, both for opportunistic irrigation from small dams, as well as directly from the Klipplaat River. This usage represents some 20% of the runoff into the dam and has a significant impact on the yield of the dam.

Additional water could be made available for urban use by means of the following options :

- Operating the Waterdown and Oxkraal Dams as a system.
- Increase the yield of Waterdown Dam by raising the wall.
- Transfer of water from Xonxa Dam.
- Use the unused portion of yield from Bushmanskrantz Dam.
- Reduce the water allocation from Waterdown Dam for irrigation by trading of water rights.
- If possible, reduce the run-of-river use upstream of Waterdown Dam.
- Construct a dam on the Klaas Smits or Black Kei Rivers.
- Increase the use of groundwater (if found to be available) as an alternative supply for irrigation.

The current DWAF study to update the information contained in the previous Queenstown Water Supply Feasibility Study (1997) (**Ref. 20**) will address the above.

Upper Black Kei Catchment (S32A/B/C)
The catchment includes the Black Kei River down to its confluence with the Klipplaat River. The current and projected water requirements based on original developments at the Nthabethemba Scheme (excluding ecological Reserve requirements) are in excess of the available water resources. However these lands are no longer irrigated with only some 50ha at Tentergate and a small area at Glen Brock being irrigated. The Thrift and Limietskloof Dams in the upper catchment are currently unutilized. The Glen Brock and Thrift Dams have dam safety problems and a decision is needed on the future of these two dams. The Thrift Dam is important from a recreational perspective due to its use for trout fishing and could be sold.

If required, additional water resources could be harnessed by development of the groundwater resources in the catchment, which are believed to be favourable. Further study of this catchment is required due to the outdated data available.

Klaas Smits Catchment (S31)
Both the surface and groundwater resources of this catchment are heavily exploited, with water requirements exceeding the available water. A significant portion of the water requirements (allocation of 8,25 million m^3/a for Queenstown) is met by importing water from Waterdown Dam and by re-using water from the Queenstown effluent treatment works for irrigation purposes downstream of the town. Queenstown also obtains 1,5 million m^3/a of its supply from Bongolo Dam within the catchment. The water requirement for Queenstown was 7,3 million m^3/a in 2002. Based on the NWRS predicted population growth rates, the water requirement will increase to 7,7 million m^3/a in 2005 and 8,4 million m^3/a in 2015.

The bulk of water for irrigation is opportunistic either from run-of-river but mainly from alluvial groundwater resources. It has been estimated that groundwater abstraction rates may exceed the sustainable yield. But without adequate data on the groundwater resources in the catchment it is not possible to accurately estimate the water balance.

Lower Black Kei Catchment (S32J/K/L/M)
The main use of water in this catchment is for irrigation with water allocated from Waterdown Dam. However, this allocation makes no allowance for losses between the dam and the irrigation areas. In addition there is an over-allocation of water from the dam. This results in a shortfall between available resources and water requirements. Ecological Reserve requirements for the catchments are not well known.

White Kei Catchment (S10)
The available water resources within the overall catchment exceed the water requirements. However, within the upper catchment of the Cacadu catchment above Macubeni Dam, the water balance shows a deficit due to irrigation requirements, domestic use for Lady Frere and surrounding rural villages from Macubeni Dam, and for the ecological Reserve requirements. The catchments above and below Xonxa Dam have a surplus of water with the yield from the dam more than meeting the irrigation requirements. Although it is known that there is a surplus of water from Xonxa Dam (the dam is being considered for supply to Queenstown) accurate data will only be known on the conclusion of the update to the Queenstown Water Supply Study presently being undertaken.

It is believed that the groundwater resources of the catchment may be a great deal larger than previous estimates with reports of deep borehole drilling (300m) in the ring structures delivering yields in excess of 30 l/s. This aspect is being further investigated under a Water Research Commission (WRC) funded project.

Doring and Indwe River catchments (S20)
The available water resources within this catchment with the Doringrivier and Lubisi Dams exceed the water requirements. This provides the opportunity for the revitalisation and expansion of the Qamata irrigation scheme downstream of the Lubisi Dam. Ecological Reserve requirements need to be more accurately defined as do the groundwater resources.

Middle Kei Sub-area

The available water resources above the Ncora Dam on the Tsomo River exceed the requirements of the upper catchment. The transfer of water from the dam to the Mbashe catchment for the Ncora irrigation scheme (20 million m^3/a) and for hydropower generation by Eskom (85 million m^3/a) both at Ncora and Collywobbles is not adequately quantified. Flow gauging is currently being installed to measure the amount of water transferred to the Mbashe catchment for hydropower generation and at the start of the Ncora irrigation canal. The theoretical average figure previously used by DWAF is 85 million m^3/a. This figure is not an accurate estimate of previous transfers where in high rainfall years it is estimated that over 120 million m^3/a has been transferred and in poor years less than 65 million m^3/a. As part of the Emerging Farmer Study currently being undertaken by DWAF as well as the new gauging equipment, more accurate data will become available on the actual yield of Ncora Dam, water requirements and surplus water.

Below Ncora Dam the Tsomo River is joined by the Tsojana River with the Tsojana Dam in the upper catchment. There is a surplus of water below the confluence of these two rivers due to the unused yield from Tsojana Dam. This will need to be confirmed once the Ncora Dam water balance has been more accurately defined. This will entail high level interaction with Eskom in order to determine the most beneficial use of the water in the catchment.

Within the Thomas River catchment there is a water deficit due to the high run-of-river use for irrigation resulting in reduced water for ecological Reserve requirements. The water requirement and balance in this catchment need to be more accurately defined.

There is an overall small deficit in the water balance in this sub-area due to the large inter-basin transfer of water to the Mbashe catchment.

Lower Kei Sub-area

The lower Great Kei River has a surplus water balance but due to the river and estuary having a very important eco-status, it is necessary that at least an intermediate Reserve determination be undertaken.

Within the sub-area General Authorizations apply to the Kubusi catchment above Wriggleswade Dam and to the Gcuwa River above Xilinxa Dam. All surplus water resources in the former have been reserved for urban use in the catchment and for inter-basin transfer to the Buffalo City Municipality.

The available yield from Xilinxa Dam has been allocated to Butterworth and for rural domestic use. However, these water allocations have not been fully utilized due to the lack of development in Butterworth and the slow implementation of rural water supply. Owing to the unknown losses in the river between the dam and Butterworth as well as the ecological Reserve requirements, it is not possible to accurately define the water balance in this subcatchment. There is a need to undertake this exercise due to the pressing demand for water supply to the rural areas.

Future water requirements in this catchment will be mainly for rural water supply and for domestic supply to a developing Kei Mouth/Morgan Bay tourist resort. A proposed mining development at Wavecrest using water from the Great Kei River has been shelved for the present.

Whole Amatole-Kei ISP Area

The following issues and concerns have been identified :

- Available information on the following general aspects is inadequate:
  - Accurate yields from farm dams and run-of-river yields for all ISP sub-areas.
  - Ecological Reserve requirements of both rivers and estuaries and their effect on the yields of the water sources.
  - The impact of invasive alien plants on the yields of water sources.
  - The distribution, types and areas of crops irrigated and their water requirements.
  - The reasons for the limited use of the groundwater resource in relation to its apparent total potential, especially in the upper and middle Kei catchments. This aspect is currently being addressed in the latest Lukhanji (Queenstown) Water Supply Study due for completion in March 2005.
  - Up to date hydrology and yields for rivers and dams in the former Ciskei and Transkei homelands.
- Lack of sufficient flow and rainfall gauging stations, especially in the catchments of the former Ciskei and Transkei homelands. These catchments include the Keiskamma, the Black Kei, the Klipplaat, the White Kei, the Doring and the Tsomo Rivers.
- The need for revised yield balance scenarios for the Amatole Water Supply System using the results of the Amatole Environmental Study completed in 2002 and up to date projections for urban demand within BCM.
- The need for a revised yield balance scenario for the Klipplaat River Government Water Scheme, which includes supply to Queenstown. This aspect is currently being addressed in the latest Lukhanji Water Supply Study due for completion in March 2005.

- The need to re-assess the available yield from Xonxa Dam as a potential supply to Queenstown.
- The lack of information regarding the available sustainable yield of the groundwater resources in the ISP area.
- Implementation of the Provincial Department of Agriculture (PDoA), the Co-ordinating Committee for Agricultural Water (CCAW), and the District Municipalities (DMs) programme for the revitalization and expansion of irrigation schemes based on available funds.
- The lack of further surface water resources for domestic rural water supplies in the area presently supplied from Macubeni Dam. Further supply will have to be based on additional dams or groundwater resources.
- The present and future requirement for water for hydropower by Eskom from Ncora Dam.
- The available yield from Ncora Dam in order to include the ecological Reserve requirements and revise the allocation for basic needs, irrigation and hydropower.
- Land use, type of crops, farm dams and irrigation water requirements in the Thomas catchment.
- Revised water allocation from Xilinxa Dam on the Gcuwa River due to the changing growth pattern in Butterworth.

Strategic Approach

Reliability of data
Improve the knowledge of surface water availability by promoting the installation of more rain gauges and gauging stations throughout the ISP area. A priority list should be compiled. Increase the number of water level recorders in the catchments of important estuaries. Update the information with respect to existing and future water requirements in the catchments.

Water availability
Update the hydrology and yields of the river systems according to a priority list to be drawn up by the RO. The priority list should be based on specific needs, such as a water use licence applications or if there is reason to believe that the yields will change when more recent ecological Reserve requirements are taken into account.

Address the lack of groundwater information by initiating studies and installing systems that improve knowledge about groundwater availability throughout the area, but especially in the Great Kei catchment.

Water use
Complete water supply studies already started by DWAF eg. Lukhanji (Queenstown) Water Supply Study and the East Cape Resource Poor Farmer Study.

Reconciliation studies that take into account the most up to date information are required in the most critical areas of the study area. This especially applies to the Amatole Water Supply System.

Once accurate information regarding the use of water by Eskom becomes available, it will be necessary for DWAF to liaise with Eskom and establish their future hydropower needs and strategies for their hydropower stations in order to undertake a reconciliation study for Ncora Dam and the catchment.

Management Actions

1. Increase stream flow and rainfall gauging especially in those river catchments that were located in the former Ciskei and Transkei homelands (refer Strategy No. 9.1).
2. Determine run-of-river and farm dam yields for the prioritized catchments.
3. Undertake more detailed ecological Reserve determinations (intermediate to comprehensive) on the river systems based on a prioritized list (refer Strategy No. 2.2).
4. Calculate the present and potential impact of invasive alien plants on yields in this ISP area (refer Strategy No. 3.2).
5. Improve knowledge on irrigation areas, crop types and water use from the registration process where possible.

6. Undertake more detailed assessments of the availability and existing use of groundwater according to the Groundwater Strategy No. 1.2.
7. Update the yields of dams in the former Ciskei and Transkei homelands for various levels of assurance.
8. Initiate as a matter of urgency a detailed study on WCDM in the BCM area.
9. Initiate the proposed Amatole Water Supply Scheme Reconciliation Study in the near future (refer to Strategy Nos. 1.3 and 8.1).
10. Complete the Lukhanji (Queenstown) Water Supply Study and implement the recommendations contained therein. This study will include recommendations for solving the over allocation of water from Waterdown Dam as well as the possible use of water from Xonxa Dam and other dams in the catchment (refer Strategy Nos. 1.4 and 8.2).
11. Continue to assist the PDoA and DMs with an implementation programme for the revitalization and expansion of irrigation schemes (refer Strategy No. 6.1).
12. Undertake a groundwater study to determine the available groundwater resources for use in augmenting the Cacadu Regional Water Supply Scheme presently supplied from Macubeni Dam.
13. Initiate discussions with Eskom and determine their future strategy with respect to future hydropower generation at Ncora and Collywobbles. If necessary, initiate a study to determine alternative uses of water from the dams that will be more beneficial to the local population in terms of poverty eradication and economic growth. This latter aspect is being partially investigated in the East Cape Resource Poor Farmer Study.
14. Undertake a reconciliation study to investigate the possible re-allocation of water from Xilinxa Dam on the Gcuwa River.

Responsibility

DWAF Regional Office with the assistance of the Directorates : National Water Resource Planning, Options Analysis, and Information Programmes (Geohydrology).

Priority

Priority 2 – High.

1.2 GROUNDWATER RESOURCES

Management Objective

The key management objective is to evaluate the groundwater resource situation for the ISP area and to propose management actions to obtain better a understanding and management of groundwater resources in the WMA .

Situation Assessment

Groundwater primarily supplies rural villages and coastal resorts. The economic and/or social cost is high in the event of failure of supply and is almost always as a consequence of poor management. Due to the nature of the water supply programmes, limited resource evaluations on regional and local scales are available from studies documented in the DWAF BoTT programme and other local government programmes. It is a concern to DWAF RO that studies and development of groundwater are undertaken by other central government departments, local government, aid organizations and the private sector without a more integrated involvement by DWAF. As a result much information is lost. Groundwater use registration is incomplete.

Detailed knowledge of the following aspects could lead to a much greater understanding of the groundwater resources of the region:

- The contribution of the ring structures at Butterworth, Komga, Toleni and Cathcart.
- The variation of water quality between the fractured and intergranular rock.
- The contamination of groundwater resources due to poor construction of VIPs.
- The negative effect that soil erosion may have on both the quantity and quality of groundwater.
- The limited available borehole as well as spring monitoring data.
- The importance of a strategic management relationship between Geohydrological Provinces and catchment management areas.

Strategic Approach

There are five key priorities:

1. To compile a clear management view on the importance of groundwater for this ISP area.
2. To develop close co-operation and common purpose with existing studies and specialists in order to access and optimize the available knowledge base.
3. To initiate the planning of a GIS data and information base useful to local government, Departments of Land Affairs and Education, other DWAF Directorates, Aid Organisations, NGOs and the private sector.
4. To promote the integration of surface, groundwater and ecological monitoring/data collection, centralization of results and access at ROs and regular interpretation and use of the results as input into an accessible GIS based information system.
5. To compare groundwater supply in relation with the socio-economic context and identify needs in order to ensure sustainability of the resource.

Management Actions

The following actions are required:

- Continue to strengthen and promote the groundwater component of the water management institution.

- Investigate the introduction of Geohydrological Provinces in the formal water management areas.
- Quantify the strategic importance of the linear features that extend along WNW/ESE trends between King William's Town and East London.
- Continue to develop groundwater schemes in the ring structures as a strategic water resource in the WMA.
- Identify and protect areas that are susceptible to groundwater contamination.
- Engage in discussions with the Department of Agriculture concerning soil erosion and degradation of groundwater resources.
- Develop a proper monitoring network for both groundwater and springs.

Responsibility

DWAF Regional Office and Head Office Directorate : Information Programmes (Geohydrology).

Priority

Priority 1 – Very high and ongoing.

1.3 RECONCILIATION STRATEGY FOR BUFFALO CITY

Management Objective

To draw up a plan of action to ensure that the water requirements of this important area are always met at acceptable levels of assurance. This must be undertaken with the co-operation of all role players to ensure that buy-in is achieved.

In achieving this objective DWAF must ensure that all the existing water resources are being optimally used.

Situation Assessment

(Note : This strategy should be read in conjunction with Strategy Nos. 1.1 and 8.1)

Growth in raw water requirements in the BCM area due to expansion of urban and industrial demands is expected to exceed available supplies sometime around the year 2012 (for a 98% assurance of supply). The date will depend on measures adopted by the BCM, such as water conservation and demand management programmes and water re-use, as well as the growth in demand from the new East London Industrial Development Zone (ELIDZ).

Due to the importance of the area as a centre of economic activity and future economic growth for the region as a whole, the highest priority should be given to ensuring that a sufficient supply of raw water at a high level of assurance is always available. The estimated urban water requirement (ignoring WCDM programmes still to be initiated) for BCM of 79 million m^3/a by the year 2012 will be close to the maximum available yield of 80 million m^3/a (**Ref. 3, 4 and 5**). However, owing to changing growth patterns in the BCM area over the past six years, these demand figures need to be revisited and revised. The ecological Reserve estimates will also have to be revisited in order to determine more accurate yield estimates where necessary. The available yield also assumes transfer from the Wriggleswade Dam (18 million m^3/a), which is currently not being transferred to the Buffalo River due to several years of above average rainfall in the catchments. Time is of the essence as the development of raw water resources can take up to ten years.

Limited financial and skilled manpower resources within the local authorities and parastatal organisations are resulting in the breakdown of adequate service provision, a lack of effective operational and maintenance activities, and a lack of planning and provision of capital works to meet the needs of the region. The Water and Sewage division of the BCM is 35% understaffed at present, although the situation is far worse due to the loss of experienced personnel.

Groundwater is unlikely to play any significant role in water supplies to BCM, other than for rural villages and coastal resorts within the municipal area.

Strategic Approach

The main issue of **additional water supply for Buffalo City** first requires that the following sub-issues be addressed.

- Ownership, operation and maintenance of the Amatole Water Supply System is complex with at least four organizations being involved ie DWAF, the Amatola Water Board (AW), the Amatole District Municipality (ADM) and the BCM. Different organizational structures with different objectives, planning and management systems, tariff structures etc are leading to a breakdown of co-operative governance, disjointed planning and sub-optimal use of the available raw water supplies of the system. Reference should be made to Strategy No. 8.1 for additional details.
- High water losses are occurring in areas such as Mdantsane due to run-down, vandalised and poorly maintained water infrastructure as well as illegal connections.

- Limited re-use of treated effluent is currently taking place by industry and for irrigation of golf courses. Owing to their proximity to the coast some effluent treatment works discharge waste water either directly into the sea or into rivers below existing dams. This includes the new Hood Point sea outfall on the West Bank which will discharge large amounts of screened raw sewage.
- Large infestations of alien plants (silver and black wattle) in the upper Buffalo, Nahoon and Kubusi catchments are reducing the run-off in these rivers.
- Recent estimates undertaken by the Amatola Water Board (AW) of existing and future water requirements show a change since the last investigations were undertaken as part of the Amatole Systems Analysis (**Ref. 4**). This has come about as a result of the change in the municipal boundaries of the new BCM, the type of industries likely to be established in the new ELIDZ as well as the possible effect of HIV/AIDS. In addition, new methods for assessing the ecological Reserve requirements of the rivers have been developed and used. These estimates need to be accessed and incorporated in the next planning stages.

Management Actions

Before the issue of BCM's existing and future water supply problems can be adequately addressed, it is critical that co-operative governance be re-established. Refer to Strategy No. 8.1. This could be achieved by the formation of an Amatole System Liaison Committee or a System Authority with representatives from all parties in order to improve co-operative governance on an ongoing basis. Alternatively, sound agreements between all parties on all aspects of the operation and management of the Amatole Water Supply System need to be put in place. Once this has been achieved, the main issue and following sub-issues can be addressed in a co-ordinated manner.

1. Undertake the proposed DWAF study titled "Reconciliation Strategy for Large Bulk Water Supply Systems – Amatole Water Supply System (Buffalo City)" within the next two to three years.
2. Ensure that the system is operated according to the recommended operating rules. This should include the application of an equitable tariff structure in order to extract the maximum raw water from the system.
3. Implement a water conservation and demand management programme with a major focus on Mdantsane.
4. Investigate the economical use of treated eflluent especially by existing industries in BCM and by new industries in the ELIDZ.
5. While it is recognized that the use of treated effluent may not always be economical and that effluent returned to rivers does to some extent satisfy the ecological Reserve requirements, it is considered important that the feasible use of treated effluent by industries should be investigated and quantified before any major new raw water resources are developed. Management of the ELIDZ are favourably considering this at present and are conducting feasibility studies for the transfer of up to 6 million m^3/a (20 Ml/d) of reclaimed water from East London's East Bank WWTW to the ELIDZ site.
6. The Working for Water programme is active in the upper catchments of the system but needs to be expanded.
7. Investigate the harnessing of additional raw water resources from all possible sources including :

    - The Nahoon River
    - The Gqunube River
    - The Kwelera River
    - The Great Kei River
    - The upper Keiskamma River (Sandile and Binfield Park Dams)
    - The lower Keiskamma River

A concerted effort is required by all parties to retain, attract and train skilled water and sanitation personnel in the region. This task would be enhanced by, for example, the rationalization of water supply activities under a single Water Authority for the Amatole Water Supply System as recommended in Strategy No. 8.1.

Responsibility

DWAF Regional Office and National Directorates : Water Resource Planning and Options Analysis, together with the Buffalo City Municipality, Amatola Water Board and the Amatole District Municipality.

Priority

Priority 1 – Very high.

1.4 RECONCILIATION STRATEGY FOR QUEENSTOWN

Management Objective

To ensure that sufficient additional raw water resources are developed timeously and made available to the urban areas of Queenstown and Sada/Whittlesea at an acceptable level of assurance to meet the growing requirement for water. In achieving this objective DWAF must ensure that all the existing water resources and dams are being used optimally and that sufficient water is made available for the revitalisation of the irrigation schemes below Waterdown Dam.

Situation Assessment

Owing to the very important role that Queenstown plays in the inland region of this ISP area it is imperative that sufficient raw water and related infrastructure is always available to meet the town's requirements. Previous studies have indicated that additional raw water for domestic purposes would be required by the year 2000, but were based on the assumption that the full water allocation for irrigation was being used, which is not presently the case. Water restrictions were introduced in December 2003 in Queenstown due mainly to the fact that the main supply pipeline from Waterdown Dam could not deliver the peak water requirements and the fact that there was very little water available from the Bongola Dam.

The present allocation for domestic use from Waterdown Dam for Queenstown and Sada/Whittlesea is 8,25 and 4,2 million m^3/a respectively with a further allocation of 14,8 million m^3/a for irrigation. The actual yield of the dam (approximately 17,5 million m^3/a) is less than the sum of these allocations. Owing to the fact that some of the allocation for irrigation is not currently used and that which is used, is at a low level of assurance, no water shortages have yet been experienced. This will change as the irrigation rights are taken up with the revitalisation of the irrigation schemes in the Klipplaat Government Water Scheme/Shiloh area which accords to the provincial government's policy on food self sufficiency and poverty relief. Part of these irrigation allocations could be converted to domestic allocations if it is found that not all the irrigation allocations are needed.

Studies into the future raw water supply to Queenstown and the surrounding region are presently being undertaken by DWAF, the Chris Hani District Municipality and the Lukhanji Municipality. These studies will obtain more up to date information with respect to actual and future domestic and irrigation water supply requirements including ecological Reserve requirements and the yields from Waterdown, Shiloh and Oxkraal Dams and other available raw water resources in the region such as Xonxa Dam. In addition the limitations of existing infrastructure such as delivery pipelines will be investigated.

The Main Issue :

The water allocations from the Waterdown Dam for irrigation and for the urban areas of Queenstown and the Sada/Whittlesea urban complex presently exceed the yield of the of Waterdown Dam. Were it not for the fact that these allocations are not being fully used, the urban areas would be experiencing water shortages. Releases to meet the ecological Reserve will exacerbate the situation. Additional water must be sourced as the irrigation schemes are being revitalized and the urban requirements continue to increase.

Strategic Approach

Future augmentation options to meet the growing water requirements of the region should include investigations into the following:

- Water demand management
  Within Queenstown it is estimated that unaccounted for water/water losses are anything between 10 and 30%. Demand and conservation measures need to be put in place by the

Lukhanji Municipality. During the revitalizing of the irrigation schemes it is important that efficient irrigation systems are installed and that the infrastructure is suitably operated and maintained in order to minimize water losses.

- Industrial use of treated effluent
  Use of treated effluent for industry has been discussed in Strategy No. 1.6. Little opportunity is available in this regard as the effluent is presently used for irrigation on the town's golf course and for pastures below Queenstown while industry in the region is in decline.

- Improved supply system operational aspects
  In order to maximise the available yield from the system and increase water availability for domestic requirements, investigations should be undertaken into the optimal operation of the dams in the Oxkraal – Klipplaat system. Refer to Strategy No. 8.2.

- Water trading / buying out of irrigation rights
  Trading of irrigation rights is a possible viable future urban supply augmentation option.

- Supply from Xonxa Dam
  Previous studies (**Ref. 19 and 20**) identified spare capacity in this dam for possible augmentation to Queenstown. This aspect will be further investigated as part of the present study.

- New dams/weirs
  New dams or weirs on the Black Kei River were previously investigated and also the possibility of raising Waterdown Dam. These options are to be reviewed as part of the study.

Management Actions

Proceed with the proposed Queenstown Regional Water Supply Study (Phase 2) as a matter of urgency and undertake the recommendations of the study according to the recommended time frames through a project steering committee. As part of this initiative, the following needs to be undertaken:

1. Consider all social, environmental and economic impacts and costs in the comparison and selection of future augmentation options.
2. Investigate the current operation of Waterdown, Shiloh and Oxkraal Dams and the Waterdown Dam allocation and implement operational recommendations from the study.
3. Liaise with and assist the Lukhanji Municipality with the implementation of a water demand management and conservation programme.
4. Investigate the viability and possibility of trading/buying out unused irrigation rights from the Klipplaat Government Scheme.
5. Investigate the potential water supply from Xonxa Dam including undertaking a detailed cost-benefit analysis on any proposed scheme and the implication this scheme will have on future water tariffs for Queenstown.
6. Make recommendations on the future use of the Oxkraal Dam, the Thrift Dam, the Limietskloof Dam and the Bushmanskrantz Dam which are all presently underutilized.
7. In the planning of the augmentation scheme consideration should be given to supplying various rural villages from the scheme.
8. A study of the groundwater potential of the region is to be undertaken both as a possible source of water for urban supply and rural villages.

Responsibility

DWAF Directorate : Options Analysis is responsible for bulk water supply planning together with DWAF RO, Chris Hani DM and Lukhanji Municipality for water demand management and effluent re-use.

Priority

Priority 1 – Very high.

1.5 WATER SUPPLY TO IRRIGATION SCHEMES IN FORMER HOMELAND AREAS

Management Objective

To support the Eastern Cape Provincial Government's Growth and Development Strategy (PGDS), which has identified the high growth potential of the agricultural sector in the former homelands as a key component for addressing poverty eradication, household food security and the promotion of economic growth and employment opportunities. This will be achieved by ensuring an adequate supply of raw water at the necessary assurance for those irrigation schemes, which have been identified for rehabilitation and revitalization on a sustainable basis.

Situation Assessment

A large number of subsidized irrigation schemes with the necessary associated infrastructure were established under the former homeland governments in the Ciskei and Transkei. These schemes were largely managed by the homeland parastatal organizations, Ulimicor and Tracor. Large dams with funding from South Africa were constructed to ensure adequate supplies of raw water for these schemes. In the years leading up to 1994 and during the period thereafter while local government structures were being established, the parastatal subsidies were dramatically reduced, the parastatals disbanded and most of the schemes fell into disuse and disrepair. As a result the allocated water for these schemes is either not being used, only partially used, or is being used for domestic supply.

These schemes include the following (refer **Appendix B6**) :

- Tyume scheme
  This scheme is situated below Binfield Park Dam on the banks of the Tyume River, a tributary of the Keiskamma River. It was originally planted with citrus, which was predominantly exported to overseas markets. The scheduled area is 231 ha with an annual allocation of 0,7 million m^3. This scheme is presently being considered for full privatization or a Community Public Private Partnership (CPPP) arrangement. Binfield Park Dam also supplies water to Alice and surrounding rural villages.

- Zanyokwe scheme
  The scheme located downstream of Sandile Dam on the Keiskamma River consists of 471 ha of scheduled lands of which only approximately 90 ha is presently used mainly for maize and vegetables. The total water allocation for the scheme is 1 million m^3/a. Sandile Dam also supplies domestic water to Middledrift, Dimbaza and surrounding rural villages.

- Keiskammahoek scheme
  The Cata and Mnyameni Dams supply water to mainly dairy farming and support enterprises such as pasture lands and maize. Some 744 ha of the scheduled area of 854 ha are estimated to be used at present. The total water allocation for the scheme is 6 million m^3/a. The Mnyameni Dam also supplies domestic water to Keiskammahoek and surrounding rural villages.

- Klipplaat Government Water Scheme
  This scheme receives its water from Waterdown Dam. Water is released into the river channel to supply a scheduled irrigation area of 1905 ha along the Klipplaat River to its confluence with the Black Kei River, and along the Black Kei to its confluence with the White Kei River, a distance of some 150 km. There are considerable losses between the dam and lower irrigators. The Shiloh irrigation scheme, which is currently being rehabilitated forms part of this overall scheme. Lucerne, maize and pastures are the main crops grown. The existing allocations from the dam comprising 8,25 million m^3/a to Queenstown, 4,20 million m^3/a to Sada and 14,83 million m^3/a to irrigation cannot be supported at an acceptable level of assurance.

- Oxkraal scheme
  The Oxkraal and Shiloh Dams were constructed with the intention of irrigating 541 ha of land from Oxkraal Dam and 25 ha from Shiloh Dam for small-scale farmers. The lands were never developed and water from Oxkraal Dam is released for use on land scheduled under the Waterdown Dam. Shiloh Dam is unused at present.

- Nthabethemba scheme
  This scheme comprises a number of separate small schemes along the Upper Black Kei River upstream of its confluence with the Klipplaat River. The schemes draw water from the small dams of Tentergate, Mitford and Glenbrock. Although an area of 1200 ha was developed for irrigation much of this area has fallen into disuse due to the very low level of assurance of water supply from the dams. The situation with respect to an increased assurance of water supply by means of additional expensive dam(s) is unlikely to change in the short to medium term due to the uneconomical status of the irrigation schemes.

- Zweledinga scheme
  239 ha of scheduled land is currently supplied with water from the Bushmanskrantz Dam situated on the upper Oxkraal River. Maize is the main crop. The dam also supplies domestic water to a number of rural villages.

- Xonxa (Bilatye) scheme
  The Xonxa dam was constructed in 1972 with the intention of providing water for some 4900 ha of land along the White Kei River, although only some 3490 ha could be supplied at a 90% assurance. The yield of the dam is approximately 33 million m^3/a at 90% assurance. Only 1643 ha have been developed but much of this has fallen into disuse and until recently only some 60 ha was being irrigated. This scheme is regarded as having a high potential for revitalization although the expected full potential is only some 1000 ha due to the unsuitable soils. A portion of the surplus water from Xonxa Dam is being considered for use for Queenstown.

- Qamata scheme
  This scheme was established in 1966 to promote irrigation by small-scale farmers using water from the Lubisi Dam on the Indwe River. Water is released from the dam and abstracted 9 km downstream at the Lanti weir. Water is then conveyed to the irrigation lands via a 28 km long canal, two balancing dams and thirty four leidams. The scheduled area comprises 2600 ha but much of the infrastructure has fallen into disrepair and it is reported that less than 25% of the area is currently being used. This scheme is regarded as having a very high potential for revitalization and some effort is presently being undertaken in this regard.

- Ncora scheme
  Although this irrigation scheme in the Mbashe catchment does not fall within this ISP area, it was developed in 1978 using water transfer (20 million m^3/a) from Ncora Dam on the Tsomo River. Previous estimates show that the available water from the dam would support some 3000 ha of irrigation which was the area developed at the time. However, for various reasons this once very successful scheme has not prospered in recent years and it is estimated that less than 25% of the area is currently been used. Proposals for revitalizing this scheme and possibly extending it are presently being considered.

A feasibility study funded by DWAF has been commissioned by the Co-ordinating Committee for Small Scale Irrigation Farmers (CCSIS). This study is being managed by the Co-ordinating Committee for Agricultural Water (CCAW), formerly known as the Irrigation Action Committee. The study is investigating the viability of water supply for the possible extension of some of the above irrigation schemes to assist aspiring resource poor farmers (Zanyokwe and Ncora schemes).

The CCAW has commissioned studies into the revitalization of several schemes and on the basis of the study recommendations funds have been made available for upgrading. The Chris Hani DM is currently upgrading the Shiloh Irrigation Scheme.

Strategic Approach

The Eastern Cape Provincial Government has developed a "Strategy Framework for Growth and Development" in the province (**Ref. 27**). In addition to the manufacturing and tourism sectors, the document identifies the high potential in the agricultural sector for addressing poverty eradication through sustainable food supplies, employment and income generation in the rural areas where a majority of the population resides. It has been identified that the deep rural areas within the former homelands has some of the best natural resources in terms of available soils and abundant and developed water resources with an estimated 32,000 ha of potential irrigable land. The realization of this potential will be achieved by :

- Programmes to promote household food security by expanded small-holder production.
- Development of commercial agriculture through optimum use of high potential agricultural land in the former homelands.
- Focusing on land distribution and land tenure reform in order to release land for poor households and for new commercial farming enterprises.

The realisation of the objectives of this provincial strategy and the revitalization and expansion of viable and sustainable irrigation schemes depends to a large extent on the key support given by DWAF. To this end DWAF must provide technical knowledge and co-ordinated and timeous support to the relevant provincial government departments and District Municipalities involved in this initiative. The following committees all provide support to this initiative and have DWAF representation :

- The Co-ordinating Committee for Agricultural Water (CCAW)
- The Irrigation Programme Co-ordinating Committee (IPCC)
- The Co-ordinating Committee for Small Scale Irrigation Farmers (CCSIS).

Management Actions

The following management actions are required :

1. Assist in the establishment of plans, programmes and studies required for the revitalization of irrigation schemes based on an accurate assessment of the available raw water resources, the state of bulk infrastructure, its ability to deliver and due consideration of any vital alternative demands.
2. Assist with the co-ordination of bulk water supply infrastructure development and rehabilitation. This will require close co-operation between DWAF, the Provincial Department of Agriculture (PDoA) and District Municipalities.
3. Develop technical capacity within local government through the development of skills, the redeployment of staff and the allocation of sufficient financial resources (intergovernment fiscal transfers) to District Municipalities.
4. Complete the present study into the Resource Poor Farmers Irrigation Schemes Feasibility Study.
5. In all the above management actions, "people issues" must be at the forefront.

Responsibility

DWAF Regional Office together with the Directorates : National Water Resource Planning and Options Analysis, and the Provincial Department of Agriculture and the District Municipalities including the relevant joint committees.

Priority

Priority 1 – Very high.

1.6 RE-USE OF WATER

Management Objective

To optimize the re-use of water (treated effluent) for irrigation and industrial use as a water reconciliation option before new raw water augmentation schemes are considered.

Situation Assessment

Reference should be made to Strategy Nos. 1.1, 1.3 and 1.4.

The main potential for water re-use on a reasonable scale in the ISP area is within the Buffalo City Municipal (BCM) area and the Lukhanji (Queenstown) Municipal area, both of which will be requiring augmentation of their raw water supplies within the short to medium term. Outside of these areas, re-use will most likely be addressed at the local municipality level only once there is a shortage of water, which is not the case at present. Most local municipalities have adequate water supplies in the short to medium term and treated effluent will mostly be used for irrigation purposes (golf courses, sportsfields and/or vegetable irrigation) or discharged back into rivers.

Within the Queenstown area most of the treated effluent is presently used for irrigation of pastures on either side of the Klaas Smits River south of Queenstown and for irrigation of the golf course. There appears to be little scope for re-use of water for domestic or industrial purposes at this stage of development without reducing the supply of irrigation water, which may threaten the economic viability of the stock farms.

The use of treated effluent is one of the strategies identified by the BCM Water Service Development Plan (**Ref. 5**) to delay the need for augmenting its raw water supplies. Approximately 33 million m^3 of treated effluent is discharged annually from the WWTWs in the BCM area. At present treated effluent is only used for pasture irrigation and for the irrigation of golf courses. The majority of treated effluent is either returned to the upper/middle Buffalo River, resulting in an increase in mineralisation of the river especially during dry periods (closed circuit loop effect), or treated effluent is discharged into the sea or into a river near the mouth without the possibility of further use. In addition to this, untreated raw effluent is discharged into the surf zone on the West Bank at Hood Point. This is presently being replaced with a sea outfall pipeline, which will be used for the discharge of raw screened effluent from parts of East London and the new East London Industrial Development Zone (ELIDZ) area on the West Bank in East London.

With the development of the ELIDZ and the possibility of new wet industries, the viability of using treated effluent becomes more favourable. As a result, the ELIDZ developers have proposed the construction of a 12km long rising main from the East Bank Treatment and Reclamation Works to provide approximately 6 million m^3/a of treated effluent to new industries still to be established in the ELIDZ. The feasibility study for this pipeline has been complete and a decision is pending on the next phase of the project. Should the proposed industries for the ELIDZ accept this supply (indications are that some will) then the need for future raw water augmentation for BCM could be postponed. The situation with respect to this option is in a state of flux at present. Its resolution will have a bearing on BCM's future raw water needs and the implementation of supplementary sources.

Strategic Approach

DWAF is fully supportive and strongly encourages all initiatives to maximize the re-use of water. Departmental pricing policies for raw water use and waste water discharge also promote this approach. The licensing of new raw water supplies will be dependent on local authorities first maximizing these opportunities, particularly in areas where water is already a scarce commodity. This message should be conveyed in liaison meetings.

This strategy must have a high profile, as its successful implementation could delay the construction of major new raw water infrastructure for BCM by several years. A large amount of water in the form of treated effluent, which could potentially be used is presently discharged to sea. This will be a joint

strategy with BCM and the ELIDZ, and will have to be managed and implemented co-operatively. The role of DWAF will be to guide, assist and give direction.

Management Actions

1. DWAF together with the BCM should identify and assist further studies to maximize the re-use of water. Previous studies on the viability and feasibility of treating effluent to certain standards for industrial use, potable use, or irrigation, particularly for the BCM area should be considered.
2. The development of the ELIDZ provides an ideal opportunity for increased use of treated effluent in the BCM area. DWAF should engage with the BCM and ELIDZ officials to support all re-use initiatives and studies for the ELIDZ as a priority.
3. There is a need to ensure that the WSDPs of all local authorities adequately address the need for water re-use, notwithstanding the general surplus availability of water in the region at present.

Responsibility

DWAF together with BCM, the ELIDZ and local authorities are responsible.

Priority

Priority 1 – Very high for BCM and the East London IDZ.
Priority 3 – Medium for other local authorities. Implement over the medium term.

STRATEGY NO. 2

WATER RESOURCES PROTECTION

Need for Water Resource Protection Strategies

The Water Resources Protection Strategy addresses the need for the protection of water resources to ensure their continuing availability for human use by leaving enough water of appropriate quality in rivers, streams and groundwater to maintain their ecological functioning. This will be achieved by:

- Classification of freshwater bodies and determination of their ecological Reserves.
- Setting resource quality objectives for freshwater bodies.
- Addressing water quality management, pollution control and sanitation.
- Addressing pollution sources.

Water required for socio-economic growth must be balanced with the availability of water that is fit for use by all users, including the protection of the aquatic ecosystem. The NWRS defines two complementary approaches for the protection of water resources. Resource Directed Measures focus on the character and condition of the in-stream and riparian habitat, whilst Source Directed Controls focus on the control of water use at the point of potential impact, through conditions attached to water use authorisations.

These strategies will aim to achieve adequate protection for surface and groundwater resources in order to reach a balance between protection and sustainable use.

Relevant Identified Strategies

The following specific strategies have been developed further:

2.1 Water Quality Management
2.2 Reserve and Resource Quality Objectives
2.3 Water Quality in the Buffalo, Nahoon and small urban rivers in Buffalo City

2.1 WATER QUALITY MANAGEMENT

Management Objective

To control, manage and protect the water quality of all surface and groundwater resources thereby either maintaining water quality where it is acceptable or improving water quality where it is unacceptable.

This will be achieved by improving management and control of point sources of pollution, diffuse pollution and spills, including solid and toxic waste sites.

Situation Assessment

Reference should be made to Strategy No. 2.3 for specific and detailed aspects of the Buffalo, Nahoon and smaller rivers within the BCM. These are the most heavily impacted rivers in the ISP area with respect to water quality.

The aim of protecting water resources is to ensure their continuing availability for human use, by leaving enough water of appropriate quality in rivers and streams to maintain their ecological functioning. The Source Directed Controls approach is primarily designed to control water use activities at the source of impact, through tools such as standards and conditions in water use authorisations.

Source directed controls include:

- Best management practice measures that apply nationally.
- Special measures, derived from catchment management strategies and/or plans.
- Site specific measures, stemming from the authorisation process, taking account of considerations specific to the water use being evaluated.

The following issues and concerns have been identified :

- Assessing the extent of pollution of surface and groundwater resources is dependent on suitable monitoring which is not being adequately undertaken on any large scale in the Amatole – Kei ISP area due to a lack of manpower and financial resources.
- There is no clear and detailed action plan on what should be included in the rehabilitation of impacted water resources.
- The quality classification system for the Eastern Cape rivers is still under development, broadly focused on the Water Quality Guideline Document.
- It is unknown which WWTWs, if any, have adequate contingency plans to deal with power outages and spills which are known to frequently occur.
- Groundwater contamination in the area is unknown due to a lack of systematic monitoring. Diffuse and point source pollution from rural and coastal villages on groundwater is known to occur. As most of the coastal resort villages and many of the rural villages rely on groundwater, it is also likely that the sewage disposal (septic tanks, VIPs, bush toilets etc) is impacting on this resource.
- Pollution from villages without adequate sewage, or with solid waste disposal facilities that are located in close proximity to rivers, is generally an unknown factor due to a lack of monitoring but could be cause for concern. This is especially so in those pristine estuaries where septic tank effluent is causing possible pollution. There is a need to protect the identified pristine rivers and estuaries (refer **Appendix B15**).
- Pollution to the middle and lower reaches of the Buffalo, Nahoon and smaller rivers within the Buffalo City Municipal area (refer Strategy 2.3) has been studied and reported on (**Ref. 4**). The result of this pollution is to cause mineralisation, salinization and eutrophication in the rivers and dams, as well as pollution of the main recreational beaches. This impact is

exaggerated by the closed loop effect of water use from and returned to the Laing and Bridle Drift Dams. Eutrophication is resulting in occasional toxic cyanobacterial blooms and in the proliferation of water weeds in some of the main dams.

- Within the Keiskamma and Great Kei catchments poor land use practices on dispersive soils is resulting in erosion leading to highly turbid rivers and siltation of estuaries. Although not quantified this is also having an effect on the quality and quantity of groundwater resources.
- Rehabilitation of defunct irrigation schemes in the upper catchments of the Keiskamma and Great Kei Rivers and the use of fertilizers and poisons may be a future source of pollution if not adequately controlled and monitored.
- Serious pollution of the Gcuwa River, a tributary of the Great Kei River, which runs through Butterworth is occurring due to runoff from industries, urban areas and from the large unlicensed solid waste site, which is located on the river bank. There is an urgent need to close this solid waste site and develop a new licensed regional solid waste site.

Strategic Approach

Water quality needs to be managed with the same attention as quantity in the ISP area where in some instances the water quality issues are more urgent. Whilst there is an urgent need for monitoring, the serious water quality issues already identified must be given immediate attention.

DWAF regards the water quantity and water quality management issues in the Amatole – Kei area in a serious light and will take a strong hand in ensuring licence compliance by all facilities (notably solid waste sites and WWTWs) and will work co-operatively with Local Government Authorities to achieve these objectives.

The general strategic approach to promoting the water quality aspects of resource protection will be as follows:

- The prevention, reduction, recovery and treatment of waste will be encouraged by applying best management practice measures as part of source-directed controls.
- If the application of best management practice measures still results in a need for discharge of water containing waste or the disposal of waste, a minimum requirement or standard will apply.
- Until applicable waste standards are developed for implementation, the current General and Special Effluent Standards will apply.
- If the applicable minimum requirements or standards are not sufficient to ensure suitable water quality as required by resource quality objectives, requirements or standards stricter than the minimum requirements or standards will be applied.
- Deviation from minimum requirements or standards, or from special or site-specific source-directed controls, will receive consideration if enforcement of these measures could have significant negative social or economic impacts, which outweigh the ecological benefits.
- Reclassification of the water resource due to irreversible water resource impairment will be considered only under very special environmental value requirements.
- For other water uses that impact on water quality, such as impeding or diverting the flow of water in a watercourse, measures required to meet resource quality objectives will be stipulated by guidelines or directives.

Management Actions

The required actions to address specific and serious water quality management issues and concerns are as follows:

a. Amatole sub-area (refer Strategy No. 2.3)

- Address water quality management problems of the Buffalo, Nahoon and smaller urban rivers with the Buffalo City Municipality, the Amatola Water Board and the Amatole District Municipality with a view to establishing a water quality management and

monitoring plan. As part of this process investigate the adequacy of pollution control mechanisms of industries situated in the Buffalo and Nahoon River catchments.

- Together with WfW develop an action plan for the eradication of water weeds in the dams and river systems in this sub-area.
- Establish monitoring systems to gauge the extent of overuse and pollution of groundwater (salinity intrusion, septic tanks and solid waste sites) for those coastal and rural villages that rely on this source for water use. This action applies throughout the ISP area.

b. Keiskamma sub-area

- Address water quality management problems caused by poor land use practices and potential effects of revitalised irrigation schemes with the Provincial Department of Agriculture (PDoA). A comprehensive soil conservation programme needs to be initiated with the PDoA. This action applies throughout the ISP area.

c. Great Kei sub-areas

- Apply pressure on the ADM to establish a regional solid waste site in Butterworth and close down the existing unlicensed site.

Implement water quality management actions in accordance with best management practice as follows :

1. Complete and distribute the water quality classification documentation.
2. Manage compliance to pollution related General Authorisations and review such authorisations and terms of actual management measures required.
3. Encourage WfW, along with District Municipalities, to compile business plans to address eradication of waterweeds in the EC Province under the invasive alien plant control strategy.
4. Keep point source pollution under control with regular visits.
5. Monitor storm water discharges and spillages from problem industries in co-operation with local municipalities.
6. Hold meetings in sensitive catchments to convey the importance of curtailing pollution.
7. Prepare for the implementation of discharge charges (polluter pays), as recommended in the National Water Quality Framework policy.
8. Through co-operative governance with local authorities, build capacity to ensure that operators of solid waste sites and WWTWs have established plans and procedures for emergency control of spillages, power failures and mechanical breakdowns.
9. Identify and address diffuse pollution from informal settlements through the Dense Settlements strategy.
10. Control diffuse pollution from irrigation schemes through co-operative governance with the PDoA.
11. Get buy-in from local authorities on solid waste site strategies and implement monitoring.
12. Implement the Department's Sanitation Policy and monitor through co-operative governance with local authorities,
13. Encourage local authorities to further develop and enforce bylaws, draft regulations etc to systematically deal with water quality problems with the long-term view of improving the water quality of riverine, marine and terrestrial environments.
14. Develop eutrophication management strategies and actions regarding toxic cyanobacterial blooms including an early warning system for domestic, agricultural and recreational users.

Responsibility

The RO is responsible for developing this regional strategy, assisted by D: WD&D.

Priority

Priority 1 – Very high. This is an ongoing strategy.

2.2 RESERVE AND RESOURCE QUALITY OBJECTIVES

Management Objective

To develop a regional strategy for the determination and implementation of management classes, Reserve requirements and resource quality objectives for surface freshwater bodies, estuaries and groundwater, within the requirements of the national classification framework. This will be done according to the prescribed methodologies by using applicable methods of determination.

Situation Assessment

The aim of protecting water resources is to ensure their continuing availability in order to sustain human use by leaving enough water of appropriate quantity and quality in rivers and streams to maintain their ecological functioning. Resource Directed Measures (RDM) focus on the quantity, quality and the overall health of water resources.

Resource Directed Measures include the following elements:

- Development of a National Classification System for rivers and groundwater.
- Determination of the class of the specific water resource.
- Determine the Reserve in accordance with the class of the resource
- Establish resource quality objectives.

The Directorate : RDM is currently streamlining the process to determine ecological Reserves. Until such time as a National Classification System is in place, a Preliminary Classification will be used to determine Preliminary Reserves. Licence applications are considered individually and decisions about the level of confidence and the method for the Reserve determination (if required) is then made. Intermediate ecological Reserve determinations have been conducted for the Nahoon, Kubusi, Buffalo and Upper Kei Rivers during various situation assessment studies.

Classification
A classification system, which allows for the formal classification of water resources is not yet available. A clear national DWAF policy for the implementation of Reserves and the calculation of allocatable resources is required. Water resources will be managed as far as possible within the boundaries of their management class.

Determination of the Reserve and Resource Quality Objectives
The Reserve comprises two components, namely basic human needs and ecological requirements. It has priority over all other water uses, and the requirements of the Reserve must be met before water can be allocated for other uses. However, where water is already allocated for other uses (existing lawful uses), the requirements of the ecological Reserve may be met progressively over time according to an implementation strategy which should be incorporated into the ISP and Catchment Management Strategy.

Resource quality objectives provide numerical or descriptive statements about the biological, chemical and physical attributes that characterise a resource for the level of protection defined by its class. They include:

- The quantity, pattern, timing, water level and assurance of instream flow.
- The water quality, including the physical, chemical, and biological characteristics of the water.
- The character and condition of the instream and riparian habitat.
- The characteristics and condition of the aquatic biota.
- Regulation and prohibition of in-stream or land-based activities, which may affect the quantity of water in or the quality of water of the resource.

- Other characteristics that stakeholders may wish to abide by.

Resource quality objectives need to be determined along with the setting of Reserves to be able to manage water resources adequately.

The ecological sensitivity of aquatic systems other than rivers has to date not been adequately assessed. The estuarine systems are generally not well studied with inadequate data available for accurate assessments. They are critically important from an ecological perspective and are sensitive to reduced flows and changes in water quality.

Water requirements for the ecological Reserve for most rivers in this ISP area will in general be high due to the relatively pristine nature of the rivers and their estuaries. Of the 40 rivers in the area, some 31 can be regarded as in good to excellent condition (refer **Appendix B15**).

As previously mentioned, a number of intermediate ecological Reserves have been determined on the more developed rivers in this ISP area.

There is a lack of groundwater monitoring data to support groundwater reserve determinations in this ISP area. This aspect of groundwater use and monitoring requires urgent attention and guidance from DWAF at a national level. Notwithstanding this, DWAF will continue to process licence applications for groundwater use until Reserve determinations protocols are established.

The status of Reserve determinations in the various sub-areas is as follows:

a) Amatole and Keiskamma Sub-area catchments

There are 40 rivers of varying size in this sub-area, the majority of which can be regarded as being in good to excellent condition (refer **Appendix B15**). The status of the larger "fair to poor condition" rivers is as follows :

- Keiskamma River : This river is in a fair condition, but with increasing abstraction in the headwaters of the catchment for basic use and irrigation, the river will become increasingly impacted. Only a rapid level Reserve determination has been performed as only water use licences for small woodlots have been received for this area.
- Buffalo River : This river is seriously degraded due to urban activities and the related pollution impacts. The river has the port of Buffalo City at its mouth and is not an estuary in the recognized sense of the word. Preliminary ecological Reserve determinations at intermediate level have been undertaken for the main reach of the Buffalo River and one of its main tributaries, the Yellowwoods River. Due to the serious water quality problems in the Buffalo River, resource quality objectives for all reaches of this river need to be established at a comprehensive level with a view to compulsory licensing in the near future.
- Nahoon River : The condition of this river is regarded as fair. But pollution from the urban areas of Buffalo City, irrigation in the catchment and peri-urban informal settlements are causing an increasing impact on the river and its estuary, which exits onto East London's main recreational beach. A Preliminary Reserve determination at intermediate level has been undertaken for the estuary, which showed that the Nahoon Dam is not releasing sufficient water to satisfy the estuarine ecological demands.

b) Great Kei River catchments

An intermediate Reserve determination has been conducted for the Upper Kei River as part of the Queenstown Water Supply Feasibility Study. A rapid reserve determination was also conducted in the lower Kei River. Due to poor land use practices in the catchment, both the riparian and estuarine ecology is being impacted by heavy siltation loads. It is expected that water from the large dams in the upper catchment, which has not been fully used in the past, will be taken up for use in revitalized irrigation schemes. This will increase the need for

Reserve releases to be determined and exercised. The estuary is highly rated in terms of its ecological importance.

Strategic Approach

In the absence of available resource classifications, Reserve determinations for water resources will continue to be done on an ad hoc basis as the need arises, depending on the availability of resources and information. The RO should keep up to date with the development of reserve methodologies for rivers, estuaries, wetlands and groundwater and ensure the timeous identification and initiation of such reserve studies where required.

Operational releases at dams must, where possible, be matched with releases for ecological requirements. There is a need to develop appropriate dam operating rules to achieve the aims of such releases once they have been determined. The issue of outlet structures at dams that cannot cope with required ecological releases is a serious one. The sizes of floods to be released must first be determined at an acceptable high confidence level before decisions are taken regarding the altering of outlet structures as this may prove to be an expensive operational and capital cost exercise.

Before any development of water resources is considered, a comprehensive study of the aquatic ecosystems in the area affected should be undertaken to ascertain the ecological impact of the development. This will depend on resources available to the Department.

In general DWAF's approach is as follows:

- Maintain the status and the present ecological state of the 31 rivers currently in a good to excellent condition.
- Set RQOs and ensuring compliance.
- Issue licences according to the current level of use and the availability of the water resources taking into account the needs of the Reserve.

Management Actions

In terms of this strategy, the following actions have been identified :

1. Request the allocation of additional manpower resources and funding for the RO for reserve determinations and setting of resource quality objectives according to a prioritized list to be compiled by the RO in consultation with the RDM Directorate.
2. The determination of the estuarine requirements of the Kei and Keiskamma Rivers should be a priority.
3. Develop the river classification at regional level once a formal classification framework becomes available.
4. Implementation of the ecological Reserves and auditing.

Responsibility

The RO, in consultation with the D: RDM, is responsible for implementing this strategy.

Priority

Priority 1: High – Buffalo, Nahoon and Keiskamma Rivers (Buffalo and Nahoon have been done and thus the implementation and auditing of the Reserve is a high priority)
Priority 2: Medium – Great Kei River (specifically the estuary)
Priority 3: Low – Other rivers.

This is a continuous programme that requires immediate and ongoing attention.

2.3 WATER QUALITY IN THE BUFFALO, NAHOON AND SMALL URBAN RIVERS IN BUFFALO CITY

Management Objective

To address the serious environmental impact and degradation that is occurring in the rivers and marine aquatic systems that are located within the Buffalo City Municipal (BCM) area due to high levels of pollution from point and non-point sources.

Situation Assessment

Refer to Strategy Nos. 1.3 and 8.1

Serious pollution of the river and marine environment is occurring within the Buffalo City Municipal area. This is resulting in degradation of the fauna, flora and recreational facilities with negative effects for the tourism industry and the local economy. This together with the health implications is a cause of dissatisfaction among residents of Buffalo City. This is especially so in the deprived areas of the City such as Duncan Village where pollution is further downgrading the already poor quality of life.

Most waste water treatment works in the catchments do have the necessary permits but do not always comply with the standards set. In some instances the capacities of the works are being exceeded. It should be noted that some of these effluent treatment facilities were owned by DWAF but have now been handed over to the BCM.

Most of the bulk sewerage infrastructure is also operating close to or above design capacity with resultant frequent sewage spills. These problems are exacerbated by inadequate maintenance of the infrastructure due to financial and manpower constraints within the BCM.

Additional pollution is caused by leachate from unlicensed solid waste sites, run off from informal settlements with inadequate sanitation facilities, from urban stormwater, from farm abattoirs and from illegal dipping tanks.

High water treatment costs are being incurred due to the high pollution loads and resultant mineralisation and eutrophication resulting in algal blooms, toxic cyanobacterial blooms and excessive water plants in the dams.

Future growth within the Buffalo City area will be hampered due to the unsatisfactory state of existing effluent treatment facilities and the urgent need for additional bulk treatment and bulk reticulation facilities.

The following issues have been identified.

- Inadequate existing effluent treatment and bulk sewerage reticulation capacity.
- Little development to meet future requirements for effluent treatment and bulk sewerage reticulation capacity. The sea outfall works for disposal of raw screened effluent has been stalled due to lack of finances.
- Inadequate skilled manpower and financial resources to address existing problems and planning and development of new facilities within the BCM.
- Inadequate knowledge of quantity and quality of pollution sources especially from industries.
- Lack of monitoring data for all rivers to establish a management plan.
- Need to identify the resource quality objectives (RQOs) and ecological Reserves for the rivers. This needs to be balanced with the capacity of the dam outlets to release water.
- Lack of a co-ordinated approach as different authorities were responsible for effluent treatment works and for addressing sources of pollution (DWAF sanitation programme).

There is also a lack of co-ordination and support within the BCM for addressing the problems due to conflicting demands on limited manpower and financial resources.

- This issue is linked to the required WCDM programme identified for BCM ie. reduce the water usage and the effluent will reduce (refer Strategy No. 4.1).

Strategic Approach

The situation as described above with regard to water quality in the Buffalo, Nahoon and other small rivers within BCM is unacceptable to the Department.

Whilst it is not possible to upgrade all facilities immediately, a programme which will lead to improved management practices, the allocation of appropriate funding for both management and upgrading of facilities, and an audited commitment to meet licensing standards as set down by DWAF must immediately be instituted by the BCM.

Any commercial offender failing to meet waste discharge requirements should institute immediate remedial action or be forced to halt operations until such time as such action has been taken. Where such management is the responsibility of the BCM and the BCM is failing to take due action, then DWAF should employ all its rights and responsibilities in ensuring compliance. DWAF will support the BCM in achieving responsible water quality management given the requisite commitment.

The above approach is adopted in the light of the urgent need for committed action.

The task of addressing the issues identified above would be simplified by the establishment of either a co-ordinating committee or single Water Authority as recommended in Strategy No. 8.1. This Authority would also have responsibility for water quality issues and could co-ordinate planning to ensure a balance between available water resources, water purification, water distribution and effluent treatment.

Management Actions

The following actions are required to address the above issues.

1. Establish a management plan for addressing the state of the rivers and dams. This would include :
   - Identifying all sources and quantities of pollution especially solid waste sites.
   - Establish RQOs and undertake ecological Reserve determinations for the rivers.
   - Identify areas of high pollution impact and embark on a programme with realistic time frames to upgrade the existing treatment facilities and develop new facilities. This will need to be undertaken together with BCM and should address the concerns being raised regarding the sea outfall project.
   - Progressively upgrade the existing and construct new sewerage treatment works and reticulation to meet the projected growth.
2. Assist in ensuring that adequate financial and skilled manpower resources are allocated to addressing the problems both within DWAF and the BCM by, for example, the secondment of staff, use of Amatola Water.

Responsibility

DWAF Regional Office together with the BCM, AW and the ADM.

Priority

Priority 1 – Very high.

STRATEGY NO. 3

WATER USE MANAGEMENT

Need for Water Use Management Strategies

Chapter 4 of the NWA describes the provisions by which water use may be progressively adjusted to achieve the Act's principle objectives of equity of access to water, and sustainable and efficient use of water. Many of the Act's sustainability and efficiency related measures would be applied through conditions of use imposed when authorisations to use water are granted. Formal water use authorisations will also facilitate administrative control of water use by water management institutions, and will form the basis upon which charges for water use may be made, and provide for the collection of water related data and information.

If and when compulsory licensing is introduced, the existing water use control measures need to be strategically implemented to provide a means of reducing the number of authorisations that require processing under the existing arrangement. The protection of water resource must not be compromised through the modification of existing controls.

The Water Use Management Strategy is required to address:

- ⇨ Schedule 1 (basic) water use.
- ⇨ Management of water use in river basins shared with other countries.
- ⇨ Usage of General Authorisations to manage water use.
- ⇨ Validation of the water use registration and verification of the legality of existing water use.
- ⇨ Processing and issuing of new water use authorizations.
- ⇨ Control of invasive alien plants and weeds.

Relevant Identified Strategies

The following specific strategies have been developed further for this ISP area:

3.1 Water Allocations and Licensing
3.2 Invasive Alien Plant Control

3.1 WATER ALLOCATIONS AND LICENSING

Management Objective

To ensure that the available water resources of the Amatole – Kei ISP area are allocated for existing and future requirements in an effective, efficient and beneficial manner in order to improve the social, economic and environmental conditions of the stakeholders while addressing equity considerations.

To achieve this DWAF will have to make decisions on the authorization of water use with the necessary conditions and within the context of the NWRS and ISP water management frameworks.

Situation Assessment

The surface water balance calculations indicate that the quaternary catchments in the ISP area vary from those with positive water balances to those that are approaching or are probably already in a stressed situation. These stressed catchments are mainly, but not only in the upper quaternaries where ecological water requirements (EWRs) rarely allow for any water allocations. It should be borne in mind that the information on which the water balances are calculated, such as the EWRs and existing use of water, requires additional investigation and refinement.

The situation in the sub-areas with respect to surface water resources is as follows:

a) Amatole Sub-area
All main river catchments with the potential to be a further source of raw water for the BCM area in this sub-area have been excluded from General Authorisations (refer **Appendix B14**). The yield of the rivers, including usable return flows of 18 million m^3/a, amounts to 80 million m^3/a. This yield can be augmented by the inter-catchment transfer of up to 18 million m^3/a of raw water from the Wriggleswade Dam on the Kubusi River in the adjacent catchment (S60), thereby giving a total yield of 98 million m^3/a. The total water requirement in the year 2000 was 82 million m^3/a.

- Buffalo and Nahoon River catchments (R20/R30E, F)
These catchments are the main source of water supply for Buffalo City Municipality with possible inter-basin transfer from Wriggleswade Dam.

  Without water transfer from Wriggleswade Dam, the water balance shows a deficit. This deficit is impacting on the ecological Reserve of the catchments, but this could be rectified by means of releases from Wriggleswade Dam.

  Allowing for water transfer from Wriggleswade Dam, the water balance shows a surplus. This surplus is reserved for, and is expected to be taken up by the growth in urban water demand from BCM by the year 2012. The actual time period will depend on the success of reconciliation interventions such as WCDM and treated effluent use and the rate of growth in demand, which will be dependent on the expansion of the formal housing sector and the success of the East London IDZ in attracting industries (wet or otherwise).

  Some 30 million m^3/a of treated effluent from WWTWs is presently discharged into the sea or into the Buffalo River near the river mouth. Use of this treated effluent may be possible and this aspect has been discussed in the Re-use of Water Strategy No 1.6.

  The upper Buffalo River which includes Rooikrantz and Maden Dams is in a stressed state due to an over-allocation and supply of water for King William's Town from the dams. Recent water supply infrastructure has been constructed to allow water from Laing Dam to be pumped back to the town. The cost and quality of Laing Dam water is not however attractive to the BCM in comparison with water from Rooikrantz Dam.

Based on the existing scenario where all spare water is reserved for the BCM, no further water allocations can be made from the Buffalo River catchment.

- Gqunube River catchment (R30C/D)
  This is the third largest river within the BCM area. There are no large dams on the river and no water is supplied for urban use. Only small farm dams and weirs in the catchment supply water for irrigation and stock farmers. It would be possible to increase the yield from the catchment with the development of a large dam(s) on the Gqunube River. However, because of the relatively pristine nature of the river and its estuary, a comprehensive reserve determination would be required in considering this catchment for additional water supplies. Verification of lawful use of water in the catchment will also be required. It should be noted that the transfer of water from Wriggleswade Dam can also be made into the upper catchment of the Gqunube River. This has already occurred for supply to irrigators during the 1993/94 drought period.

- Kwelera River catchment (R30B)
  The hydrology of the river is not well recorded and a flow recording station will be constructed in the near future. In addition the demands on the river are not well known. Based on the ISP water balance analysis, the Kwelera catchment appears to have a small surplus water balance. However, due to the relatively pristine nature of the river and estuary and the low confidence in available data, a comprehensive Reserve determination must be undertaken before further allocations can be considered from run-of-river. The concept of a dam and water supply to the peri-urban communities in the Kwelera and Mooiplaas areas has previously been proposed. Further analysis is required to ascertain the likely additional yield that could be generated by the construction of a dam(s).

- Kwenxura River catchment (R30A)
  This catchment consists of a number of small coastal catchments, which are in a relatively good condition. The catchment is in a deficit water balance if the ecological Reserve requirements are to be met. No further run-of-river allocations of surface water should be considered from these small rivers.

b) Keiskamma Sub-area

- Keiskamma River catchment (R10)
  Apart from the upper quaternary catchments of this river basin there is a water surplus in the middle to lower catchments which is available for allocation should the need arise. It should be borne in mind that revitalisation of the irrigation schemes with water allocations from Binfield Park, Sandile, Cata and Mnyameni Dams is presently underway and this will affect the water balance. The Keiskamma River with its under-utilised dams is also considered an important possible raw water resource for future supply to BCM. In view of the potential of this river with its storage dams in the upper catchment, further water allocations should be limited until the intended Reconciliation Strategy for the AWSS (BCM) has been drawn up.

- Bira/Mgwalana River catchments (R50)
  These catchments form part of the range of pristine coastal rivers, which have high ecological Reserve components. No significant run-of-river allocations should be considered from these rivers. Domestic water supplies are presently sourced from the Keiskamma River. Any increase in demand should be from the same source or from groundwater.

- Chalumna/Gulu River catchments (R40)
  These catchments also form part of the pristine range of coastal rivers, which have high ecological Reserve components. No significant run-of-river allocations should e considered from these rivers. Domestic water supplies are presently sourced from the Keiskamma and Buffalo Rivers. Any increase in demand should be from the same sources or from groundwater.

c) Upper Kei Basin Sub-area

Quaternary catchments S10A and S10E upstream of the Xonxa Dam, catchments S20A to S20C upstream of the Lubisi Dam, catchments S32A to C upstream of the Black Kei/Klipplaat confluence, catchments 32D and E upstream of Waterdown Dam and catchment S32F upstream of the Oxkraal Dam are all excluded from the General Authorisation in this sub-area (refer **Appendix B14**).

- White Kei River catchment (S10)
  If the ecological Reserve requirements are to be met, then the upper catchments above the Xonxa Dam are all in deficit with respect to water balance and no further run-of-river allocations from surface water should be considered. Future water supplies in the upper catchments should be sourced from groundwater. The catchments below Xonxa Dam have a large surplus of water. This surplus will be partly used during the rehabilitation of the Bilatye (Xonxa) irrigation scheme below the dam. In addition an allocation of water from the dam is being considered as a possible future supply for Queenstown (< 10 million m^3/a) and studies are presently underway in this regard. Other than the above, allocations of water can be considered in this catchment below Xonxa Dam should this be necessary, although it is known that there is currently little demand for water due to the steep topography and small rural population.

- Doring/Indwe River catchments (S20)
  The catchments are all in surplus with a large surplus generated below Lubisi Dam. This surplus will be partly used during the rehabilitation and possible expansion of the Qamata irrigation scheme below the dam.

- Klaas Smits/Heuningklip River catchments (S31)
  These rivers above Queenstown do not flow throughout the year. Currently opportunistic irrigation based on flood flows and alluvial groundwater is used.

  Below Queenstown the Klaas Smits River receives treated effluent from Queenstown, most of which is used for the irrigation of pastures.

- Black Kei/Klipplaat River catchments (S32)
  The upper quaternary catchments of the Black Kei river to the confluence with the Klaas Smits River are all in balance with no further surface water available for allocation. There is an over-allocation from Waterdown Dam compared to its available yield together with high water losses. This aspect together with the revitalisation of irrigation schemes at Shiloh is presently being investigated as part of the Queenstown augmentation study. Until the results of this study are complete, and due to the known good groundwater resources in the area, immediate future requirements should be sourced from the groundwater resources where possible.

d) Middle Kei Basin Sub-area

Quaternary catchments S50A to S50C upstream of the Ncora Dam and catchments S40A to C are all excluded from the General Authorisation in this sub-area (refer **Appendix B14**).

- Tsomo River catchment (S50)
  The subcatchments above Ncora Dam are in deficit. Below the Ncora Dam, the Tsomo river is joined by the Tsojana River with the Tsojana Dam in the upper catchment. This has the effect of creating a surplus below the confluence of the two rivers. Further allocations of water can be considered for domestic supplies from

  these two dams as the estimated requirements for this purpose form part of the Reserve and represent a very small percentage of the yield of the two dams. However, the current inter-basin allocation of water from Ncora Dam to the Mbashe

catchment for hydropower generation, revitalised irrigation projects and expansion of irrigation at the Ncora irrigation scheme is not accurately defined and is the subject of an existing study to ascertain the yield of the dam. Should it prove necessary, reallocation of water from Ncora Dam (hydropower) for local economic activities must be considered as a high priority in the future. The question of water supply to Eskom hydropower stations needs to be addressed at a national level.

- Thomas River catchment (S40A/B/C)
  The quaternary catchments are all in deficit due to the high use of water in run-of-river irrigation schemes and if the ecological water requirements are to be met. No further run-of-river abstractions should be allocated and existing lawful use and licences should be re-examined in this catchment.

- Great Kei River catchment (S40)
  There is minimal demand for water in this catchment down to the river mouth due to the nature of the deep gorge through which the river flows.

e) Lower Kei Basin Sub-area

- Gcuwa River catchment (S70)
  This catchment shows a surplus, with water released from Xilinxa Dam for abstraction downstream at Butterworth which has been on a negative growth curve since 1994. Further allocations for domestic requirements can be considered from this catchment below Xilinxa Dam but the available dam yield and environmental requirements need to be more accurately defined as demand increases. The catchments upstream of the Xilinxa dam in this sub-area are excluded from the General Authorisations.

- Kubusi River catchment (S60)
  The upper Kubusi catchment is considered a part of the Amatole System as the yield from the Wriggleswade Dam has been reserved for the BCM. The two upper quaternary catchments consist largely of forests (indigenous, formal and alien) with a water requirement for Stutterheim, rural villages and surrounding farms. The upper quaternary catchments would have a water deficit should the ecological Reserve be instituted. Without the removal of invasive alien plants in the catchment above Wriggleswade Dam, no further water allocations should be considered without a detailed water balance analysis.

- Great Kei River catchment
  This catchment shows a surplus water balance. The only large requirement for water abstraction from the lower Great Kei catchment that has been identified is for a proposed mining venture at Wavecrest. This project is currently on hold and it is unlikely to proceed due to major environmental opposition. However, should it or any other project requiring large water demands such as for BCM be considered in the future, a comprehensive ecological Reserve determination must be undertaken in view of the high importance of the ecostatus of the lower Kei River and its estuary.

While the groundwater potential of the Upper Kei Basin is believed to be good, groundwater resources in the ISP area are not well understood, with a lack of monitoring and information data from existing boreholes. Until such time as a more complete picture is gained, it is not possible to accurately determine water allocations or licensing criteria for this water resource. Notwithstanding this, further groundwater developments in the region are to be encouraged. In terms of the General Authorisations for groundwater, abstraction zones have been identified based on allowable extraction rates per hectare per annum (refer **Appendix B14**). These GAs need to be revised once a more detailed hydrocensus of the area has been undertaken during which all existing boreholes should be identified.

Strategic Approach

Allocations and issuing of water licences in those areas with a clear surplus of water should be done to encourage economic development. Where the water balance in a catchment is of low confidence and is approaching a balanced or deficit situation, further studies should be undertaken before allocations are made. In order to develop a comprehensive strategy for the allocation of water resources throughout the region and the licensing thereof, it is necessary that detailed and accurate information on the water resources is available and all existing lawful use has been quantified and verified. Until such time as this is in place, some water allocations and issuing of water licences may prove difficult. The main areas that require attention are as follows :

- A detailed and accurate knowledge base of existing groundwater resources and the use thereof needs to be established.
- Accurate information on lawful (and unlawful) water use including farm dams needs to be established in all catchments.
- Due to the pristine nature of many of the rivers and estuaries in the ISP area, the ecological Reserves need to be more accurately quantified. This will include studies on the hydrology of these rivers.
- For those catchments that are approaching a balanced state, specifically the Buffalo, Nahoon and Kubusi Rivers (the Amatole Water Supply System) previous studies need to be updated to include for changes in the water demand scenarios and the ecological Reserve should be factored-in on the availability side. No compulsory licensing is required before such an exercise has been completed.

Until such time as the above is in place, allocations and issuing of water licences should be done with care and only in those catchments where there is clearly a surplus of water available based on the latest water balance information. The future supplies of water to the Buffalo City Municipality and the Queenstown/Sada areas are priorities. Further allocations from possible supplementary water resources, which might be required in the future, should be limited until matters are clarified in the Reconciliation Strategy for the Amatole Water Supply System and strategies are refined based on current Queenstown studies.

Management Actions

General management actions include the following :

1. Implement available streamlining procedures to reduce the backlog of authorisation applications, which are delaying the implementation of projects.
2. Establish a central register of licence applications in the RO to ensure that the various offices issuing licences are aware of each other's activities so that a holistic licensing approach is followed.
3. Motivate for additional resources and budget for processing authorisations if necessary.
4. Evaluate and process water use licences only in those catchments or aquifers that clearly have surplus water.
5. Prioritise required Reserve determinations and motivate to the D: RDM.
6. Undertake comprehensive reserve determinations of the Buffalo, Nahoon and Kubusi Rivers and update the water balance situation in the Amatole Water Supply System.
7. Educate municipal policy makers and officials about the licencing process and the ISP to improve their planning for licence applications and to improve the quality of their WSDPs.

Responsibility

The RO in consultation with the Directorates WU, RDM, NWRM and Information Programmes (where applicable) is responsible for implementing this strategy.

Priority

Priority 1 – Very high.

3.2 INVASIVE ALIEN PLANT CONTROL

Management Objective

To protect the quality and quantity of the rainfall runoff to the groundwater and surface water resources and to protect the indigenous biodiversity of the environment through the control, harvesting and removal of invasive alien plants. This should be undertaken with due cognizance of the potential economic value of the invasive alien plants as well as the socio-economic conditions of the rural population who often rely on invasive alien plants for their requirements.

Situation Assessment

Widespread alien invasives in the ISP area largely comprise infestations of wattle species, which were originally introduced into the Stutterheim area in the late 1800s. The economic value of wattle grew with the development of the wattle bark industry in the 1950s for the production of tannin for use in the leather industry. With the demise of the tannin industry in the Eastern Cape, the lack of demand for the bark resulted in the abandonment of plantations. The original "plantations" were neither managed nor regulated and most were neglected or abandoned with the result that the seed from these wattle plantations spread throughout the Eastern Cape resulting in widespread and endemic wattle infestations on grazing lands and in riparian zones.

The establishment of plantations was not regulated until 1972, but by then infestations had been established throughout the area and adjacent to many watercourses. Government disincentives were only legislated once the problem had grown out of control, and then the regulations were never actively applied by government agencies, with the Department of Agriculture being particularly inept. In contrast, where landowners have managed their plantations, for example in KwaZulu-Natal, and where the demand for bark and timber products has existed, the cultivation of black wattle has been highly successful, resulting in a thriving tannin and timber export industry.

In a region where poverty is a major problem, the wattle timber is regarded by the local rural population as a critical resource and is used for building materials and fuelwood. The elimination of this resource without a suitable inexpensive replacement would further impoverish the populace who regard wattle as a superior resource to the indigenous species for their purposes. There are instances of communities requesting permission to grow wattle plantations due to its value to communities. The resource also has a commercial value in that it can be used for pulp, charcoal and laths. It can therefore play an important role in the economic development of the region if managed and controlled correctly.

The Conservation of Agriculture Resources Act provides for control over the use of the natural agricultural resources to promote the conservation of the soil, the water resources and vegetation and for the combating of weeds and invader plants. Benefits to be derived from the Working for Water (WfW) programme are the prevention of further invasions and protection of biodiversity, the creation of jobs and the improved availability of water.

WfW has its own approach and strategies and is a large, well-funded and important programme falling under the control of DWAF. The RO has an important interest in ensuring that the programme is carried out in a co-operative manner and takes account of objectives for the maximizing and good management of water resources in the ISP area.

Working for Water in the Eastern Cape is currently focusing on mainly state-owned and some private land through funding provided by the DWAF trading account. The main focus of the programme in the Amatole – Kei ISP area is in the upper reaches of the Buffalo, Nahoon and Kubusi catchments. This programme has not been entirely successful with unhappiness being expressed by the riparian landowners with claims that the riparian wattle previously formed a green fire belt against the spread of fires. With its removal run-away fires are more frequent and this has resulted in an increase in the

spread and germination of wattle seed. There are also widespread claims that while the wattles are being chopped down, they are not being removed. This has resulting in debris clogging up the rivers and the extraction pumps of farmers.

The situation within the ISP area is as follows :

Amatole Water Supply System Area:

It has been estimated that some 4000 ha of dense wattle infestation exists in the upper catchments of the Buffalo, Nahoon and Kubusi Rivers mainly on state and privately owned land. Of this, it is estimated that approximately 2600 ha should be cleared from wetlands, riparian zones and other watercourse areas. The remaining 1400ha could be managed as a high value resource or converted to forestry to produce equivalent products and meet economic needs.

Remaining Sub-areas

Surveys have shown that infestations of uncontrolled wattle exist throughout the ISP area from the coast to the upper reaches of the Kei River. The timber is regarded as a valuable resource by the rural population. The main threat throughout the ISP area is in the uncontrolled nature and spread of the wattle seed and its impact both on the biodiversity and water resources of the region.

Strategic Approach

DWAF and in particular the provincial DEAET would, ideally, like to see all invasive alien plants completely and permanently removed from the landscape for water and biodiversity reasons. Failing this, the minimum is to ensure that further spread is contained. However, it must be recognized that in the Amatole – Kei area there is considerable socio-economic dependence on the invasive black wattle as fuel wood and as a commercial resource. It is also recognized that the eradication of all jungle wattle is beyond the financial resources of the Working for Water programme. A three-pronged strategy should therefore be adopted:

- To prioritise all critical catchments and riparian zones and wetlands and to schedule the WfW programme for clearing of these areas, notably the catchments serving the BCM and Queenstown/Sada.
- To take up the opportunity offered by the so-called Water Use Exchange Guideline : allocating water use licences to areas cleared of IAPs (DWAF 2004 – in preparation at time of compiling this report). In this case the possible conversion of jungle wattle and/or IAPs either to formally managed wattle woodlots or to forestry plantations. This conversion would be the responsibility of the landowner (farmer or community) and the managed timber would have to licensed as forestry plantation. Advantages are that :
    a) All priority areas (riparian zones and wetlands) would have to be cleared,
    b) The waste stands would become commercially productive and licensed users of water.
    c) The cost would be borne by the landholder.
    d) Real co-operative partnerships could be developed with local communities thereby alleviating poverty.
- To provide incentives to landholders to clear their lands of invasive alien plants. These incentives could be offered through the WfW programme (eg free herbicides) or through DWAF (such as a rebate on water use or allowable conversions/exchanges via licences/General Authorisations).

Management Actions

The following actions are required to manage the control of invasive alien plants:

1. Complete invasive alien plants mapping initiatives and reconcile mapping with clearing data collected on an ongoing basis.
2. Categorise and license wattle plantations so that the wattle can be managed as a high

value resource. The DEAET would have to provide consent for this to occur. The PDoA does however allow demarcation of jungle wattle to become "managed" stands.

3. Identify opportunities for job creation through the use of the biomass. WfW has a Secondary Industry Programme and the benefits of job creation could be derived from this process.
4. Provide incentives to private landholders for clearing of invasive alien plants.
5. Develop clearing plans to optimise clearing and job creation within available budgets.
6. WfW will identify beneficiaries of clearing and do proportioning of clearing costs among those users.
7. Research the additional flow generated by eradication of aliens in the catchments.
8. Implement the national WfW Exit Strategy for handover to Maintenance when it becomes available.
9. Design a regional strategy of co-operation with the PDoA and DEAET to educate farmers on the importance of eradicating invasive alien plants.
10. Funding for WfW programmes should be constant. Five-year plans should be drawn up and monitored to avoid social problems following retrenchment.

Responsibility

DWAF Regional Office (WfW).

Priority

Priority 1 - Very high. Programme is ongoing.

STRATEGY NO. 4

WATER CONSERVATION AND DEMAND MANAGEMENT

Need for Water Conservation and Demand Management Strategies

The options for further augmentation of water supplies by developing new physical infrastructure are becoming increasingly limited and expensive. As result more attention is being placed on managing the demand for water, encouraging its efficient and effective use, and reducing losses in water systems. This requires the creation of a culture of water conservation and demand management amongst individual users and within all water management and water services institutions.

The National Water Conservation and Demand Management Strategy is based on the premise that many water users can maintain their quality of life and achieve the desired outcomes from their water use, whilst using less water. Furthermore significant reductions in water use can be achieved by changes in behaviour and the adoption of water-saving technologies. DWAF will continue to encourage all water users to voluntarily comply with water conservation and demand management principles and strategies.

The Water Conservation and Demand Management Strategy is required to address the urban, agricultural and industrial sectors.

Relevant Identified Strategies

The following strategies form part of this overall strategy:

4.1 Urban water conservation and demand management.
4.2 Agricultural water conservation and demand management.
4.3 Industrial water conservation and demand management.

4.1 URBAN WATER CONSERVATION AND DEMAND MANAGEMENT

Management Objective

To identify the priorities for urban water demand management measures in the ISP area and to use the opportunities created through legislation to promote implementation through co-operative governance, assistance, buy-in and capacity building.

Situation Assessment

DWAF is promoting and insisting on efficient water management and use. The principle of efficiency has been strongly emphasised in legislation. A national water conservation and demand management strategy is being developed. This strategy is aimed at the water supply industry and society at large and covers all water user sectors including agriculture, forestry, industry, recreation, the ecology, and water services.

The development and implementation of an urban water demand management strategy must be integrated into the water resource planning processes as a requirement before the planning of new infrastructure schemes. It should be regarded as the highest priority option before new augmentation options are considered.

There are a number of categories of water conservation and demand management measures and initiatives that can be implemented. The following categories are general for all water sectors and are according to the different components of the water supply chain:

- Water conservation measures in resource management.
- Water demand management in distribution of supply management.
- Water demand management measures of customer or end user.
- Water conservation measures for return flow management.

Water demand management is the responsibility of the user sectors. The District Municipalities are now responsible as Water Service Authorities/Providers for ensuring that WCDM plans are compiled and implemented by the various local municipalities. The RO still has a regulatory and advisory role.

Unaccounted for water consists of a combination of reticulation system leaks, unauthorised water connections, faulty water meters and domestic plumbing leaks. These factors, combined with the low levels of payment and institutional problems of local authorities, affect the sustainability of water services.

More efficient use of water will reduce the costs associated with purifying and distributing water to consumers, and with the subsequent treatment of wastewater. Proposed strategies include:

- Water Services Authorities will be required, as part of their WSDPs, to develop and implement a WCDM strategy in accordance with the model strategy prescribed by DWAF.
- Water Boards will be required to develop and implement their WCDM strategies according to the model strategy prescribed by the Department, and submit them as part of their business plans.

Urban demand for water in the ISP area is projected to increase. An evaluation of the supply and use of water indicates that up to 50% of the water supplied is unaccounted for in many of the urban areas within the Amatole – Kei area, eg Butterworth.

Most of the municipalities in the ISP area do not have the capacity, experience, knowledge and funds to implement water demand management strategies. At the present time only the larger municipalities have any capacity to implement a demand management programme, but even their resources are limited.

Stepped tariffs, a useful tool in discouraging excessive water use, are generally not in place in the smaller towns, except to accommodate the 6 kl per month free basic use. Demand management, if undertaken at all, is currently not addressed according to correctly identified priorities. Information is required to prioritise the required WCDM initiatives for each municipality. Establishment of a WDM plan for each town according to identified priorities in terms of the WCDM principles is required.

The WSDPs of the two largest urban consumers in the ISP area (BCM and Queenstown) have identified WCDM as the highest priority, but due to limited resources neither municipality has yet embarked on instituting any comprehensive programmes.

In summary therefore :

- Some towns have up to 50% unaccounted for water.
- Stepped tariffs are not in place throughout the area.
- Demand management is not pre-planned in all but the largest municipalities.
- BCM and Lukhanji LM have prioritised WCDM but lack technical resources.
- Capacity within all the municipalities is very low.

Strategic Approach

It is estimated that by 2012 the BCM raw water supply will need to be augmented. This period could be extended if comprehensive measures are adopted for water demand management and conservation leading to savings in existing water use. This strategy must receive the highest priority and immediate action is required. It is essential that regular liaison take place with the BCM, ADM and AW concerning a water demand management programme for the Amatole Water Supply System.

The implementation of further augmentation options that require infrastructural development will not be approved if serious and adequate steps have not been taken by BCM to ensure that water is not being wasted and unaccounted for water is at an acceptable level.

Queenstown is currently suffering from water restrictions due to the severe drought in the region and it is imperative that a comprehensive WCDM programme is implemented immediately.

Promotion of WCDM is essential, but if this is to succeed the DWAF head office and regional office, and/or the future CMAs will have to assist the municipalities until such time as they are capacitated by appointing specialists to do situation assessments and to develop water demand management strategies, guide them with the implementation thereof and do monitoring and evaluation. Otherwise it is unlikely that such measures will be implemented in many municipalities. Funds for such studies could be generated through water tariffs. Implementation of water demand management should be promoted and defined by need and within the constraints posed by resources at both DWAF and the municipalities.

Management Actions

Following this approach, implement an urban water conservation and demand management strategy as follows:

1. Facilitate the establishment of a water demand management plan for each local authority, according to priority, through co-operative governance. Assist municipalities to draw up detailed local urban conservation and demand management strategies where required, co-operatively with the responsible District Municipality.
2. Ensure that the WSDPs of local authorities highlight the need to implement local water conservation and demand management strategies prior to the development of new schemes.

WSDPs must also include plans for the use of water saved through demand management measures.

3. Review WSDPs submitted to ensure that water conservation and demand management objectives have been adequately addressed.
4. WCDM plans should include benchmarking. Set benchmark targets for water savings with local authorities through co-operative governance.
5. Build capacity in local authorities by providing appropriate support services where these are needed in local planning, development of new supply schemes or rehabilitation of existing schemes.
6. Use the water allocation process to promote the principles of water conservation and demand management.
7. Promote the principles of water conservation and demand management through forums and the media. Encourage the use of printed and electronic media to disseminate information to all stakeholders and contribute regular articles to relevant publications to promote the concepts of water conservation and demand management.
8. Directorate : Water Use Efficiency and the regional Water Use Efficiency division to assist local authorities with the implementation of WCDM to overcome the technical and financial barriers many municipalities face.
9. Assist the municipalities financially by appointing specialists to undertake situation assessments, to develop WCDM strategies and assist with the implementation thereof. The funds can be generated through Water Resource Management tariffs.
10. Set up regular liaison meetings with the BCM, ADM and AW officials to keep informed about their WCDM initiatives and progress within the Amatole Water Supply System.
11. Regularly liaise with responsible officials and if necessary politicians at the District Municipalities and Local Municipalities (more immediately Butterworth) where water demand management interventions are required and aggressively promote the implementation of demand management measures.

Responsibility

Water Service Providers are responsible for implementing urban water use demand management programmes that have been developed with the assistance of DWAF. The RO has a regulatory and advisory role but will continue its monitoring and mentoring role to build capacity and to promote the concept. D: WUE is responsible for a national framework and the development of standardised demand management methods and procedures. District Municipalities are responsible for ensuring that local WCDM plans are compiled and implemented.

Priority

Priority 1 – Very high.

4.2 AGRICULTURAL WATER CONSERVATION AND DEMAND MANAGEMENT

Management Objective

To promote the use of water conservation and demand management principles by the agricultural sector by ensuring the use of efficient and effective irrigation systems, and by ensuring that bulk irrigation systems are operated and maintained to conserve water and minimize losses

Situation Assessment

Irrigation requirements/allocations in the year 2000 accounted for an estimated 61% of total consumptive water requirements (i.e. excluding the ecological Reserve) in the Amatole – Kei ISP area. With the revitalization of irrigation schemes in the former Ciskei and Transkei homeland areas, the potential water losses within the irrigation sector due to dysfunctional and/or inefficient infrastructure could prove to be very large and could undermine the viability of these schemes. This is especially important below Waterdown Dam, which supplies the Klipplaat Irrigation Scheme and Queenstown/Sada. Water supply from the dam has been over-allocated with respect to the available yield and assurance, and water restrictions have been imposed on all users (also due to the present severe drought). Any savings through more efficient distribution systems and irrigation methods would assist the situation.

Irrigation losses are often very significant but have rarely been quantified for irrigation schemes in the area. The value of water seems largely unrecognised by many agricultural water users where flood irrigation and overhead sprinklers are widely used. Lining irrigation canals, and improving application efficiencies in areas where flood and sprinkler irrigation is practiced, will substantially reduce irrigation water losses.

Conveyance losses in canals (eg Lanti canal below Lubisi Dam to Qamata Irrigation scheme), and rivers (eg. Klipplaat River below Waterdown Dam) can be significant. There are also significant leakage losses in many distribution and irrigation systems. Whilst there are areas where water use is efficient, substantial improvements can be achieved, especially in those irrigation schemes located and being revitalized in the former Ciskei and Transkei areas.

Some irrigation system losses return to the river systems but this return water can be of reduced quality. Irrigation methods, irrigation scheduling, soil preparation, crop selection, crop yield targets and evaporation all affect the efficient use of water.

The development and implementation of an agricultural water demand management strategy, with specific targets, must be integrated into the overall water resource planning process.

To achieve the objectives in the agricultural sector, the Directorate : Water Use Efficiency has developed a suite of tools comprising Best Management Practices (BMPs), Water Audits, Benchmarks, Train the Trainer programme and a Training Manual. This suite of tools is being tested and refined in case studies.

Strategic Approach

The approach will be to promote water conservation and demand management through co-operative governance where the need is greatest.

Implement a regional agricultural water conservation and demand management strategy as follows:

- Use the water allocation process to promote and encourage water conservation and demand management principles.

- Losses in canals and distribution systems need to be identified, costed and repairs prioritized.
- Inherently inefficient and badly planned schemes should either be improved or dismantled.
- Set targets with the PDoA, DMs and WUAs (co-operative governance) for re-allocation of water saved. Procedures need to be in place to ensure that water, which is "freed up" is used appropriately elsewhere. This is of particular importance if the water saving has been achieved through incentives directed at farmers.
- Promote the use of more water efficient irrigation equipment in order to conserve water. Discourage the use of flood irrigation where laser levelling is not continually done to increase the efficiency. Likewise with overhead sprinkler irrigation methods.
- Provide appropriate support services where these are needed in planning, development of new irrigation schemes and rehabilitation of existing schemes.
- Encourage the use of the printed and electronic media to disseminate information to all stakeholders and contribute regular articles to local agricultural publications to promote the concepts of WCDM.
- Initiate awareness campaigns through workshops, discussion forums, and newsletters.

Water User Associations will implement the strategy through the drafting and submission of Water Management Plans. In a Water Management Plan, a WUA describes its current irrigation water use and conservation measures and sets out how it plans to implement Best Management Practices (BMPs) to improve its irrigation water supply services and to achieve water conservation and water demand management. Developing a Water Management Plan and reviewing it regularly is a major stimulus to efficiency, promotes co-ordinated action and facilitates negotiations with the CMA and other stakeholders. The process does not require expensive data gathering, but uses existing data for its initial implementation and then aims to improve the plan from year-to-year.

Management Actions

The following actions are required:

1. Ensuring that the WUAs and end users understand and appreciate the need to progressively modernise their water conveyance systems and irrigation equipment.
2. Ensuring that water allocations promote equitable and optimal utilisation of water by all sectors in a water management area.
3. Ensuring that preventative maintenance programmes are put in place to postpone major rehabilitation, replacement and reconstruction.
4. Ensuring that sufficient irrigation information is generated and accessible to all stakeholders.
5. Ensuring that the concepts of environmental awareness and protection are promoted and accepted by all stakeholders.
6. Ensuring that service providers implement audits from the water source to the end users and beyond.
7. Encouraging water services institutions and farmers to use the latest technology in irrigation methods and for their water release and distribution systems.

Study the results arising from the report on agricultural water demand management options in the Gamtoos GWS. Based on the results and experiences of this study, undertake or facilitate the implementation of water conservation and demand management plans for irrigation schemes in the Amatole – Kei ISP area as per the above strategic approach.

Responsibility

DMs, WUAs, Irrigation Boards and individual farmers are responsible for implementing agricultural water demand management programmes with the assistance of DWAF and the PDoA where necessary. The RO has a monitoring and mentoring responsibility to build capacity and to promote the principle. D: WUE is responsible for a national framework and the development of standardised agricultural demand management policy, methodology and procedures.

Priority

Priority 1 – Very high.

4.3 INDUSTRIAL WATER CONSERVATION AND DEMAND MANAGEMENT

Management Objective

To identify regional industrial water demand management measures and savings opportunities and to use the legislation now available to promote implementation through co-operative governance, buy-in and capacity building.

(It should be noted that in all cases in this ISP area, industrial water supply is currently supplied as part of urban supply and in general this strategy forms a part of the urban strategy. Only relevant and unique aspects relating to industrial supply are highlighted in this strategy.)

Situation Assessment

Limited industrial demand management initiatives and treated effluent use have so far been undertaken in the ISP area.

The development and implementation of an industrial water demand management strategy, with specific targets, must be integrated into the water resource planning process, not only as a potential alternative or augmentation option to increasingly expensive supply side management options, but as a requirement before the planning of new infrastructure schemes.

Water demand management is the responsibility of the user sectors. The well-being of this sector is crucial to South Africa's economic development, and it requires a high degree of certainty that its water needs will be satisfied. There is nevertheless scope for water use to become more efficient without adverse impacts on economic activity.

The manufacturing industry together with agriculture and tourism is expected to be the biggest contributor to future economic growth in the region. The industrial sector, which includes large industries mainly in the Buffalo City Municipal area, is projected to have the greatest growth in water requirements. Much of this growth is expected to occur in the new East London IDZ, specifically manufacturing and other industrial activities. It is imperative to have assured water supplies at a reasonable cost to support industrial development and for the industrial sector to improve its efficiency of water use and to minimise waste. The use of treated effluent (20 Ml/day) for appropriate industries in the East London IDZ is presently being investigated.

Strategic Approach

The implementation of a regional industrial water conservation and demand management strategy is dependent on co-operative governance, since all industries now fall under the jurisdiction of either district or local municipalities. Co-operative partnerships are therefore required with especially the BCM, but also with smaller municipalities to ensure that demand management is being undertaken by all large industrial users of water.

DWAF's strategic approach will be to provide an enabling legislative framework, assistance and incentives to the municipalities and in turn the relevant industries for the implementation of industrial water conservation and demand management measures.

Management Actions

Implement a regional industrial water conservation and demand management strategy as follows:

1. Promote the supply of treated effluent to industries by municipalities by providing an enabling legislative framework, assistance and incentives.

2. Promote the efficient use of water by industries through financial incentives or disincentives.
3. Identification of the largest water consuming industries.
4. Classification of those businesses that have the greatest impacts on the water resources in terms of water utilised, wastewater discharged and the efficiency and effectiveness thereof.
5. Develop regional and local levels of databases for the purposes of monitoring the water-related performance of businesses. There are too many businesses for all of them to be included in the databases, and only those businesses that have the greatest impacts on the water resources should be considered (i.e. the high priority categories).
6. Undertake performance auditing on identified industries. Determine whether the water is lost through leaks or bad maintenance or through the normal production process or business operation. Use best practice guidelines and manuals to provide guidance.
7. Ensure or facilitate the implementation of measures in industries where wastage is noted, such as fixing leaks to reduce further wastage.
8. Analyse the efficiency of production processes to understand how water is being utilized.
9. Design and implement communication, public awareness and education programmes as required.
10. Set up water conservation forums.
11. Identify and undertake pilot projects.
12. Manage non-conforming industries.

Responsibility

Water management institutions (Municipalities and water boards) and large individual water users are responsible for implementing urban and industrial water use demand management programmes. The RO has a monitoring and mentoring responsibility to build capacity and to promote the concept. D: WUE is responsible for a national framework and the development of standardised demand management methods and procedures.

Priority

Priority 2 – High.

STRATEGY NO. 5

INSTITUTIONAL DEVELOPMENT AND SUPPORT

Need for Institutional Development and Support Strategies

There is a requirement that Local Authorities (LAs) and DWAF interact in the management of existing water supplies and in planning for new and additional water supplies in order for both parties to know and understand the opportunities and constraints of the available water resources. This interaction and sharing of knowledge should be reflected in the IDPs and WSDPs that are the responsibility of the Local Authorities. Due to the lack of skilled and experienced manpower within many of the LAs and their advisors, this has often not been the case. The result is that many IDPs and WSDPs that have been produced to date contain fundamentally wrong information and proposals that do not take account of the constraints and opportunities imposed by the available water resources. As a result these programmes, which are being adopted by the LAs, will in many instances not be successful resulting in much wasted effort and wasting of scarce resources. There is an urgent need for DWAF to pro-actively provide institutional support to the LAs in terms of closing the knowledge gap that presently exists thereby ensuring that LAs (councillors and officials) and their technical advisors know and understand the limitations to water supply in their areas.

At a national level this overall strategy includes support for the formation of Catchment Management Agencies (CMAs) and Water User Associations (WUAs). These are national functions with national strategies and policies in place. These national strategies and policies will need to be incorporated in an institutional development strategy still to be formulated relating to the establishment of Catchment Forums, WUAs and CMAs. Currently very little progress has been made on this issue.

This ISP strategy addresses institutional support for development of water supplies to Local Authorities.

Relevant Identified Strategies

The following strategy forms a part of this overall strategy:

5.1 Supply to Local Authorities

5.1 SUPPLY TO LOCAL AUTHORITIES

Management Objective

To ensure that District and Local Municipal Authorities work together with DWAF to understand the available surface and groundwater resources in their areas in order to optimise the development and use of these resources.

IDPs, WSDPs, Water Sector Plans and water feasibility plans should reflect these opportunities and constraints.

Situation Assessment

The water supply situation in most of the towns in the ISP area is currently adequate with exceptions described under each key area below (refer **Appendix B13**).

Studies regarding water requirements and water supplies that could have a regional impact have to date been undertaken by DWAF Directorate : Project Planning (now Options Analysis). These studies include for water supply to BCM (**Ref. 3 and 4**) and augmentation of Queenstown's water supply (**Ref. 20**). Studies have also been undertaken by DWAF under the BoTT programme to implement water supplies to many rural villages and towns in the ISP area.

Since the establishment of District Municipalities as Water Service Authorities, investigations for additional or new water supplies to local authorities have been undertaken by the District and Local Municipalities using technical advisors (consulting engineers). In most cases the capacity and water management expertise in the DMs and LMs is insufficient. When requested, DWAF regional office has assisted municipal officials in compiling acceptable programmes and plans. However, in many cases this has not happened and unacceptable proposals for water supply options are often recommended for implementation by municipal officials where there are often insufficient raw water resources available or there are competing interests requiring the same source. This only becomes known when applications are made to DWAF for water licences. This gives the appearance that DWAF are delaying what are often seen as urgent and necessary water supply schemes and leads to misunderstanding and a breakdown in co-operative governance.

Local and District Municipalities are mostly unaware of provincial and national priorities when producing their IDPs and WSDPs. Until these documents are completed to an acceptable level of accuracy and detail, the information regarding the anticipated future water requirements and sources of supply for local authorities remains uncertain. Support requested and given by DWAF at the initial stages of compiling the WSDPs would overcome many of the problems encountered with the WSDPs to date. Often the fault lies with inexperienced consultants appointed by the LAs.

Many LAs obtain all or a portion of their water requirements from schemes which they own and operate. These LAs are often unaware that they must consult with DWAF, as the government department responsible for the management of the water resources, before making or approving recommendations regarding water supplies. In addition, there is often a general lack of capacity within many LAs to participate and to take responsibility for their mandate.

Amatole and Keiskamma catchments:

Morgan Bay/Kei Mouth obtains its water supply from a number of small surface water sources. Operation and maintenance is therefore problematic. The assurance of supply is also less than the required 98% especially during the peak holiday seasons. With the upgrading of the access road to Kei Mouth and a more permanent population, which is expected to grow rapidly in the short term, additional water resources will be required by 2008, probably sourced from the Kei River. Although a pre-feasibility study has been undertaken, no detailed studies for a future water supply have been

conducted. The most likely source of water would be from the Kei River which has a surplus water balance. However, due to the ecological Reserve requirements of the Kei River at different times of the year, it is most probable that off-channel storage will be required.

East Coast Resorts, which include some twenty villages along the coast to the east of East London rely on local dams, boreholes and rainwater tanks and all suffer from a low assurance of water supply. The resorts between Yellowsands and Cintsa should be considered for supply from Buffalo City notwithstanding their location within the Great Kei Municipal area. Plans for the extension of the bulk water supply from the BCM have been proposed but were put on hold pending the finalisation of the municipal boundary between the BCM and the Great Kei LM. It is likely that the construction of this pipeline to as far as Cintsa/Cefane will proceed within the next five years subject to the availability of funds and a sale agreement being concluded between the two municipalities. The few remaining resorts will continue to be dependent on local groundwater resources and/or small river schemes with off-channel storage for the foreseeable future. In the long term water will have to be sourced either from the BCM or from the Kei River. The Great Kei LM with the assistance of the ADM is presently undertaking a feasibility study to investigate the future water supplies to the region.

West Coast Resorts, which include some thirteen coastal villages to the west of East London down to Kaysers Beach all fall within the Buffalo City Municipal area. Most of these villages currently rely on boreholes and rainwater tanks. Plans have been developed and are gradually being implemented for water supply to these villages from the Buffalo City supply system (Amatole System). In time this will require the release of water from Wriggleswade Dam to supplement the raw water supplies in the Buffalo River, which is the identified source of raw water supply for these coastal resorts.

Buffalo City Municipality, which includes the towns of East London, King William's Town, Bisho, Zwelitsha, Mdantsane obtains its water from the Amatole Water Supply System. With the expected growth in this area, plans need to be advanced for the development of additional raw water sources by the year 2012, depending on the success of the East London IDZ. Due to the importance of this city in the region, a separate strategy has been developed for its future water supply (refer Strategy No. 1.3).

Mooiplaas/Kwelera are large peri-urban areas north east of East London. The communities currently rely on low yielding and poor water quality boreholes, which results in inadequate water supplies to these villages. Detailed feasibility studies are required to identify reliable future water sources for this area possibly from the Kwelera or Kei Rivers.

Kei catchments:

Lady Frere together with surrounding rural villages obtain water from the Cacadu Rural Water Supply Scheme with raw water from the Macubeni Dam. As a result of loss of capacity in the dam due to sedimentation as well as expansion of the rural components of the scheme, it is believed that the assurance of water supply is below 98%. The scheme and its possible augmentation and/or capacity constraints need investigation. Detailed groundwater investigations should form part of these investigations as the area has been identified as possessing good groundwater potential.

Sterkstroom obtains its water supply from boreholes. The assurance of the groundwater supply appears to be adequate for the foreseeable future.

Queenstown/Ezibeleni, together with Sada/Whittlesea obtains the bulk of its water from Waterdown Dam, which also supplies the Klipplaat River Government Water Scheme. The existing allocations from the dam cannot be supported at an acceptable level of assurance. Previous studies have been undertaken by DWAF and these studies are presently being revisited to confirm future water supply options for Queenstown (refer Strategy No. 1.4).

Nqamakwe currently obtains an inadequate water supply from boreholes. A study has been commissioned (Oct. 2003) by the ADM to undertake water supply feasibility investigations for the whole Nqamakwe region including that of the town.

Hewu Groundwater Scheme is currently being expanded to supply those rural villages that presently have inadequate supplies of water.

Tsojana Water Supply Scheme supplies the town of Cofimvaba and surrounding rural villages. Plans have been suggested for expanding this water supply from Tsojana Dam to additional rural villages between Cofimvaba and Tsomo and the Ncora Flats area. The yield of Tsojana Dam shows that there is a surplus of water to achieve a basic supply to these communities. However, the yield of the dam and demand need to be more accurately assessed before a firm recommendation in this regard can be made. This aspect should also be considered in conjunction with the studies to determine the yield from Ncora Dam as both dams are suitably situated for supplying the proposed rural villages. In addition, the groundwater resources of the region need to be more fully investigated.

The following issues and concerns have been identified for this ISP area:

- There is continued urbanisation in this ISP area. Water requirements are growing in most towns, even though overall populations are not increasing or are even declining in the rural areas. Services have been upgraded in most small towns under the CMIP programme.
- DWAF and the District and Local Municipalities do not have an adequate process of interaction, information sharing and co-operative governance.

Strategic Approach

The approach will be to work with and inform DMs and LMs, to promote up-front liaison and agreement between DWAF and LAs regarding proposed developments as mentioned in the WSDPs. Also to promote awareness within LAs of the need to inform DWAF of their plans and to consult before making recommendations. The WSDPs should more closely conform to the NWRS, ISP and Catchment Plans. WSDPs should highlight water conservation and demand measures proposed by the LAs in addition to current sources of supply and future anticipated sources of supply. Future planning should consider applicable social, environmental and economic impacts and costs.

DWAF RO will identify outstanding WSDPs and ensure that they are submitted timeously. They must review IDPs, WSDPs and Water Sector Plans and provide feedback to the relevant LAs to ensure that proposals conform to DWAF requirements. IDPs and WSDPs must become the documents that reflect the total municipal water strategies. The WSDPs should include water conservation and demand management measures and treated effluent use measures where appropriate.

LAs should be encouraged at every available forum, committee or other venues jointly attended by DWAF and the LAs to first pursue alternative augmentation options, such as water demand management, groundwater use, treated effluent use, water trading or eradication of alien plants in water stressed areas before applying for additional surface water developments. Where future water supplies have not been identified in the WSDPs, further feasibility studies must be undertaken by the LAs.

An approach and strategy for water supply must be developed for each town. The over-abstraction of coastal aquifers should be stopped as soon as possible.

There is a very real need to assist with building capacity in the water sector at District and Local Municipality level.

Management Actions

1. The RO must review the WSDPs and follow up with LAs in cases where submissions are incomplete or have not been submitted. The RO must pro-actively assist the LAs with regard to development of water supply schemes and water demand management investigations and implementation programmes.
2. Update the data of all municipal water sources, requirements, issues and future augmentation plans etc as contained in this Strategy (refer **Appendix B13**). Advise LAs and their technical advisors to interact upfront with DWAF before finalising water supply options.

3. Capacitating officials in District Municipalities is planned by the DWAF RO on an ongoing basis.
4. Request Directorate : Water Use Efficiency at DWAF Head Office and the regional WCDM division to assist LAs to overcome the technological barriers many of the local municipalities in the area face with the development and implementation of WCDM strategies.
5. Aquifer management plans are essential for groundwater supplies to the coastal villages to avoid over-abstraction and saline intrusion.
6. Aim to improve borehole monitoring and ensure that water management plans are compiled. Directorate: Information Programmes and RO Hydrological Information Sub-Directorate must investigate this and compile a strategy to deal with the situation.
7. Co-ordinate with the BCM, ADM and AW recording the need for further studies into future water supply options for the BCM (refer Strategy No. 1.3).
8. Similarly, co-ordinate with the Chris Hani DM and Lukhanji Municipality further studies into future water supply options for Queenstown (refer Strategy No. 1.4).

Responsibility

All Directorates in DWAF Regional Office.

Priority

Priority 1 – Very high.

STRATEGY NO. 6

SOCIAL AND ENVIRONMENTAL

Need for Social and Environmental Strategies

Water for poverty eradication, for equity, and as a generator for economic growth is a major focus of both central and provincial government that will be pursued under this strategy. In addressing imbalances of the past, the provision of an equitable share of available water to previously disadvantaged communities is being addressed to improve the livelihoods of the poor. The establishment of resource poor emerging farmers, and the provision of water to areas in which land restitution is in progress, must be prioritised as one of the ways to reduce poverty. The water reconciliation for the ISP area has shown that water is available for allocation to emerging farmers especially in the former Ciskei and Transkei homeland areas where new and revitalized irrigation farms are being established. This strategy will support the Eastern Cape Provincial Government's Growth and Development Strategy.

Relevant Identified Strategies

The following specific strategy has been developed further:

6.1 Poverty eradication, emerging farmers and revitalising of irrigation schemes.

6.1 POVERTY ERADICATION, EMERGING FARMERS AND REVITALISING OF IRRIGATION SCHEMES

Management Objective

To provide support to the Provincial Strategy Framework for Growth and Development (PGDP), which has identified poverty eradication as having the highest priority.

To optimize the allocation and use of water in the quest for equity and poverty eradication whilst at the same time recognizing the importance of the established agricultural sector and the need for resources to sustain urban and industrial growth and development in the long term.

Situation Assessment

The provincial strategy framework for growth and development in the Eastern Cape highlights the fact that most of the constraints for improvement stem from the severe poverty that exists in the region especially in the rural areas. Amongst other factors, the underdevelopment of the agricultural potential of the province is both a cause and effect of the poverty that exists. At provincial level the sustainable development of the "abundant" natural resources of water and land has been identified as one of the main keys to poverty eradication. As such, food security has been prioritized and will be addressed through household food production programmes and increased support to black commercial farmers through credit and low interest loans, additional land etc (The Massive Food Production Programme and the Integrated Rural Development Programme).

DWAF is co-operating with other departments to ensure that the management of water resources can contribute to these programmes, with particular emphasis on interventions to reduce poverty and increase food supply.

Interventions under the Integrated Rural Development Programme include:

- Modifying water resource management programmes and priorities to align with the priority areas identified for the IRDP.
- Ensuring that rural development features strongly in catchment management strategies.
- Identifying rural water needs and opportunities, and making specific allowances for rural development and livelihoods in allocating water. In particular, identifying potential rural users, in addition to registered users, in calling for licence applications during licensing.
- Ensuring community representation on the management bodies of water management institutions.
- Ensuring that communications, awareness creation and education programmes are appropriate for rural communities.

The following mechanisms exist to alleviate poverty in terms of the broader Water for Equity approach:

- Assistance to resource poor emerging farmers.
- Assistance to small towns and rural settlements for general access to water.
- Creation of employment opportunities under the Working for Water and Working for Wetlands programmes.
- Assistance to farm workers.

The following national issues and concerns have been identified regarding resource poor farmers and rural settlements:

- The process to implement schemes for resource poor farmers is a lengthy one.
- DWAF provides access to water but land acquisition falls under other authorities (Department of Land Affairs and Department of Agriculture).

- DWAF can only subsidise farmers who are included in WUAs or other recognized water management institutions.
- Capital costs to acquire existing farms or to establish infrastructure on new land is expensive.

A number of initiatives have already been started by the Provincial Department of Agriculture (PDoA) and the District Municipalities. DWAF is assisting these initiatives through the CCAW by providing financial and resource support to these organizations. Most of these schemes are centred around irrigation projects and bulk water supply schemes and dams that were originally implemented under the former Ciskei and Transkei homeland governments. During the political transition period of the mid 1990s, most of these schemes fell into disuse with very little farming activity taking place. With the adoption of a new provincial strategy, which identifies poverty alleviation and self-sufficiency in food as one of its main goals, major emphasis is now being place on rehabilitating these schemes, either partially or wholly.

The following schemes have been identified for assistance by DWAF and an investigation study is presently underway:

- The Qumanco Scheme, which comprises a 2000 ha extension to the existing irrigation area supplied from Ncora Dam (scheduled water rights for 3000 ha). One of the main factors affecting the feasibility of the scheme will be the availability of water from the Ncora Dam. An updated yield analysis will be required taking account of the latest dam silt survey and water allocations required for domestic supply to rural communities.
- Ncora Scheme Extension, which consists of a further 1000 ha of irrigable land. The feasibility of the scheme depends on the water availability from Ncora Dam.
- Lower Wolf/Sandile Scheme, which is a new identified scheme of 15 ha with water to be pumped from Sandile Dam.
- Zanyokwe Scheme (Kama Furrow) entails rehabilitation and extension of an existing scheme to 60 ha with water from the Keiskamma River below Sandile Dam.
- Qamata Scheme (Extension 6) comprises phase 2 level development following on from centre pivot irrigation schemes implemented with assistance from Eskom. The scheme is a 642 ha extension to the existing scheduled area of 1959 ha with supply from the Lubisi Dam/Lanti weir and canal system.

In addition to the above, a number of schemes with existing scheduled water rights are in the process of being revitalised. These include the Xonxa/Bilatye scheme below Xonxa Dam (1643 ha), the Zanyokwe scheme below Sandile Dam (471 ha), the Keiskammahoek scheme below Cata and Mnyameni Dams (854 ha), and the Shiloh irrigation scheme, which forms part of the Klipplaat Government Water Scheme below Waterdown Dam (1905 ha).

Strategic Approach

DWAF has prioritized water for equity, but not at the expense of efficiency and beneficial use. DWAF supports the PDoA in providing water for resource poor farmers, provided the water is available and allocations have been prioritized. This requires close co-operation between DWAF and the PDoA.

DWAF will honour the allocations made to irrigation schemes and supports the revitalization of existing but defunct schemes. There are, however, four caveats :

- Alternatives to allocating and distributing this water to a wider spread of population for more effective poverty relief should be examined.
- The water must be available and new demands, notably the recently recognized requirements of the ecological Reserve, could mean some trimming of historical allocations.
- Where new demands (such as growth within the BCM and Queenstown areas) which are critical to the economy and affect the livelihoods of a very large number of people are identified, then defunct schemes should not be revitalized without detailed studies of all current and future water requirements.
- Irrigation schemes which will clearly never be viable and where water and investment will be wasted should not be revitalized.

Management Actions

The needs of prioritised resource poor farmers should be addressed through the CCAW, through co-operative governance between DWAF, the Department of Land Affairs, the Department of Agriculture, appropriate District Municipalities and DEAET as follows:

1. Identification of areas where it may be possible to develop and sustain resource poor farmers in the ISP area, especially those areas where bulk water supplies (and dams) are in place with existing water rights.
2. Identification and short-listing of schemes by the CCAW for further evaluation. The District Municipalities must be requested to provide information on potential small and large scale irrigation developments identified in their areas including the requirements for home gardens. DWAF will provide the water resource availability scenario to aid the identification process.
3. Evaluation of the short-listed and prioritised schemes through planning studies to determine the feasibility of the schemes.
4. Ways in which appropriate relevant information regarding water requirements and water availability can be effectively assessed in a structured way and transferred to the CCAW must be revisited. A protocol for a structured sharing and transfer of information, particularly between DWAF, the PDoA and the District Municipalities, regarding potential resource-poor farmer (and commercial) irrigation developments and required water resources must be implemented.
5. Ways in which the irrigation development needs of the PDoA in line with the provincial economic development strategy and various priority lists can be effectively communicated to the CCAW in a structured way must be revisited.
6. Ensuring the availability of staff and funds to undertake the planning studies by lobbying for such activities within DWAF and other Departments at a political level. The current serious shortage of manpower resources in the RO to implement this strategy must be addressed. To implement this strategy, staffing requirements must be clarified and adequate staff must be allocated.
7. Motivate for Reserve determinations where required to be able to allocate water licences where water is still available.
8. Attach a high priority to the forming of WUAs where the needs of resource poor farmers have been prioritised, once the schemes have been proven to be sustainable.
9. Arrange payment of a subsidy to the WUAs and assist with the sourcing of such funds if necessary according to the procedure for funding and construction of such schemes, as devised by D: WU.

Responsibility

The development of this strategy is the responsibility of the CCAW supported by the RO together with the PDoA, DLA, the DMs and the LMs.

Priority

Priority 1 – Very high.

STRATEGY NO. 7

INTEGRATION AND CO-OPERATIVE GOVERNANCE

Need for Integration and Co-operative Governance Strategies

This strategy addresses co-operative data collection, information sharing, sharing of visions and plans, and co-operative making of joint decisions which are satisfactory or at least acceptable to all parties. The ISP strategies interface with those of other central and provincial government departments, local authorities and water service providers. Consequently, there is an inherent need for establishing co-operative relationships with such organisations. This is required to ensure that management and control of the water resources in the ISP area are integrated with the relevant strategies of other organisations, whilst meeting the requirements of particular legislation with which it must comply.

The Integration and Co-operative Governance Strategy is required to address:

- ⇨ Regional, local and sector-specific co-operative governance.

Relevant Identified Strategies

The following specific strategy has been developed further:

7.1 Co-operative governance

7.1 CO-OPERATIVE GOVERNANCE

Management Objective

To improve co-operation and co-ordination between DWAF personnel and other authorities regarding information sharing and decision-making and thereby achieve improved management of the water resources in the Amatole – Kei ISP area.

Situation Assessment

Reference should be made to Strategy No. 8.1

Due to the integrated nature of water resource management, co-operative governance is linked to all of the strategies discussed in the ISP. Furthermore, land affairs issues, land use issues and marine issues are all related to water resources in one way or another. Consequently, the effective and efficient management of water resources requires co-operation between DWAF, other government departments and local authorities and parastatals such as Eskom and Water Boards.

In the spirit of good co-operative governance, the DWAF Regional Office has been involved with:

- Liaison with the Provincial Department of Economic Affairs, Environment and Tourism (DEAET), the Department of Agriculture (PDoA) and local authorities through the Stream Flow Reduction Activities Licence Assessment Advisory Committee (SFRALAAC).
- The existing Wetlands and Riparian Zone Delineation Policy Committee between DWAF and DEAET.
- The existing Provincial Liaison Committee (PLC) and its sub-committees, such as the Co-ordinating Committee for Agricultural Water (CCAW) involving DWAF, the PDoA, DEAET, the Department of Land Affairs (DLA), the Department of Local Government and Housing and the District Municipalities.
- The existing Integrated Water Services Management Forum.

The generic issues and concerns relating to co-operative governance requirements are identified as follows:

- The need for co-operative governance in the sharing of information and approval and licensing of all water related activities.
- Delays caused by the lack of capacity, finances or lack of knowledge on the part of officials within different government departments.
- There is a need to consolidate data information systems in the region and improve the sharing of water resource related information (and other information) between government departments, local authorities and institutions to avoid duplication of effort in an area with scarce skilled manpower and financial resources.
- The management and operation of purification and wastewater treatment works and solid waste sites by local authorities in order to meet the standards and requirements set by DWAF.
- Pollution of rivers and the marine environment due to inadequate and/or poorly maintained and operated infrastructure services under the control of local authorities.

The following issues and concerns relating to co-operative governance in the Amatole – Kei ISP area have been identified:

- The integrated nature, overall optimum management and future planning for augmentation of the Amatole Water Supply System requires significant co-operation between various organizations. This need for co-operation includes the deteriorating water quality of the Buffalo and Nahoon Rivers.

- Similarly, the need for co-operative governance related to the future water supply for Queenstown and it environs.
- The need for co-operative governance relating to pollution in the Gcuwa River due to illegal effluent discharges and the unlicensed solid waste site in Butterworth.
- Sedimentation of rivers and dams due to poor land use practices especially in the former Ciskei and Transkei components of the ISP area.
- The need for improved co-operation between DWAF, DLA, PDoA and DEAET for the management of wetlands, marine environments and estuaries, soil conservation and alien plant control programmes.
- The need for alignment between the Eastern Cape Provincial Growth and Development Strategy, the IDPs and WSDPs and the regional ISP perspectives.
- Need for groundwater representation on the CCAW because of unco-ordinated drilling often unknown to DWAF.

Strategic Approach

Promote the effective management and co-ordination of water resources in the ISP area through co-operation between DWAF, other government departments and local authorities and parastatals. Continue involvement in the various co-operative management bodies already established, and ensure active involvement in new liaison bodies that are being or will be established to contribute towards improved water management.

Management Actions

The following specific actions are required to address issues and concerns in the ISP area:

1. Study and provide feedback on the Provincial Situation Assessment and Provincial Strategy framework recently undertaken by the Eastern Cape Provincial Government.
2. Arrange a meeting between DWAF and DEAET to establish a permanent co-operative liaison body for improved co-ordination and information sharing regarding the management of wetlands, estuaries, marine environments and alien plant control programmes.
3. Arrange a meeting between DWAF and PDoA to initiate co-ordination regarding land use issues and soil conservation programmes.
4. Establish a co-operative initiative with local authorities and the Department of Housing and Local Government especially with respect to planning for future water needs and water conservation and demand management.
5. Develop and implement an action plan to ensure that all infrastructure planning processes that impact on water resources are aware of DWAF requirements.
6. Develop and implement an action plan to ensure DWAF input and requirements for IDPs and WSDPs during compilation.
7. Ensure groundwater representation on the CCAW.
8. Set up meetings with the BCM, the ADM and the AW to facilitate improved co-operative governance for optimum water management of the Amatole Water Supply System.
9. Report all co-operative governance issues to the PLC meetings as a regular agenda item.
10. Liaise with Eskom regarding their future plans for hydropower generation in the region.

Responsibility

Although the issues identified are at ISP level, the need for improved co-operative governance is a national and provincial requirement, with action from the RO on area specific matters.

Priority

Priority 1 – Very high.

STRATEGY NO. 8

WATERWORKS DEVELOPMENT AND MANAGEMENT

Need for Waterworks Development and Management Strategies

Alternative options for the future ownership and management of major water resource infrastructure currently owned and operated by DWAF **(**refer **Appendix B9)** are being investigated at national level. In the interim, there is an ongoing need to economically and safely manage the existing water resource infrastructure at both national and regional level.

The Waterworks Development and Management Strategy is required to address:

- ⇨ Strategies for proposed augmentation and new regional schemes
- ⇨ Strategies for major infrastructure operational components
- ⇨ Disaster management planning

Relevant Identified Strategies

The following strategies form part of this overall strategy:

8.1 Amatole System Management (refer also Strategy No.1.3)
8.2 Klipplaat Government Water Scheme (Queenstown)(refer also Strategy No. 1.4)
8.3 Public Health and Safety

8.1 AMATOLE SYSTEM MANAGEMENT

Management Objective

To ensure the effective and efficient operation and management of the dams and bulk infrastructure of the Amatole Water Supply System (AWSS) in order to meet the present requirements and to ensure that planning and implementation of new infrastructure is undertaken timeously in order to meet the anticipated growth in demand in the Buffalo City Municipal (BCM) area.

Situation Assessment

Reference should be made to Strategies No. 1.3 and 7.1.

The AWSS supplies the water requirements of the BCM area consisting of the East London/Mdantsane/Bisho/King William's Town urban complex, and the town of Stutterheim/Mlungisi and surrounding rural villages. The system is a complex one that has developed over many years from a number of separate water supply schemes, some of which have become interlinked as their supply areas have been extended.

The system consists of seven linked raw water storage dams, their associated water treatment works and distribution infrastructure. The dams are the Maden, Rooikrantz, Laing, and Bridle Drift dams on the Buffalo River, the Nahoon Dam on the Nahoon River, and the Gubu and Wriggleswade Dams on the Kubusi River (refer **Appendix B10**).

Most of the demand on the system is in the catchment of the Buffalo River and the adjacent coastal strip and is currently supplied from the dams on the Buffalo and Nahoon Rivers. With the expected growth in demand and/or drought conditions, water will be conveyed from Wriggleswade Dam on the Kubusi River to the Buffalo / Nahoon catchments by means of a canal and tunnel system. This inter-basin transfer scheme can also discharge water into the upper Nahoon and Gqunube catchments.

The AWSS can be divided into a number of sub-systems as follows. These systems are all linked in one way or another:

- The upper Buffalo system from Maden and Rooikrantz Dams supplying King William's Town and surrounding suburbs.
- The middle Buffalo system from Laing Dam supplying Bisho, Zwelitsha and surrounding peri-urban villages. This sub-system can also feed into the upper Buffalo System and the lower Buffalo system. An abstraction weir below the dam also supplies the large peri-urban area of Needs Camp.
- The lower Buffalo system from Bridle Drift Dam supplying Potsdam, Fort Jackson, Mdantsane, East London and the coastal strip.
- The Nahoon system from Nahoon Dam which feeds into the lower Buffalo system and also supplies the peri-urban areas of Newlands.
- The Kubusi system from Gubu and Wriggleswade Dams supplying Stutterheim/Mlungisi and surrounding rural villages. The primary purpose of Wriggleswade Dam is to feed raw water into the middle and lower Buffalo systems by means of an inter-basin transfer system.

The system of ownership, operation and maintenance of the AWSS infrastructure is complex with DWAF, the BCM, the Amatola Water Board (AW), the Amatole District Municipality (ADM) and the Amahlati Local Municipality all involved. The present arrangement is leading to problems with co-operative governance issues.

One example of this is the issue of different tariffs for the supply of raw and treated water in the AWSS. BCM owns Bridle Drift Dam, the associated Umzoniana Water Treatment Works and

distribution network in the lower Buffalo system, while DWAF owns Nahoon Dam and the associated treatment works, which are operated and maintained on DWAF's behalf by AW. Owing to different cost structures and overall customer base for each organisation the price of treated water supplied by the AW to BCM from the Nahoon system is greater than that supplied by BCM from its own Bridle Drift Dam and treatment works. The result of this is that the BCM uses as much water as it can from its own infrastructure whilst under-utilizing water from AW (a similar situation applies to water from Laing Dam to King William's Town). The AWSS is thus operated on a "tariff based system" and not on a system that optimises the yield nor takes into account the deteriorating water quality in the system. The consequences of this are many including :

- A breakdown of co-operative governance with arbitration methods being used to solve problems that arise.
- Necessary infrastructure being constructed by one organization but only being used (and paid for) during drought situations by another.
- Overall co-ordinated planning for additional infrastructure such as the need and location of additional water treatment works is not occurring.
- During a drought situation the yield of the system will be less than the optimum yield as each sub-system is presently being operated independently of the other sub-systems. This may create the apparent need for development of additional raw water resources, which could be delayed with optimum operation and management.
- The operation of the sub-systems currently makes no allowance for improving the serious water quality concerns in the system nor for environmental releases. This aspect could possibly be improved with the release of water from Wriggleswade Dam although studies (**Ref. 4**) show the impact to be minimal.
- Wriggleswade Dam, which was completed in the late 1980s has only being used a couple of times, once to provide farmers in the Gqunube catchment with water during the 1992/93 drought. For most of the past decade the dam has remained 100% full and has been used mainly for recreational purposes. There is a perception that the dam is a "white elephant" as it is not presently being used. Based on this perception, farmers in the Kubusi catchment are continually requesting water for additional irrigation and licences for forestry.

The following issues and concerns regarding the AWSS have been identified:

- The availability of water for future augmentation of the system.
- The need for a co-ordinated management and operational system for the AWSS. This may need to be undertaken by an organisation or forum involving all stakeholders such as a steering committee tasked with overseeing the management and operation of the system.
- The need for a uniform systems approach towards tariffing in the AWSS.
- The location and size of the existing bulk supply infrastructure (including water treatment works) limits supply options from the various sources. Major augmentation to this bulk infrastructure would be required in addition to the raw water resource development (dams).
- The need to transfer ownership of assets and redeployment of manpower according to DWAF policy.
- The need to address the current inadequate environmental releases.
- The need to define and implement clear operating rules based on drought conditions and accurate assessments of the ecological Reserves and releases.

Strategic Approach

A more integrated management approach must be led by DWAF. This could take the form of a new organization or steering committee with the authority to manage and operate the system to clear optimum guidelines, which would include setting of tariffs. Alternatively, it could be undertaken by agreements being drafted between the various parties for operation, maintenance and supply aspects of the system. The implementation of an overall universally agreed management plan and system tariff would be a logical extension of this approach. This system tariff should be compiled as part of a pricing strategy for the region where allocations and not only water use are paid for. It will be necessary to accurately evaluate the water allocations to achieve this.

Management Actions

The main actions include the following:

1. Establish liaison with the BCM, the AW and the ADM with the purpose of encouraging a co-operative governance approach to the management and operational problems of the AWSS.
2. Investigate the phasing in of a uniform systems tariff and how this will affect users.
3. Ensure that overall co-ordinated management and operational plans are put in place as soon as possible through co-operative governance.
4. Appoint specialists to undertake investigations to optimize the location of future water infrastructure such as water treatment works and bulk infrastructure pipelines. Previous studies into future raw water augmentation schemes need to be revisited in view of changing developments within the BCM, which may affect the growth in water requirements. More accurate information and assessments need to be made on the quantity of water required and the related time frames. Reference should be made to Strategy No. 1.3.
5. Address the requirements for environmental releases from all dams but especially from the Nahoon and Wriggleswade Dams.

Refer also to Reconciliation Strategy No. 1.3.

Responsibility

The DWAF Regional Office is responsible for developing this strategy in consultation with the Buffalo City Municipality, the Amatola Water Board and the Amatole District Municipality.

Priority

Priority 1 – Very high.

8.2 KLIPPLAAT GOVERNMENT WATER SCHEME (QUEENSTOWN)

Management Objective

To ensure the effective and efficient operation and management of the dams and bulk infrastructure of the Klipplaat Government Water Supply System which supplies Queenstown and Sada/Whittlesea and irrigation developments downstream of the dam.

To ensure that planning and implementation of new infrastructure is undertaken timeously in order to meet the anticipated growth in demand especially from Queenstown and the proposed revitalized irrigation developments in the former Ciskei homeland.

Situation Assessment

Due to the important role that Queenstown plays in the sub-area, it is imperative that sufficient raw water is always available to meet the town's requirements. Bulk raw water supply for Queenstown is currently supplied from the small Bongolo Dam (1,5 million m^3/a) just outside the town, but mainly from the Klipplaat Government Water Supply Scheme based on the Waterdown Dam some 40 km away on the Klipplaat River (8,25 million m^3/a). Water is supplied to Queenstown from Waterdown Dam by means of a 46 km long pipeline, which is over 35 years old. A booster pumpstation some 16 km from Queenstown increases the flow in the pipeline. An offtake from this pipeline supplies the expanding Sada/Whittlesea urban complex in the former Ciskei homeland.

The present allocation for urban use from Waterdown Dam for Queenstown and Sada/Whittlesea is 8,25 and 4,2 million m^3/a respectively, with a further allocation of 14,8 million m^3/a for irrigation. The actual yield of the dam (17,5 million m^3/a) is less than the sum of these allocations. Water from the Oxkraal Dam is used to supplement the irrigators in the lower parts of the scheme. Water use in Queenstown is close to its full allocation, but due to the fact that most of the allocation for irrigation is not currently used or used at a low level of assurance, no major water shortages have been experienced. This will change as the irrigation rights are taken up as part of the revitalization of the irrigation schemes around Shiloh, which forms part of the Government Supply Scheme.

A number of studies have been undertaken to investigate possible future raw water supplies for the town (**Ref. 19 and 20**). These studies indicated that additional raw water would be required by the year 2000 based on the assumption that the full water allocation for irrigation was being used and that the growth experienced in the town over the past decade (1986 –1996) would continue. This has not been the case as most of the potential irrigation development in the former Ciskei downstream of the dam did not occur with the result that the allocated irrigation water has been available for use by Queenstown and Sada subject only to the limitations of the pipelines and pump stations. In addition, the growth in the town especially of industries has slowed due to the removal of homeland border subsidy schemes. A number of alternative options were investigated during the study including optimizing the operations of the system. In addition to the very necessary requirement for optimizing the operations, the favoured infrastructure augmentation scheme consists of a new pump station and pipeline from the under-utilized Xonxa dam to Queenstown. This pipeline would also supply a number of rural villages along the pipeline route.

Due to the number of uncertainties and assumptions in the above studies, such as a lack of hydrology records, ecological Reserve requirements, actual growth patterns, revitalization of irrigation schemes etc, DWAF are currently assisting the Chris Hani District Municipality and the Lukhanji Local Municipality with updates to the previous Queenstown Regional Water Supply Feasibility Study (**Ref. 20)**.

The Chris Hani DM is placing increasing pressure on DWAF to give permission for the next stage of the Xonxa Dam supply option to proceed.

Strategic Approach

It is important that more accurate data and information is obtained regarding the assumptions made in the previous studies in order to substantiate the recommendation for proceeding with the Xonxa Pipeline option. Without this information a costly scheme could be undertaken with far reaching implications for future water tariffs for Queenstown. This information and the revised studies should be undertaken with the utmost urgency in order to ensure that neither the urban sector nor the irrigation sector is unduly affected. These studies should also include details for optimizing the operation of the dams in the Klipplaat catchments.

Management Actions

The main actions required include the following:

1. Until such time as a definitive recommendation can be made regarding Queenstown's future raw water supply augmentation, an operational plan for the dams in the Klipplaat system should be put in place in order to maximize the yield of the system. This will require close co-operative governance between DWAF, the Chris Hani DM and the Lukhanji LM. On the supply side, the yield of the Klipplaat system must be optimized through recommendations for the operational aspects of the dams including the Oxkraal Dam. This should include allowances for environmental releases, which must still be determined.
2. The overall yield information for the existing dams in the Klipplaat catchments and Xonxa Dam should be more accurately calculated using the latest hydrological information and setting of ecological Reserve requirements.
3. DWAF should proceed with the utmost urgency to finalise its studies and recommendations for the augmentation of Queenstown's water supply with time frames for its implementation. These studies should provide more accurate information on the existing and future water requirements of the town and region.

Responsibility

The DWAF Regional Office and Directorate : Options Analysis are responsible for developing this strategy in consultation with the Chris Hani DM and the Lukhanji Local Municipality.

Priority

Priority 1 – Very high.

8.3 PUBLIC HEALTH AND SAFETY

Management Objective

To ensure the effective and co-ordinated disaster management planning and implementation relating to floods, droughts, dam safety issues and pollution spills.

Situation Assessment

The Public Health and Safety strategy is addressed under the following headings:

- Disaster management planning
- Floods
- Droughts
- Dam safety
- Emergency pollution.

a. Disaster Management Planning

The National Disaster Management Act was promulgated in 2002. This Act establishes the National Disaster Management Centre as the national focal point for all disaster management activities. DWAF is investigating the establishment of a dedicated Public Safety Unit to deal with its water resources management, water services and forestry responsibilities relating to disasters and emergencies.

The following issues/concerns have been identified:

- An Eastern Cape Disaster Management Forum has been established.
- The need for each District Municipality to have a disaster management forum.
- Uncertainty about the existence of disaster plans for Bridle Drift Dam, which is owned and operated by BCM.

b. Floods

The National Disaster Management Centre has established several working groups, each of which will prepare a component of the National Disaster Management Framework. The Department will lead the working group to develop a national flood management policy.

The following issue/concern has been raised:

- The high risk of flooding to informal settlements located below flood levels especially within the Buffalo City Municipal area.

c. Droughts

The Department will co-operate with the National Department of Agriculture, which leads the Drought Working Group established by the National Disaster Management Centre, in developing prevention and mitigation measures for drought conditions.

The following issues /concerns have been raised:

- A method is required to co-operatively deal with supply to local authorities during times of drought.
- The level of sedimentation and its impact on the dead water storage in former Ciskei and Transkei dams is not well known.

d. Dam Safety

The Dam Safety Office within DWAF, administers the Act's provisions relating to the safety of all new and existing dams with a safety risk. The Department is preparing new regulations relating to the safety of dams. The drafting process was completed during 2002, after which the proposed regulations will be the subject of a public consultation process. There are no dams within the area that presently pose any major risks.

e. Emergency Pollution of Water Resources

In emergency situations, where harmful substances are accidentally or negligently discharged into water resources, the Act makes those who have caused the pollution responsible for remedying its effects. At present all pollution incidents must be reported to the Department, so that appropriate departmental responses can be co-ordinated with the relevant emergency services and disaster management centres.

Pollution from diffuse sources such as informal settlements is extremely difficult to control at source, and inadequate sanitation facilities in these areas can result in bacterial pollution of water resources, which may cause outbreaks of diseases such as cholera.

The National Disaster Management Centre has co-ordinated the development of an inter-departmental strategy to deal with cholera, which has become endemic in the Eastern Cape.

The following issue /concern has been raised:

- Vulnerability of rural and dense informal settlements to the outbreak of water borne diseases, especially cholera and dysentery.

Strategic Approach

DWAF will manage the water resources of the region to ensure that water is stored, managed and distributed to maximize health and minimize risk. This entails compiling a set of protocols that can be timeously implemented to mitigate the risks posed by floods, droughts, infrastructure failure and pollution of the water resources.

Management Actions

Until such time as the Public Safety Unit has been established, an interim strategy will be implemented as follows:

a. Disaster Management Planning

1. Procedures to supply water during times of emergency need to be documented. This includes procedures for repair work that may be required to specific infrastructural components.
2. Integrate any disaster management plans with the Disaster Management Act.
3. Emergency supply arrangements need to be developed for various durations of possible non-supply from the system or components for the various user groups.
4. Encourage the establishment of disaster management forums in all District Municipalities through the Water management institutional framework strategy.
5. Complete Emergency Preparedness Plans (EPPs) for all government dams in the ISP area and implement.
6. Encourage owners of Category 2 private dams to prepare EPPs for their dams.
7. Through the co-operative governance strategy, liaise with the BCM, other affected municipalities and the Department of Local Government and Housing to influence the fast tracking of the housing process to get people out of dangerously located informal settlements such as exist within the BCM area.

b. Operation During Floods

1. Draw up a management plan to operate government infrastructure during floods.

c. Operation During Drought Periods

1. Implement the recommendations on operating rules as contained in the Amatole Water Resources System Analysis Report (**Ref. 4 and 26**) in a drought period.
2. Draw up a drought management plan to operate all government infrastructure during droughts.
3. Draw up a drought management plan to co-operatively deal with supply to local authorities during times of drought.
4. Review and document procedures adopted during previous droughts.
5. Identify shortcomings in terms of operation during previous droughts.
6. Develop procedures for the implementation of restrictions in the agricultural sector.
7. Address both surface and groundwater resources in the above.

d. Dam Safety

1. Implement the requirement of the NWA regarding dam safety.
2. Process dam safety applications and issue authorisations as required.
3. Keep a regularly updated register of all dams with a safety risk.
4. Undertake dam safety inspections and reporting.
5. Take action against owners of illegal or unsafe dams.

e. Emergency Spills and Pollution

1. Request the polluter to remedy its effects.
2. Contact relevant emergency services and disaster management centres.
3. Ensure that measures are in place to address sporadic outbreaks of cholera in the region.

In addition to the above, the following specific management actions are required:

a. Buffalo River / Bridle Drift Dam

Liaise with BCM officials to establish the status of disaster management plans for the dam and encourage them to implement such plans if not already done so.

Consult with the BCM regarding the operation of their infrastructure during drought periods and ensure the implementation of the recommendations on operating rules as contained in the Amatole Water Resources System Analysis Report (**Ref. 4 and 26**).

b. Nahoon River / Nahoon Dam

Revisit and, if necessary, revise the Disaster Management Plan.

Responsibility

The RO is responsible for developing this strategy in consultation with the BCM, the AW, the Chris Hani DM and Amatole DM, the Provincial Department of Agriculture and the Department of Housing and Local Government.

Priority

Priority 2 – High.

STRATEGY NO. 9

MONITORING AND INFORMATION MANAGEMENT

Need for Monitoring and Information Management Strategies

The National Water Act requires the Minister to establish monitoring systems for water resources to collect appropriate data and information. As part of the national Monitoring and Information Strategy which forms part of the NWRS, the Department is addressing the inadequacies and shortcomings of the current arrangements by amalgamating all existing and planned monitoring and assessment systems into a structured and coherent monitoring, assessment and information management system. This system and the data captured on water availability, water use and water quality is required for effective and efficient management of an increasingly scarce resource.

Monitoring at catchment level is required to ensure compliance with water authorisation conditions and licensing, to control all water use and also for billing and revenue collection.

The Monitoring and Information Management Strategy is required at a National, Water Management Area and Catchment Management level to:

- ⇨ Improve monitoring networks and data capturing for water use control (availability, allocations, licensing and revenue collection).
- ⇨ Obtain and capture accurate data on the physical, chemical and biological aspects relating to surface and groundwater resources (quality).
- ⇨ Improve on efficiencies in gathering of information, particularly through institutional co-operation in data acquisition, storage and management, information generation and dissemination.
- ⇨ Set and maintain standards for the acquisition/sampling, processing and management of accurate data leading to generation of information.
- ⇨ Ensure that information systems are easily accessible both within DWAF and to outside stakeholders without compromising data security.
- ⇨ To ensure roles/responsibilities (including providing key required resources) are clearly defined for different levels of monitoring. This will help avoid duplication while encouraging sharing of resources between WMAs.
- ⇨ Ensure co-ordinated long-term sustainability of existing monitoring networks and the emerging/new ones, eg. the Reserve Monitoring compliance.
- ⇨ Ensure that the WMA/local strategic monitoring framework is linked to the national framework.

Relevant Identified Strategies

The following specific strategies have been developed further:

9.1 Monitoring networks and data capture
9.2 Information management

9.1 MONITORING NETWORKS AND DATA CAPTURE

Management Objective

The installation of effective national and regional monitoring networks and the accurate population of databases to ensure sustainable water use (monitor the balance between availability and requirements), to ensure the control and billing of water use, and to ensure the protection of surface water resources and groundwater (water quality).

Situation Assessment

The National Water Act requires the Minister to establish national and regional monitoring systems for water resources to collect appropriate data and information necessary to assess the following:

- The quantity, quality and use from and effluent return to surface and groundwater resources
- The rehabilitation of water resources
- Compliance with resource quality objectives
- The health of aquatic ecosystems
- Atmospheric conditions which may influence water resources
- Other data necessary for the management of water resources such as billing and tariff calculations

To meet the requirement for detailed integrated information, DWAF is currently reviewing and revising at a national level, all data-acquisition, monitoring and information systems.

In addition to national networks required for assessing water availability and use, the following national water quality monitoring networks are required.

- National Chemical Water Quality Monitoring Network
- National Microbial Monitoring Network
- National Eutrophication Monitoring Programme
- National Aquatic Ecosystem Biomonitoring Programme (River Health Programme)
- National Toxic Monitoring Programme
- National Radioactivity Monitoring Programme is being tested
- National Estuarine Monitoring Programme is planned

Monitoring networks and data capture on **water use** aspects within the Amatole – Kei catchments are far below optimal, especially in the former Ciskei and Transkei areas, due to under resourcing (refer **Appendix B11**). Very little monitoring by DWAF of water use from surface water resources to small towns is done in the region. Monitoring is mainly undertaken for those supplies from DWAF owned dams or those for regional water supply schemes originally funded by DWAF. These include supplies to the Buffalo City Municipality and Queenstown.

The location and status of monitoring boreholes of small towns and coastal villages is poorly documented. Actual groundwater abstraction information is also generally not available from these towns and villages. In most instances officials responsible for these schemes do not have the technical expertise or capacity to do groundwater monitoring over an extended period and DWAF lacks the capacity to adequately undertake such monitoring on their behalf.

While agriculture is the largest user of water in the area, most of the irrigable areas fall within the former Ciskei and Transkei homelands where monitoring equipment and data capture is seriously lacking and prone to vandalism.

Flows in rivers are monitored at national monitoring stations. The number of operational flow monitoring sites, where flow is measured at reservoirs, at transfer schemes, at major irrigation schemes and at estuaries needs to be greatly expanded. This need is currently being addressed with proposals for flow gauging stations in the Kwelera River, below the Laing Dam in the Buffalo River and below the Binfield Park Dam in the Tyume River. These efforts need to be increased and facilities constructed in rivers such as the Kei River (estuary).

Within the former RSA component of the area, the regional hydrological data capture systems and databases are generally regarded as being the minimum acceptable to regional DWAF staff (monitoring and capturing of rainfall, evaporation, surface water, ground water and water quality). The available information and monitoring systems and resources to capture data are, however, not acceptable. Previous attempts at establishing sustainable GIS capacity in the region have failed. There is a lack of skilled personnel within DWAF and within the municipalities to undertake adequate monitoring, together with a lack of funds to increase monitoring points at an acceptable rate. This situation is worse for the former Ciskei and Transkei areas. An example is that of water quality samples, which are taken monthly by DWAF and not every two weeks due to a lack of manpower.

Water quality monitoring is sparse and sporadic throughout the area due to a lack of skilled manpower resources, both at the regional (DWAF) level and at the local (municipal) level. The near to pristine nature of many of the rivers and estuaries in the area and their important role in the region with regards to biodiversity, fish breeding and recreational activities and tourism requires that improved and expanded monitoring systems be formulated. As the overall responsible authority for the water quality of the rivers, it is incumbent on DWAF to ensure that all rivers are adequately monitored either by DWAF personnel or by local municipal authorities.

The urban rivers in and around East London are heavily impacted. After classification, these rivers require a detailed monitoring and data collection programme in order to identify the impacts and institute steps to improve the health of the rivers. Buffalo City Municipality is also presently undertaking a sea outfall for raw screened sewage and effluent, which will require monitoring by DWAF.

Both national and regional monitoring systems are spatially inadequate and operate largely in isolation of each other. Whilst DWAF is actively working to structure its systems into a single “Monitoring, Assessment and Information System (MAIS)”, this strategy will need to address networks and funding, staff capacity, and co-operative relationships with other organizations.

The current resources in the RO to implement this strategy are inadequate. This results in monitoring only of perceived critical data at intervals that are too long.

Strategic Approach

DWAF recognizes that the monitoring of water resources, both quantity and quality, is seriously deficient within the Amatole – Kei area and particularly within the former Ciskei and Transkei regions. Manpower and financial resources are severely limited and the Department will have to invest heavily in monitoring if it is to fulfill its requirements as mandated under the NWA.

The implementation of an adequate monitoring programme will require the installation of significant new equipment and infrastructure eg. weirs etc, a major increase in staff capacity, and the bringing of all water quality monitoring up to standards, with an emphasis on potential crisis areas.

Many different organizations are involved in monitoring and the first step for DWAF will be to co-ordinate these disparate organizations. At the same time this will require DWAF to share data and information.

Management Actions

Develop a detailed regional strategy that is compatible with the national information system for the monitoring needs of the ISP area by undertaking the following generic actions:

1. Establish a regional task team and review or identify all aspects that need to be monitored. Group all monitoring needs into logical systems with common goals according to functional areas, which are then divided further into sub-systems. This will include but not be limited to:

    - Hydrology (rainfall, climate and streamflow)
    - Geohydrology (groundwater)
    - Inflows and outflows (transfers)
    - Abstractions (water users, dam levels, operational releases, losses etc)
    - Water quality (surface and groundwater)
    - Return flows
    - Waste water outflows
    - River health
    - Sedimentation
    - Small farm dams (numbers, capacity and use)
    - Land use changes (agricultural cropping, forestry, alien invasives)
    - Wetlands

2. Develop a detailed information requirement and monitoring needs assessment for the various systems, which are grouped by functional areas.
3. Prepare a set of standards for monitoring and data capture which must cover accuracy, completeness, time scales and time frames, information sharing etc.
4. Identify and motivate for additional monitoring points or functions required for the ISP area in a phased implementation manner based on priorities.
5. Amalgamation of the identified existing and planned monitoring and assessment systems needs into a coherent and structured monitoring, assessment and information system.
6. Review staff resources required for adequate monitoring of surface and groundwater and employ, develop and train additional staff where identified.
7. Motivation for the regional share of the national monitoring budget.
8. Develop regional co-operative, collaborative relationships between DWAF and other organisations that have relevant data or operate water-related monitoring, assessment and information systems. This should include a plan for storage and sharing of mutually useful information.
9. Regularly review and update the regional monitoring strategy.

Surface water monitoring: Continue existing monitoring and data capture systems and identify the need to install additional rainfall, flow and estuarine recorders.

Groundwater monitoring: Build capacity, especially at local authority level. Additional staff are also urgently required in the RO.

Water quality monitoring: This was largely addressed in the *Water Quality Management Strategy*, which also dealt with water quality monitoring needs.

Coastal and marine monitoring (estuaries and effluent discharges to sea outfalls) is required and assistance should be obtained from the Coastal and Marine Research Institute of Port Elizabeth and the South African Institute for Aquatic Biodiversity in Grahamstown. These two organizations could be part of a co-operative governance effort.

Responsibility

The development of this strategy is the responsibility of the RO in consultation with the RDM office and the Directorates of Information Programmes, Waste Discharge and Disposal and the RQS. Co-operative governance liaison should be developed with the provincial departments of Local Government, Health, the District Municipalities and Buffalo City Municipality.

Priority

Priority 2 – High. Implement over the short to medium term.

9.2 INFORMATION MANAGEMENT

Management Objective

Facilitate improved storage, manipulation, backup, archiving, dissemination, access to and sharing of information within the ISP area and WMA.

Situation Assessment

National systems will be designed so that CMAs, once established, can take responsibility for information management in their Water Management Areas, as well as have access to information from adjacent areas. The national information system for water services required by the Water Services Act will be linked to information systems for water resources. The Act requires any person, at the request of the Minister, to provide data and information to facilitate the management and protection of water resources. Regulations may be written in this respect. The Minister is required by the NWA to establish the following national information systems:

a. Surface Water Hydrology
The Department's existing mainframe-based *Hydrological Information System*, and several related systems are being replaced with a new server-based commercial system (Hydstra). It is expected to be operational at all DWAF Regional Offices by the end of 2004.

b. Water Quality
The Department is developing the *Water Management System* for the operational management of water quality monitoring systems, and storing, processing and disseminating the results arising from monitoring. The *Water Management System* is currently functional and operational in the Department's National Office and some Regional Offices. The system is expected to be fully operational throughout the Department in 2007.

c. Groundwater
The present mainframe-based national groundwater database is to be replaced with a server-based, web-enabled *National Groundwater Archive*. The development of the system and transfer of all data are expected to be completed by the end of 2004. The Archive will be linked to a proprietary system that provides management information by modelling groundwater recharge, the impacts of abstraction, and the impacts of aquifer contamination. The system was installed in the Department's National Office and three Regional Offices by the end of 2002, and will be fully operational in all Regions by the end of 2004.

d. Water Use Registration and Authorisation
The *Water Use Authorisation and Registration Management System* (WARMS) is a comprehensive system designed to manage the process of registering water use and the authorisation of water use (by licensing), as well as manage administrative components of the water charge system. The registration component of the system has been in use since 2000. The cost recovery functions became operational early in 2002, with the licensing capabilities to follow in 2003. Links with national databases operated by other departments should be established by the end of 2004.

e. State of Rivers Reporting
The *National River Health Programme* intends to produce *Ecological State of the Rivers Reports* for all major river systems in the country by 2008. The reports will indicate the present state of the rivers, whether conditions are stable, deteriorating or improving, what is causing the state of the river to change, and what management interventions are required. This will depend on the availability of physical and chemical data.

The following monitoring strategy issues and concerns were identified in the Amatole – Kei :

- The need to share information, responsibilities, databases and other related issues and actions.
- Inability of the *Water Use Authorisation and Registration Management System* (WARMS) to handle water use queries per catchment area.
- The *Water Quality and Quantity Water Management System* (WMS) will supersede the *Pollution Monitoring and Capture System* (POLMON).

The following information management related issues and concerns were identified:

- There is ongoing capturing according to priority in the registration process. Data of some water users and solid waste sites have not yet been captured.
- There is an ongoing mapping project that captures data on alien invasive species.
- There was a loss of captured solid waste site data in the RO due to inadequate backup facilities. Only 20 % of solid waste sites are now populated in the *Waste Manager* programme (waste permit information).
- There is an urgent requirement for adequate data storage, backup and archiving systems for captured Eastern Cape data.
- The availability and retention of suitably trained and qualified staff is a problem.

The current resources in the RO to implement this strategy are inadequate. Skilled IT and GIS staff, funds to buy and properly manage the software and databases and technical staff to evaluate, manage and improve the systems and databases and to liaise with other information managers are required. The available staff is very stretched and address issues according to priorities (reactive and crisis management). The most important activity is thus to increase skilled manpower resources. Restructuring is currently under way in the RO, which is a difficult time to increase resources, but is also an opportune time to divert appropriate resources to information management, which in the past generally seemed to be undervalued in importance.

Strategic Approach

Data is valuable and expensive, and adequate systems and staff must be provided to ensure the accurate capture and storage, retrieval processing and dissemination. In the case of potentially harmful events, the RO should have the necessary plans and information in place to warn all relevant stakeholders. The Department recognizes the inadequacies of the current monitoring and information systems and proposes that an Information Management Plan be instituted through this ISP.

Management Actions

Compile an ISP area Information Management Plan as follows:

1. Identify what information the Departmental information managers require.
2. Determine GIS specific requirements such as hardware for storage.
3. Identify information requirements from other departments, provincial and local government and other organizations.
4. Compile an information sharing policy with other departments, provincial and local government and other organisations and identify the following:
    - What information should be shared?
    - Who should have access to it?
    - What is the integrity of the information to be shared?
    - With whom is sharing of information beneficial?
5. Implement the information sharing policy through co-operative governance with other departments, local authorities and institutions through various formal and informal committees or other forms of effective co-operation.
6. Re-capture waste related permit information in Waste Manager.
7. Install adequate storage, backup and archiving facilities and library systems in all the Eastern Cape Offices.
8. Formulate an approach to deal with available WARMS information.

Responsibility

A new Chief Directorate Scientific Services will be created to take overall responsibility. The development of the regional strategy is the responsibility of the RO in collaboration with HO NWRS so as to avoid conflicting ideas.

Priority

Priority 2 – High. Implement over the medium term.

STRATEGY NO. 10

IMPLEMENTATION

Need for an Implementation Strategy

The Implementation Strategy is required to address:

- ⇨ An Implementation programme for the ISP
- ⇨ Resources to implement the ISP
- ⇨ Delegation of responsibility
- ⇨ Budgeting priorities

Relevant Identified Strategies

The following specific strategy has been developed further:

10.1 Implementation

10.1 IMPLEMENTATION

Management Objective

To ensure that the approaches put forward by the Department through this ISP are adopted and implemented in the Amatole – Kei catchments of the Mzimvubu to Keiskamma WMA 12. This will require willpower, funding and capacity.

Situation Assessment

The ISP is an internal document, developed almost exclusively by and on behalf of the Department of Water Affairs and Forestry. The ISP sets out the approach which the Department is taking towards water management in the Amatole – Kei catchments of the Mzimvubu to Keiskamma WMA 12, and lists suggested actions towards achieving good management of the water resource.

The wider public has had no direct input into this ISP. However, it is recognised that the approaches adopted have a significant impact on the populace of the Amatole – Kei area. Whilst the approach to date in developing this ISP may seem non-participatory, it must be remembered that this is not a Catchment Management Strategy, but DWAF setting out how DWAF itself sees the situation, and the steps which DWAF views as most appropriate in dealing with the situation. Years of interaction with the public have had an important influence.

The ISP is not a closed document, but is to be made available to the wider public for comment and input. This makes the ISP an inherently transparent document, exposing the thinking and planning of the Department in a way that has never been done before. Although DWAF makes no commitment to adopt every comment made, these will be taken seriously and the ISP will be updated and improved as newer and better perspectives are formed. Once the Catchment Management Agency has been established, it will be required to develop a Catchment Management Strategy, and this will require full public participation. It is to be hoped that the ISP will be taken as useful baseline information and, indeed, that the approaches adopted here are found to be acceptable to, and adaptable by, the new dispensation.

Strategic Approach

The ISP is subject to the approach set out in the NWRS and details this approach for the Amatole – Kei catchments of the Mzimvubu to Keiskamma WMA 12. It carries significant weight in expressing how water resource planning and management will be carried out in the WMA. It is not, however, an inflexible document, nor is it without its flaws. As such the ISP may be adjusted and adapted when new and better ideas are presented. Despite this, the approaches and requirements of this ISP may not be ignored.

The implementation of the ISP is an enormous task. Never before have all the hopes and expectations of the Department been gathered together into one document. Much of what is in this document describes the day-to-day functions of the Department. But there are many new tasks, functions, and actions set out in response to DWAF's visions for the future.

It is recognised that it is quite impossible to immediately launch into, and achieve, all that is required by this ISP. Funds and capacity are, and will always be obstacles that must be surmounted. The approach is to take the ISP and to use it as instruction, guidance, and motivation in the development of yet clearer management and action plans. These must be built into Departmental Business Plans, and budgeted for as part of Departmental operating costs. This will necessarily be in a phased manner as dictated by available resources, but it is important that the ISP be used to leverage maximum funds, maximum capacity, and to bring optimum management to the WMA

A major focus in the Amatole – Kei catchments in the short to medium term will be on the following :

- Planning for the provision of additional water for the Buffalo City Municipal area (and the East London IDZ).
- Ensuring that intervention measures are applied to the deteriorating water quality situation in the Buffalo, Nahoon and small urban rivers within the BCM area.
- Applying co-operative governance measures to optimize the management and operation of the Amatole Water Supply System.
- Supporting the Eastern Cape government's growth and development plan for the revitalisation of the agricultural sector by means of the rehabilitation of irrigation schemes in the former Ciskei and Transkei homelands. This support will include institutional development (WUAs) to enhance the process.
- Planning for the provision of additional water for Queenstown in the short term.
- Interacting with the Provincial Department of Agriculture in order to address the increasing soil erosion problems in the region.

This will be achieved through the implementation of the identified strategies, which must complement each other.

Management Actions

The following actions are required:

1. Publish the ISP in hard-copy, on CD, and perhaps even on the Web, for public input and comment. Copies will only be presented to key stakeholders, and on request. It is not the intention to have a major drive for public input, but merely to create accessibility for input.
2. There are many actions in the ISP which do require public involvement – and it is important that the thinking with regard to, for example, the use of groundwater, and the importance of WCDM, are taken out forcefully both to local authorities, other direct water users such as agriculture, and the wider public.
3. Collate comment and consider this in revising and improving the ISP.
4. The ISP should, in any event, be open to continuous improvement, with possible updating on an annual basis.
5. All DWAF Regional staff, Working for Water, and other major stakeholders should have access to, or copies of, the ISP.
6. Approaches set out in the ISP need to be accepted and adopted by both national and regional staff. Where there is resistance to ideas then this needs to be resolved in an open climate of debate and understanding. Modification of the ISP is not ruled out.
7. The practicalities of implementation demands must always be considered.
8. Most actions in this ISP have been assigned to the Region. It is critically important that the tasks outlined are prioritised, budgeted for, and built into regional and national business plans and budgets.

Responsibility

The DWAF Regional Office is responsible for managing the implementation of this ISP.

Priority

Priority 1 – Very high.

The implementation is to be ongoing until the establishment of a fully functional CMA in the Mzimvubu to Keiskamma WMA and the ISP is superseded by a CMS.