

# THEEWATERSKLOOF DAM

## RESOURCE MANAGEMENT PLAN



## RESEARCH REPORT



# 1 EXECUTIVE SUMMARY

## INTRODUCTION

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The Department of Water Affairs, initiated the development of Resource Management Plans (RMPs) and Business Plans (BPs) for seventeen dams in South Africa between 2012 and 2014. According to the Guidelines for the Compilation of Resource Management Plans (RMPs) (2006), the main aim of RMPs is to *“attain the objectives underlying sustainability and to compile workable, functional sustainable access and utilisation plans for water resources and in particular State Dams through a process based on the attainment of harmony within the natural and cultural environment while addressing the needs and expectations of both the community, users and visitors based on sound business practices combined with a representative institutional structure to take charge of the management of the resource in equitable manner, thus ensuring that the process will be consultative with interested and affected parties playing an essential role in the success of the final plan.”*

A RMP is a combination of an integrated resource management plan, including zonal mapping and a proposal for the implementation of the plan. In addition to the RMP which will be operational for five years, an annual BP prioritises objectives and informs decision makers of required actions and resources. Resource management concerns the management of how people and natural resources interact and the RMP and Business Plan for Theewaterskloof dam aims to bring together planning, allocation, conservation and use. However, in order for this RMP to be effective, a solid foundation for management actions and objectives is required.

This report represents the Research Report of the RMP process and serves to understand the current state of the environment and to identify the issues, opportunities and constraints at Theewaterskloof Dam. Understanding the status quo and characteristics of both the catchment at large and the local dam environment is a vital and significant component of the compilation of a management plan. The outcomes of the Research Report will build on the existing Visioning and Objective Identification and provide a foundation upon which the RMP will be built.

Theewaterskloof Dam is owned and managed by DWA, to transfer water primarily to Cape Town and irrigation in the Berg WMA, as part of the extensive Western Cape water supply system. The purpose of the dam is to provide storage for the larger quantities of runoff that become available during the winter rainy season in the upper reaches of the Rivieronderend and by pumping through tunnels from the Berg River catchments. During the dry summer season water from the Theewaterskloof Dam can be transferred to the Berg River and Eerste River valleys (BOCMA, 2011). The dam falls in the Theewaterskloof Local Municipality.

## **ENVIRONMENTAL PROFILE**

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The Environmental Profile describes the current state of the environment which was ascertained through *inter alia* baseline evaluations and descriptions, desktop assessments, existing data assimilation and stakeholder engagement (as required).

The environment at Theewaterskloof Dam is explained in terms of the various features and attributes that serve as the building blocks for the (1) Biophysical, (2) Planning and Development, and (3) Social, Economic and Cultural Environments. The biophysical environment of the catchment was considered as this will have far-reaching implications on the water resource. In addition the immediate receiving environment was considered in terms of the effects of the environment on the dam, and the effects of the dam on the environment.

## **PRIORITIZING OBJECTIVES**

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The first phase of the RMP was to determine a vision and objectives for the dam. From the information gathered in the Research Report, three of the identified objectives have been prioritised and their feasibility discussed at the end of the Research Report.

## 2 TITLE AND APPROVAL PAGE

**TITLE:** Theewaterskloof Dam – Resource Management Plan:  
Research Report

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Research Report

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## 4 INTRODUCTION

### 4.1 Background

The Department of Water Affairs has initiated the development of Resource Management Plans and Business Plans for seventeen dams in South Africa between 2012 and 2014. Dams were identified during a survey which was undertaken by the National Water Resource Infrastructure (NWRI) survey in 2007 for the General Strategic Plan for Commercialisation (DWA, 2009).

According to the Guidelines for the Compilation of Resource Management Plans (RMPs) (2006), the main aim of RMPs is to “attain the objectives underlying sustainability and to compile workable, functional sustainable access and utilisation plans for water resources and in particular State Dams through a process based on the attainment of harmony within the natural and cultural environment while addressing the needs and expectations of both the community, users and visitors based on sound business practices combined with a representative institutional structure to take charge if the management of the resource in equitable manner, thus ensuring that the process will be consultative with interested and affected parties playing an essential role in the success of the final plan.”

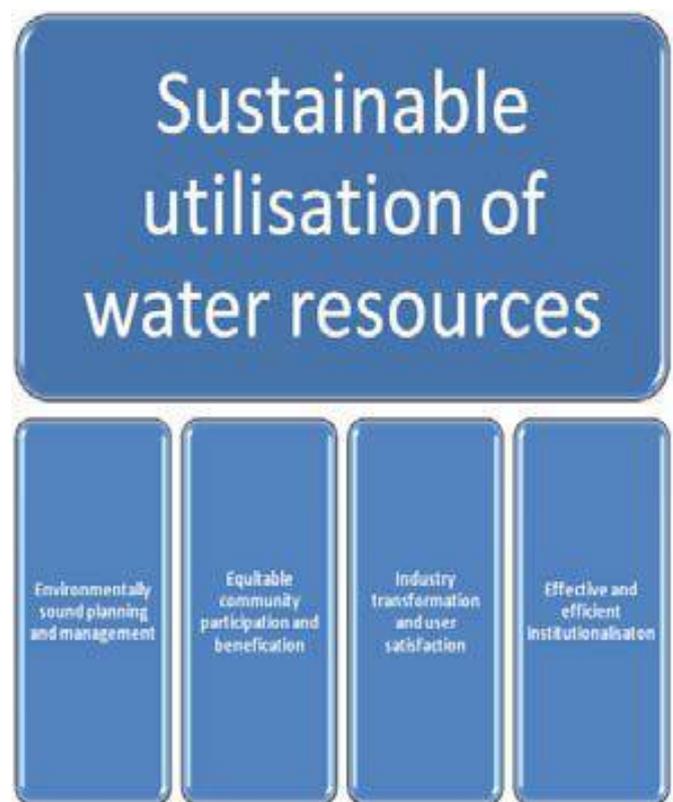


Figure 1: Sustainable Utilisation of Resources

Resource Management Plans focus on the current and future uses of the resource, as well as any requirements that must be fulfilled in order to be used in an optimal and sustainable manner. An RMP will lay the foundation required to consolidate objectives for the resource, within the framework of existing policy priorities. It will also be used to inform decision-making that may have a direct impact on the resource. In the case of a dam this may include forming a platform from which to introduce Public-Private Partnerships to unlock further economic potential of recreational use of the resource.

Broadly, the RMPs will compose of two main features, namely, an integrated environmental management plan (including a zoning plan) and a proposal for institutionalising the implementation of the plan. In addition, a Business Plan which informs decision makers of the required action and resources of the RMP will also be developed.

The purpose of the NWA (Section 2) is to ensure that the nation's water resources are "*protected, used, developed, conserved, managed and controlled*" in ways which take into account amongst other factors:

- The meeting of basic human needs of present and future generations;
- Promoting equitable access to water resources;
- Redressing the results of past racial and gender discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for a growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam (and public) safety;
- Managing floods and droughts; and
- Establishing suitable institutions to ensure appropriate community, racial and gender representation.

Sustainable livelihood is a combination of beneficial impacts ranging from economic, social, cultural and managerial that a resource and use have on communities. Therefore, by informing communities about both the value of water resources and the value of community involvement in ensuring the sustainability of these resources, it will be possible to get the local community, due to their geographical proximity, as well as the community affected by the utilisation and management of the resource to take an active interest in the management and utilisation of the water resource, thereby significantly contributing to the conservation, development, management and sustainability of the resource (DWA, 2006).

However, sustainability is a concept that is often used yet seldom understood, and as such requires proper plans to ensure that all aspects pertaining to sustainability (including resource management, community involvement and beneficiation and sound business principles based on clear and achievable policies) are addressed simultaneously rather than sequentially. In order to achieve this, the Department of Water Affairs (DWA) has developed a planning procedure which aims to achieve sustainability through systematic procedures.

According to DWA policy the use of water for recreational purposes should benefit and contribute to the sustainable livelihoods of the host, affected and local community. Communities which host water resources which are used for recreational purposes often receive no benefit, directly, or indirectly and do not understand the value of water within their community and how they can contribute to and benefit from water resources.



It is DWA's belief that:

- Communities which host water resources should share in the benefits emanating from the utilisation of these resources for recreational purposes.
- By ensuring that communities have physical access to the resource, as well as access to the water based recreation economy, it will be possible to transform the industry in an appropriate and sustainable level.
- The concept of “community” can be further divided into the following:
- Local community – communities who live within the vicinity of the resource
- Affected community – communities who are affected by the use of the resource
- Host communities – communities which have taken ownership of the resource and whose livelihood depends on the sustainable management of the resource.
- By focusing on a planning procedure which aims to achieve sustainability, and by informing local and affected communities about the value of water resources and the value of community involvement, local communities can

move beyond merely being affected by or living close to a water resource but rather undertaking the transition to become host communities (Figure 2).

In addition, the process is designed to address issues such as resource management, community beneficiation and industry transformation.

## **4.2 Significance of the Research Report**

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Understanding the status quo and characteristics of both the catchment at large and the local dam environment is a vital and significant component of the compilation of a management plan. Resource management is about managing the way in which people and natural resources interact and the RMP and Business Plan (BP) for Theewaterskloof dam aims to bring together planning, allocation, conservation and use. However, in order for this RMP to be effective, a solid foundation for management actions and objectives is required.

This foundation is achieved through a detailed desktop analysis of the biophysical, social, economic, legal and cultural environment.

Further, as time, money and human resources are limited; prioritizing objectives is a crucial part of managing Theewaterskloof dam. Various factors must be considered when considering the first objectives to be completed. Although the prioritization of objectives must be achieved through open consultation with stakeholders, the feasibility of such objectives needs to be determined in light of the local environmental conditions.

## **4.3 Project Area**

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The project area considered in this research report is two-fold. At the local scale, it involves Theewaterskloof dam which is located in Theewaterskloof Local Municipality in the Western Cape of South Africa.

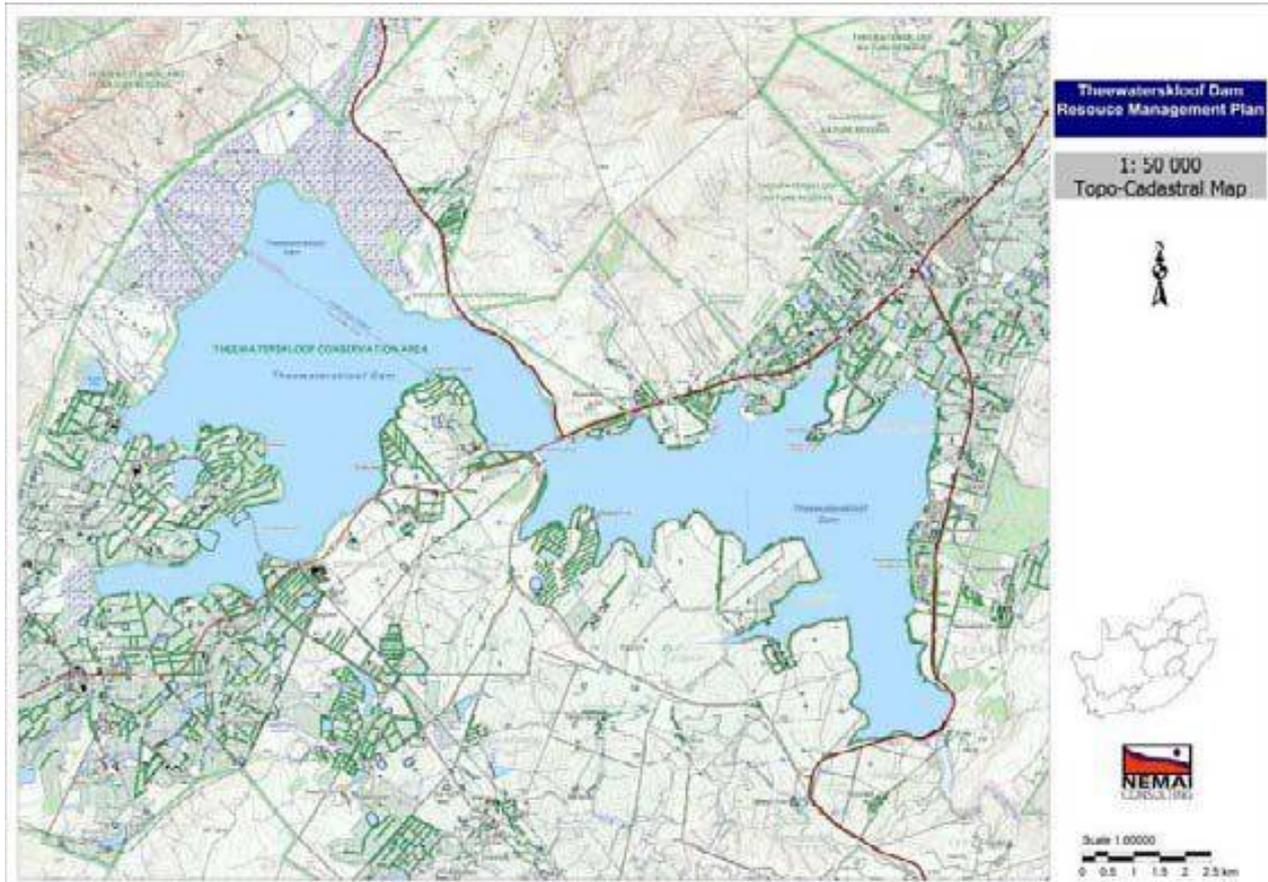


Figure 2: 1: 150 000 Topo-cadastral locality map

At a broader scale, characteristics of the Breede-Overberg Water Management Area are also provided. The Breede WMA falls within the Western Cape Province and is characterised by mountain ranges in the north and west, the wide Breede River valley, and the rolling hills of the Overberg in the south. The Breede valley is bordered by the Franschhoek and Du Toit's Mountains in the west as its boundary with the Berg WMA, the Hex River Mountains to the north between the Olifants-Doorn WMA and the Langeberg Mountains as the eastern watershed with the Gouritz WMA. The Overberg meets the Indian Ocean along its southern coast, including the southernmost tip of Africa (BOCMA, 2011).

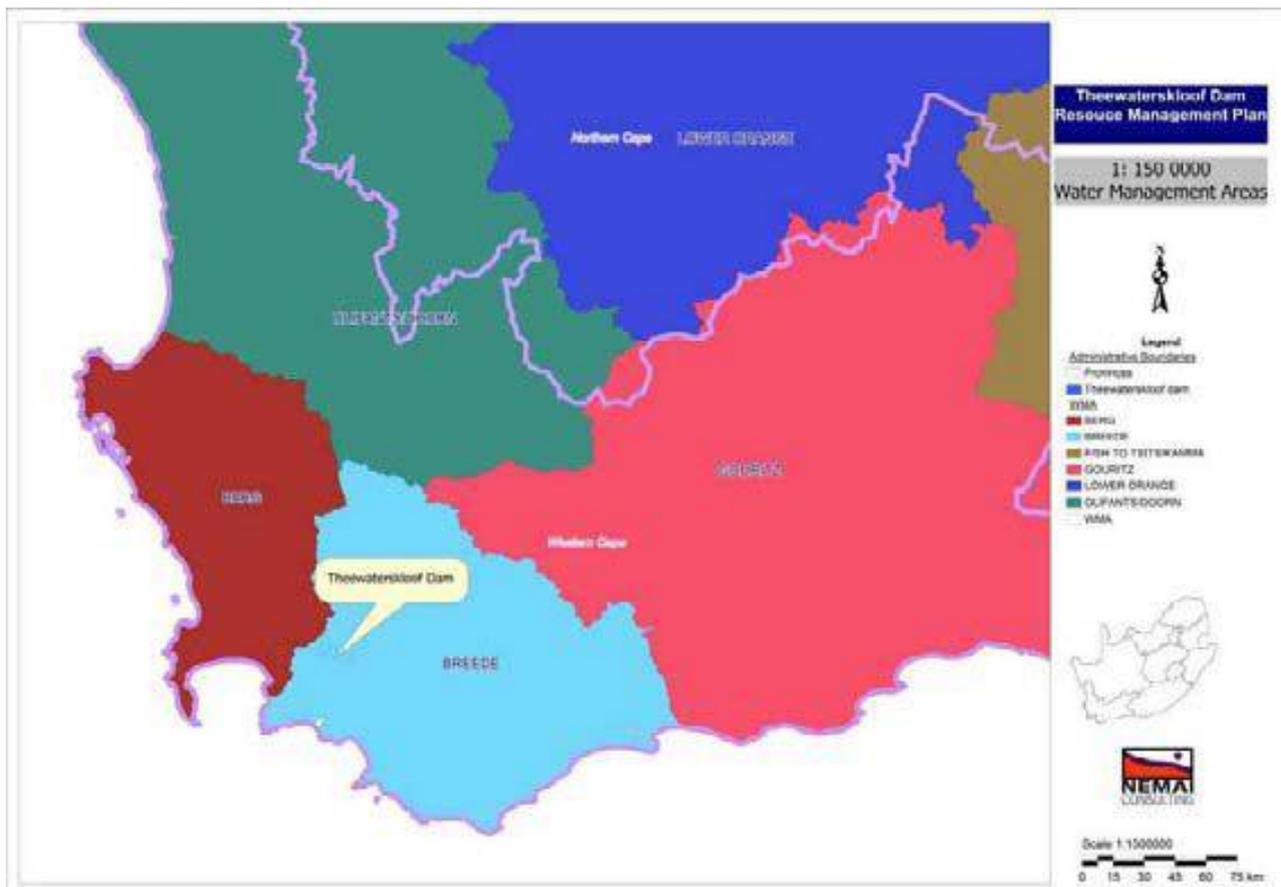


Figure 3: Breede Water Management Area

#### 4.4 Assumptions and Limitations

The following limitations and assumptions are implicit in this report:

The Research Report is primarily based on desktop studies. Information was further refined through tapping into local knowledge by engaging with stakeholders. Various available information sources (including reports, stakeholder knowledge, specialist input) were used and it is assumed that the information is accurate. Information gaps and the manner in which these should be attended to will be highlighted in the RMP and associated Business Plan. It is accepted that more accurate and supplementary information may become available subsequent to the finalisation of the RMP. Going forward the annual Business Plans may be used as a vehicle for addressing and using new information.

## 5 ENVIRONMENTAL LEGAL REVIEW

### 5.1 Relevant Legislation

#### ● National Water Act (Act 38 of 1998)

The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

- meeting the basic human needs of present and future generations;
- promoting equitable access to water;
- redressing the results of past racial and gender discrimination;
- promoting the efficient, sustainable and beneficial use of water in the public interest;
- facilitating social and economic development;
- providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity;
- reducing and preventing pollution and degradation of water resources;
- meeting international obligations;
- promoting dam safety; and
- managing floods and droughts.

The National Government is responsible for the equitable allocation and use of the scarce and unevenly distributed water resources of the nation. The aim of water resource management is to ensure the sustainable use of water through the protection of the quality of water resources for the benefit of all water users.

As Theewaterskloof dam primarily functions to supply drinking water to Cape Town and agricultural water to the local farmers, the management must be in line with the National Water Act, 1998.

Further, the Breede Overberg Catchment Management Agency (BOCMA) was established by the Minister of Water Affairs in July 2005, in terms of the National Water Act (36 of 1998). The Governing Board was appointed in October 2007 and the

Catchment Management Agency became operational with the appointment of the Chief Executive Officer and staff in 2008. The Catchment Management Agency is accountable to the Minister, but reports through the Department of Water Affairs. It has a close cooperative relationship with the Department of Water Affairs (BOCMA CMS, 2011).

The NWA also requires participation in important decisions such as the establishment of catchment management agencies, classification of a particular water body, establishing the reserve, and developing a water resource management plan.

There are a number of provisions in the policy and the legislation that are relevant to management. Principle 7 of the policy states that management of waters is “to achieve optimum, long term, environmentally sustainable social and economic benefit for society from their use.”

The provision of water for basic human needs and for environmental functions (the basic human needs and ecological reserves) are the only recognized rights to water; all other water uses require entitlements that will be recognized only if they are beneficial in the public interest.

## **Environmental Management: Protected Areas Amendment Act (Act 15 of 2009).**

The north-western section of Theewaterskloof dam is adjacent to the Hottentot’s Holland Nature Reserve which lies in the Hottentots Holland mountains, some 90km south east of Cape Town (Cape Nature, 2010). About 7000ha of private and state property adjoining the reserve is co-managed as the Theewaterskloof Conservancy by CapeNature and local landowners.

As Theewaterskloof is adjacent to Hottentot’s Holland, important legislation to take into account is the National Environmental Management: Protected Areas Amendment Act (Act 15 of 2009).

The purpose of the National Environmental Management Protected Areas Act (NEMPAA) is to amend the National Environmental Management: Protected Areas Act, 2003, so as to provide for:

- A comprehensive list in the schedule of all national parks;
- The assignment of national parks, special nature reserves and heritage sites to the South African National Parks;

- Flight corridors and permission of the management authority to fly over special nature reserve, national park or heritage site; and
- Specific areas available for training and testing of aircraft.

This act creates a national system of protected areas in order to protect and conserve ecologically viable areas representative of biodiversity in the country. It further seeks to achieve co-operative environmental governance and to promote sustainable and equitable utilisation and community participation.

## ● **National Environmental Management Act (Act 107 of 1998)**

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The National Environmental Management Act (Act 107 of 1998), or NEMA, as it is simply known, is the foundation piece of legislation for environmental management on South Africa.

Section 2 covers the principles that govern environmental management in the country. This section covers the sustainable development factors that should be considered when carrying out environmental planning, these are:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- that waste is avoided, or where it cannot be altogether avoided, is minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;

- that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

Coupled with these considerations, the following is stipulated with regards to integrating social and economic aspects into the purely biophysical aspects of the environment:

*“Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.”*

## ● **Water Services Act (Act 108 of 1997)**

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The Water Services Act outlines the responsibilities of municipalities regarding the supply of water and sanitation to citizens in their jurisdiction. It also recognises the rights of all humans to basic water supply and sanitation services

The Water Services Act serves to:

- Provide for the rights of access to basic water supply and sanitation;
- To prioritise access to basic water and sanitation services when services available cannot meet the demands of all consumers;
- Prescribing national standards relating to water services. This includes:
  - The provision of water services;
  - The quality of water taken from or discharged into any water services or water resource system
  - The effective and sustainable use of water resources for water services;
  - Requirements for persons who install and operate water services works; and
  - The construction and functioning of water services works and consumer installations;

- To provide for the development of water services development plans;
- To Provide for the development of a National Water Resource Strategy to set out the strategies, objectives and plans for the protection, use, development, conservation, management and control of water
- To provide for the establishment of water services institutions and intermediaries, and to outline their duties and obligations;
- To Provide for the monitoring of water services and to allow for intervention by the Minister or the relevant Province
- Providing citizens with access to basic water and sanitation;
- Developing a water services development which defines reasonable measures to be taken to provide water and sanitation services;
- Allocating water services where all demands cannot be met. In general, where water supply cannot meet the demands of existing consumers, preference is given to the provision of basic water and sanitation services to consumers;
- Monitoring the successful provision of access to basic water and sanitation services;
- Water services authorities are allowed the discretion to enter into joint ventures with water service providers, including those in the private sector

## • The Municipal Systems Act (Act 32 of 2000)

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The Municipal Systems Act serves to provide the framework to enable municipalities to ensure access to essential services to their citizens. The act gives priority to the basic needs of the community, but also gives local government the freedom to set tariffs, and charge for services independently of other municipalities, providing that decisions made are in the best interest of the community.

The Municipal Systems Act is of particular relevance to the RMP process, as it requires integrated planning from all spheres of government to ensure equitable and accessible municipal services. This means that any planning or policy-making must be in line with local government policies and planning and initiatives. Section 73 also makes provision for all municipal services are equitable and accessible, while maining financial and environmental sustainability.

## 5.2 Generic Environmental Management Legislation

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Development and conservation planning must be contextualised within the framework of national government, provincial government, district municipality and local municipality's legal, regulatory and policy.

Environmental law provides mechanisms for the management and conservation of environmental features and the sustainability of new developments. The importance of environment management is to make responsible use of natural, economic and human resources in ways that protect and improve the environment.

Environment law is divided into various sections and most laws applicable to protection and management of the environment were developed to protect and manage specific sectors.

The most common laws applicable to environment management are described below. This is not an exhaustive list, but merely highlights key elements of legislation to be considered in the development of an RMP.

### 5.2.1 Environmental Law

#### **The Constitution of South Africa (108 of 1996)**

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##### Environmental Rights

Section 24 of the Constitution deals with Environmental Rights and gives the right to all citizens: *“to an environment that is not harmful to their health and well being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*

- *Prevent pollution and ecological degradation;*
- *Promote conservation; and*
- *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.*

The Constitution of South Africa is the highest form of law enforceable on any individual or organisation. This section therefore provides the basic environmental rights to all citizens to safe and healthy environment.

#### **National Environmental Management Amended Act (Act 62 of 2008)**

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The NEMA is considered the overarching act in terms of environmental legislation. Every act that relates to environmental matters is directly or indirectly linked to the NEMA and

provisions are made in acts that followed publication of NEMA 1998 to accommodate conditions specified in various acts.

The NEMAA act was promulgated in 2008 and was aimed at substituting certain definitions, further regulating environmental authorisations and to effect certain textual alterations.

NEMAA provides for cooperative governance and establishes principles for decision-making on matters affecting the environment such as:

- People and their needs must be placed at the forefront of environment management;
- Development must be sustainable and therefore requires avoidances of pollution and degradation of the environment, disturbances of landscapes and sites of cultural heritage
- The integrated nature of the environment and that responsibility for environmental management exists throughout the life cycle of an activity (from cradle to grave);
- Public Participation;
- Transparent decision making; and
- Intergovernmental co-ordination and harmonisation of policies, legislation and actions.

Chapter Five of NEMA provides for Integrated Environmental Management and defines the general objectives of IEM. Minimum procedures are laid down with respect to investigating, assessing and communicating the potential impacts of activities.

Section 24 of NEMA provides for Environmental Management Frameworks through provisions for the identification of sensitive and geographical areas. Chapter Eight of NEMA specifies the sensitive and geographical areas mentioned above and maps created as a result thereof to be used as environmental management framework.

### **National Environmental Laws Amendment Act (Act 14 of 2009)**

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The above-mentioned act amended various sections of an array of laws related to environmental management. Below is a summary of amended laws:

- Atmospheric Pollution Prevention Act, 1965,;
- Environment Conservation Act, 1989;



- National Environmental Management: Protected Areas Act, 2003;
- National Environmental Management: Biodiversity Act, 2004; and
- National Environmental Management: Air Quality Act, 2004.

### **National Environmental Management: Air Quality Act (Act 39 of 2004)**

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The purpose of this act was to reform the law regulating air quality by providing measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

The acts aims to promote justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; and for specific air quality measures.

### **National Environmental Management: Waste Act (Act 59 of 2008)**

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This act was developed to reform the law regulating waste management in order to protect health and the environment.

This act places a high liability on waste producers and government to supply adequate waste removal, treatment and disposal facilities to ensure that waste is not threatening the health and safety of citizens.

Waste management was previously conducted in terms of the NWA and several sections of law have been repealed by NEMWA. This act must be read with NEMA and application must be guided by principles set out in section 2 of NEMA.

### **National Environmental Management: Biodiversity Act (Act 10 of 2004)**

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The purpose of the National Environment Management Biodiversity Act (NEMBA) is to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act (Act 107 of 1998).

The Act allows for the publication of provincial and national lists of ecosystems that are threatened and in need of protection. The list should include:

- *Critically Endangered Ecosystems*, which are ecosystems that have undergone severe ecological degradation as a result of human activity and are at extremely high risk of irreversible transformation.

- *Endangered Ecosystems*, which are ecosystems that, although they are not critically endangered, have nevertheless undergone ecological degradation as a result of human activity.
- *Vulnerable Ecosystems*, which are ecosystems that have a high risk of undergoing significant ecological degradation.
- *Protected Ecosystems*, which are ecosystems that are of a high conservation value or contain indigenous species at high risk of extinction in the wild in the near future.

Similarly, the Act allows for the listing of endangered species, including critically endangered species, endangered species, vulnerable species and protected species. A person may not carry out a restricted activity (including trade) involving listed threatened or protected species without a permit.

### **National Heritage Resources Act (Act 25 of 1999)**

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The purpose of the NHRA is to protect and promote good management of South Africa's heritage resources, and to encourage and enable communities to nurture and conserve their legacy so it is available to future generations.

The Act makes heritage resources of cultural significance or other special value part of the national State, and therefore places them under the care of the South African Heritage Resources Agency (SAHRA).

Heritage resources may include buildings, historic settlements, landscapes and natural features, burial grounds and certain moveable objects, including objects of decorative art or scientific interest. Provincial and municipal authorities also play a role in managing provincial heritage resources and local-level functions.

### **National Forests Act (Act 84 of 1998)**

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The purpose of this Act includes the following:

- To promote the sustainable management and development of forests for the benefit of all;
- To create the conditions necessary to restructure forestry in State forests;

- To provide special measures for the protection of certain forests and trees;
- To promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.

### **Conservation of Agricultural Resources Act (Act 43 of 1983)**

CARA seeks to provide for the conservation of natural agricultural resources by maintaining the production potential of land, combating and preventing erosion and weakening or destruction of water resources, protecting vegetation and combating weeds and invader plant species.

CARA generally does not apply to any land situated in an urban area (which is land under the control of a local authority, excluding any commonage or other land used for agricultural purposes; or any land that is subdivided). However, the provisions relating to weeds and invader plants do apply in urban areas.

### **5.3 Provincial legislation**

In addition to the National legislation described above, Western Cape has specific legislation governing several aspects of conservation, planning and management that have a bearing on the development of an RMP.

- Constitution of the Western Cape Act, (Act No. 1 of 1998)
- Western Cape Nature Conservation Board Act, (Act No. 15 of 1998)
- Western Cape Nature Conservation Laws Act, (Act No. 3 of 2000)
- Western Cape Planning and Development Act, (Act No. 7 of 1999)
- Land Use Planning Ordinance, (Ordinance No. 15 of 1985)
- Nature Conservation Ordinance, (Ordinance No. 19 of 1974)
- Provincial Notice 955 of 1975

Further, Hottentots Holland Nature Reserve management is guided by a number of internal CapeNature policies, procedures and guidelines. The policies, procedures and guidelines applicable to this management plan are referenced in the Strategic Implementation Framework. The following have direct reference to management activities:

- Wilderness Policy
- Fire Policy
- Finance Policy
- Game Translocation and utilization Policy
- Fish Utilisation and Translocation Policy

The most common provincial legislation has been described below. While it is not an exhaustive list, it highlights the elements of legislation that must be considered in the development of an RMP.

### **Cape Nature and Environmental Conservation Ordinance, (no 19 of 1974)**

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The purpose of this ordinance is to regulate wild animals and plants and the establishment of nature reserves.

### **Land Use Planning Ordinance, (No 15 of 1985)**

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The purpose of the ordinance is to regulate land use and to provide for incidental matters related to land use.

### **Western Cape Nature Conservation Board (Act 15 of 1998)**

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The purpose of this act is to promote and ensure nature conservation, render services and provide facilities for research and training, generate income. Agreements related to biodiversity are signed under this act.

### **Cape Nature Laws Amendments Acts 2000 (Act No 3 of 2000)**

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Act 3 of 2000 contains amendments to the CapeNature Act, 1998 and the Nature Conservation Ordinance, 1974. The whole Ordinance has been amended and is contained in Act 3 of 2000. The amendment act provides for the amendment of various laws on nature conservation in order to transfer the administration of the provisions of those laws to CapeNature.

Further, it amend CapeNature Act, 1998 to provide for a new definition of Department and the deletion of a definition.

It also provides for an increase in the number of members of the Board, provides for additional powers of the Board and amends the provisions regarding the appointment and secondment of persons to the Board. It also provide for matters incidental thereto.

## **6 INSTITUTIONAL ROLES AND RESPONSIBILITIES**

In effect, the key aspect of any institutional reform development is to find proper balance between operational functionality, geographic area of jurisdiction and span of control, and the need for effective oversight and governance. This needs to be structured around the various aspects of institutional viability as well as the requirements of the resource itself. Understanding the current institutional management and roles and responsibilities, is an integral part of ensuring useful institutional management roles in the RMP document. .

The successful implementation of an RMP hinges on the various institutions adopting and putting into practice this environmental management tool. This section provides an overview of the institutions which play a significant role in the management of Theewaterskloof Dam.

## 6.1 Key Role players

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### 6.1.1 Official Institutional Structure

Officially, Theewaterskloof Dam is managed by the Department of Water Affairs (DWA) who functions as the custodian of all surface water in South Africa. Further, the Breede Overberg Catchment Management Agency (BOCMA) was established by the Minister of Water Affairs in July 2005, in terms of the National Water Act (36 of 1998). The Governing Board was appointed in October 2007 and the Catchment Management Agency became operational with the appointment of the Chief Executive Officer and staff in 2008. The Catchment Management Agency is accountable to the Minister, but reports through the Department of Water Affairs. It has a close cooperative relationship with the Department of Water Affairs (BOCMA CMS, 2011).

The DWA Western Cape regional office, is in the process of withdrawing its operational presence in the area and delegating relevant functions to the Agency. The National Water Act (Section 80) provides BOCMA with five initial functions:

- Investigate, and advise interested persons on the protection, use, development, conservation, management and control of the water resources;
- Develop a catchment management strategy (which was initiated in 2010);
- Co-ordinate the related activities of water users, and of water management institutions;
- Promote the co-ordination of the implementation of its catchment management strategy with the implementation of applicable water management and development plans; and
- Promote community participation in its functions.

BOCMA is therefore an official management body of the dam. However, currently at this point, it is not involved in the day to day management of the dam.

Other important government structures that have an official management role include the Department of Transport (related to vessels and safety), the South African Maritime Safety Association (SAMSA), The Department of Public Works, Department of Sports and Recreation and CapeNature.

### 6.1.2 Informal Institutional Structure

At present, the main control of the dam is informal in nature. The Theewaterskloof Sports Club (TSC) is the main management body. The objective of the Club is to facilitate, for the benefit of its members, long-term, sustainable, aquatic-related activity for family

recreation and competitive sport, providing members with associated facilities, whilst conserving the natural environment, and the individual rights of people as embodied in the Constitution of the Republic of South Africa ([www.theewaters.co.za](http://www.theewaters.co.za)).

Currently, there is no formal gatekeeper agreement in place although there is a verbal agreement and a lease agreement. The TSC has been in place since 1979 and has a historical management presence at the dam. In addition, the General Manager of TSC meets with the DWA regional office to provide updates. A lease agreement between DWA and TSC also clarified certain roles and responsibilities in regards to safety vessels and equitable access.

A caretaker agreement has recently been signed by the TSC, however, this agreement has yet to be signed by DWA and thus is not yet formalised. Further, this agreement only outlines the management and maintenance of the land to the waterline and does not outline the management of safety, access and use of the water surface.

### 6.1.3 Management of the water surface

Management of the water surface and infrastructure (including buoyage related to the dam wall) is carried out by DWA. Management of the buoyage system related to obstructions and water sports has been historically managed by TSC.

There is no specific gatekeeper agreement, however the lease agreement does specify some safety and access requirements. The rules and responsibilities of either party are somewhat unclear although especially in light of the new SAMSA buoyage system. Initial payment of the new buoyage system will be undertaken by DWA. However, the maintenance of the buoys needs to be agreed upon.

### 6.1.4 Access

The official access point is through the TSC. As mentioned the lease agreement between DWA and TSC does make some provision for equitable access however there is no detailed gatekeeper agreement. As part of the CIWSP programme, the wash bay system has been built in the TSC entrance however there are no agreements in place governing the management of this.

TSC charges an entrance fee of R45 to the dam. However, in order to facilitate local community use, this price is reduced to R25 for people who live Theewaterskloof Local Municipality. The Sports Club also charges an annual registration fee for all vessels. These vessels are then provided with a sticker which can be checked by the Safety Officer. In addition, there is a R60 launching fee per boat.

The Theewaterskloof Country Estate (Golf Course) also has a slipway. This allows residents and holiday makers to launch their vessels onto the dam. A verbal agreement has been set up between TSC and the Country Estate whereby a record of all launches

are kept by the Country Estate. All residents and holiday makers are also required to register with TSC and pay the R150 registration fee. They also receive a sticker for their vessel. The registration fees are used to cover the safety officer's salary and the maintenance of the TSC safety vessels.

Dennehof Holiday Resort which is managed by the Overburg District Municipality also has access to the dam. A slipway does exist however due to a lack of proper control, the slip way is no longer used and Dennehof only provides access for swimming and fishing.

Gloria Bay Residential Development also has a communal slipway for use by residence only.

In addition, a number of farms have caretaker agreements with DWA and thus have waterside access.

#### 6.1.5 Permits

The north-western portion of Theewaterskloof Dam forms part of the Theewaterskloof Conservancy and is currently zoned as a restricted zone for use by permit holders only. Currently, this includes Bass Fisherman. However, there appears to be a great deal of confusion regarding where these permits are obtained from. The Western Cape Bass Angling Association (WCBAA) does have an informal agreement (email) from CapeNature allowing them access into the restricted zone for fishing purposes. However, no specific restricted area permits are required.

A Freshwater Angling License is required for all fishing activity in the dam. This license can be obtained from CapeNature.

#### 6.1.6 Safety

TSC is responsible for safety on the water surface. The club owns two boats and also employs a Safety Officer which undertakes patrols. Although there is no specific gatekeeper agreement, the lease agreement does specify that the club is responsible for safety. A General Boating Rules booklet is available and all vessels entering the club are required to register. They are then be issued with a safety booklet, a registration disc and the Rescue Service telephone number sticker. The registration disc and sticker must be affixed to the boat in a prominent position.

TSC is also responsible for landside safety on the TSC property. Landside safety around the rest of the dam is not regulated although caretaker agreements between DWA and adjacent farmers are currently being signed.

These caretake agreements do not deal specifically with safety however issues such as fire breaks; fire fighting; alien invasive plant management; cutting of trees; hunting; cattle grazing are discussed.

The Cooperative Inland Waterways Safety Programme (CIWSP) is a partnership between government entities and between the community and government. The aim is to enhance the development of a best practise model to ensure a safe and structured inland maritime environment and culture whilst protecting our precious water resources. This will be done through a phased roll-out of the best practice model to dams & rivers and communities in South Africa (CIWSP, 2012). The project has three key elements, namely vessel safety and incident management, environmental and resource integrity, and local development (transport as catalyst for rural tourism, safety systems, etc).

The project was born from a concern related to the inability to implement and enforce a number of government regulations regarding vessel safety (as compiled by SAMSA and DWA) to prevent un-safe vessels and skippers from operating on South African inland waters. It soon became clear that regulations from and responsibilities of other departments, such as managing invasive aquatic species (DEA), water resource management (DWA), policing and events management (Sports and Recreation) are equally important. These regulations are worthless unless it's enforced and monitored in an integrated manner. A suite or toolbox of integrated policy implementation solutions is thus needed. In essence, what is needed are ground-level actions that are simple, implementable and sustainable. The Cooperative Inland Waterways Safety Programme combines pro-active and preventive measures with integrated reactive solutions should there be an incident. Given its unique integrative nature, the model further aims to create a single point of inland maritime information for the public, thus promoting transparent, user-friendly accessibility and empowerment. Water users, including recreational and commercial use will further receive additional value through the integrated incident management and response system, navigational aids and improved environmental quality.

The project is currently being piloted at five sites including Theewaterskloof Dam. As part of this programme, a wash bay has already been built at TSC. Roles and responsibilities regarding this still need to be clarified.

#### **6.1.7 Overnight facilities**

Overnight facilities are provided by TSC in the form of caravans and tent sites. There are currently 19 camping sites fitted with electrical points, as well as caravans and a club cabin. Cleaning staff ensure that the ablution facilities are kept neat and clean. Braai facilities are provided on the public side. Tent sites with electricity are R55 per person per night. Tent sites without electricity are R45 per person per night. In addition, it is R300 per caravan per night and R400 per night for the club cabin.

Overnight facilities are also provided at the Dennehof Holiday Resort. There are 40 chalets, 27 camping sites and 24 houses. The resort is managed by the Overberg District Municipality. A number of improvements have been made to the resort including the

upgrade of facilities (painting); and roads and the implementing of an electronic booking system. The prices are between R184- R360 per person per night for the chalets and houses and R86 per person per night for the camping.

Theewaterskloof Country Estate is a residential estate where landowners can purchase land to build houses in land adjacent to the dam. There are 162 stands of which 75% have homes on them, are surrounded by a golf course rated one of the top 20 nine-hole golf courses in South Africa by the SAA Golf Digest. Home owners also have access to a private beach, slipway, tennis court, swimming pool and clubhouse.

#### 6.1.8 Event Management

There is no official permit system for events. All events are organised through TSC. For large events such as concerts, DWA is advised of the event and provides a response. More common events such a regatta's etc. are managed solely by TSC.

#### 6.1.9 Gatekeepers

TSC are the gatekeepers for Theewaterskloof Dam although there is no separate gatekeeper agreement. A lease agreement does exist. Informally there is Theewaterskloof Steering Committee which is made up the the following organisations:

- DWA
- BOCMA
- Department of Public Works
- Provincial Government of Western Cape - Department of Environmental Affairs and Development Planning
- Department of Agriculture
- Overberg District Municipality
- Theewaterskloof Municipality
- Cape Metropolitan Council
- Elgin Grabouw Vyeboom
- Villiersdorp Farmers Association
- Theewaterskloof Conservancy
- Fire Protection Association

- Boland Cape Nature
- Vyeboom Water Users Association
- Elandskloof Water Users Association
- Rivierzonderend Water Users Association
- Overberg Water Users Association
- TWK Golf Estate, Gloria Bay
- Theewaterskloof Sport Club

Currently, the steering committee is not functioning and does not provide much support or management capabilities.

#### *6.1.10 Catchment Management*

The Breede Overberg Catchment Management Agency (BOCMA) was established by the Minister of Water Affairs in July 2005, in terms of the National Water Act (36 of 1998). The Governing Board was appointed in October 2007 and the Catchment Management Agency became operational with the appointment of the Chief Executive Officer and staff in 2008. The Catchment Management Agency is accountable to the Minister, but reports through the Department of Water Affairs. It has a close cooperative relationship with the Department of Water Affairs (BOCMA CMS, 2011).

The DWA Western Cape regional office, is in the process of withdrawing its operational presence in the area and delegating relevant functions to the Agency. The National Water Act (Section 80) provides BOCMA with five initial functions:

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- Promote community participation in its functions.

BOCMA is therefore an official management body of the dam. However, currently at this point, it is not involved in the day to day management of the dam.

*1.1.1 Other key stakeholders include:*

- Landowners
- Local communities
- Other Interested and Affected Parties (I&APs), including Non-governmental Organisations, and Civil Society Structures.

Of particular note are

- Water Users Associations;
- Farmers associations; and
- Recreational sporting bodies.

## **7 PURPOSE AND SIGNIFICANCE OF THEEWATERSKLOOF DAM**

### **7.1 Purpose of the Dam**

Theewaterskloof Dam is owned and managed by DWA, to transfer water primarily to Cape Town and irrigation in the Berg WMA, as part of the extensive Western Cape water supply system. The purpose of the dam is to provide storage for the larger quantities of runoff that become available during the winter rainy season in the upper reaches of the Rivieronderend and by pumping through tunnels from the Berg River catchments. During the dry summer season water from the Theewaterskloof Dam can be transferred to the Berg River and Eerste River valleys (BOCMA, 2011).

Construction of the dam's earthfill wall which is 37,5m in height was completed in 1980 (DWA, 1989). The storage capacity of the dam is 434 million m<sup>3</sup> and at full supply level, the surface area of the dam is 5100ha. A tower within the dam basin, some 13km from the dam wall houses the inlet to and outlet from the tunnel system which links the dam with the Berg river and Eerste River catchment areas. The dam forms part of an extensive water supply scheme where water is transferred to and from separate catchment areas separated by mountains. The purpose of the dam is to provide storage for the large quantities of run off that become available during the winter months. During the dry summer season, water from the dam can then be transferred back by means of the tunnels (DWA, 1989). At the time of being built, approximately 60% of the water yield was provisionally allocated to irrigation water and the rest to the City of Cape Town.

The table below provides overview of the dam and the catchment:

**Table 1: Overview of Theewaterskloof dam (DWA, 1989)**

<b>Catchment Details</b>	
Total Breede Catchment Area	12 600 km <sup>2</sup>
Incremental Breede Mean Annual Runoff (MAR)	1 904 million m <sup>3</sup> /annum
Loss (including dam evaporation and alien vegetation)	-121 million m <sup>3</sup> /annum
Total Overberg Catchment Area	7 186 km <sup>2</sup>
Incremental Breede Mean Annual Runoff (MAR)	558 million m <sup>3</sup>
Loss (including dam evaporation and alien vegetation)	-72 million m <sup>3</sup> /annum
<b>Dam Characteristics</b>	
Year of completion	1980
Purpose	Storage of water for irrigation and urban use
River	Riviersonderend
Nearest Town and Province	Villiersdorp, Western Cape
Type	Earth embankment
Net Storage capacity	434 million m <sup>3</sup>
Wall height	37.5m
Crest length	646m
Material content of dam wall	Earthfill – 960 000m <sup>3</sup> ; concrete – 37 000m <sup>3</sup>
Type and length of spillway	Side channel spillway on left flank (75m)
Capacity of spillway	700m <sup>3</sup> /s
Surface area of dam at full supply	5100ha
Owner, designer and construction	Department of Water Affairs
Yield and Assurance (BOCMA, 2011)	204 million m <sup>3</sup>

Year of completion	1980
Purpose	Storage of water for irrigation and urban use
River	Riviersonderend

## 7.2 Users and uses

### 7.2.1 Storage and provision of high-quality drinking water

One of the main uses of Theewaterskloof dam is to provide high quality drinking water to the City of Cape Town which obtains most of its raw water from mountainous catchments outside the municipal area (WSDP, 2012). Theewaterskloof dam provides approximately 118 million kl per annum. This accounts for 29,6% of the raw water required and a decrease in water quality would have vast financial implications in terms of treatment costs.

### 7.2.2 Storage and provision of irrigation water

One of the initial functions of Theewaterskloof dam was to provide irrigation water to farmers in the Boland Area (DWA, 1989; BOCMA, 2011). With increasing population growth in Cape Town, there is an increased water requirement which puts pressure on agricultural requirements. This is a main concern of farmers in the area.

According to the BOCMA Catchment Management Strategy (2011), one of the main issues in the catchment (and thus true for Theewaterskloof dam) is that there are no reliable estimates of current actual or legal irrigation available, which poses a major challenge for allocation and authorisation of water use. It is critical to have a proper understanding of agricultural use approximately 60% of the water in Theewaterskloof dam was initially allocated to irrigation (DWA, 1989).

Further, irrigation in the Breede-Overberg WMA constitutes approximately 95% of the in-catchment water requirement, making this the most important sector on which to focus savings. The water available to virtually all the existing irrigation water supply schemes in the WMA is fully allocated, and agricultural water users must be encouraged to use water much more efficiently.

### 7.2.3 Recreational Use

Theewaterskloof dam is one of the largest water sports club in the Western Cape ([www.theewaters.co.za](http://www.theewaters.co.za)). In addition, the excellent sailing conditions, good infrastructure and picturesque setting makes it one of the most popular water sports venues in South Africa. In addition, the dam offers excellent bass angling and bank angling opportunities.

The Theewaterskloof Local Municipality recognizes the importance of the dam in terms of improving tourism and recreational activities (Theewaterskloof IDP, 2012).

#### 7.2.4 Conservation

Theewaterskloof dam falls within Theewaterskloof Conservancy which is jointly run by CapeNature and local landowners. It is also located adjacent to Hottentot's Holland Nature Reserve which plays an important role in the conservation of mountain fynbos, with approximately 1300 species occurring, some of which are rare and endemic. Approximately 110 bird species have been recorded, including several species of raptor.

#### 7.2.5 Events at Theewaterskloof Dam

A number of national regatta's are held at Theewaterskloof dam. Angling competitions are also held at the dam.

#### 7.2.6 Educational Programmes

Theewaterskloof Sports Club has a well established community sailing program which has been running for six years, focusing on creating water sport experiences for previously disadvantaged youths. In addition, the Western Cape Bass Angling Association (WCBAA) holds a Youth Day annually for the youth of Villiersdorp. This involves teaching children environmental awareness. There are competitions and prizes which are funded as part of the day.

#### 7.2.7 Food Security

A recent pilot project between University of Stellenbosch, CapeNature, DWA and landowners is the African Food Market project. The Project has, over the past two years, collected sufficient data on African food items, including plants and fish products, to provide a clear indication of both the demand for products and the potential for local agriculture and fisheries to supply in the demand (Visser, 2012).

Fish protein makes up to 80% off all animal protein intakes of Central African populations. The Project data has shown that the target population will eat fresh water fish twice a week when available and affordable. The Project has an existing market reach of 100 000 immigrants. The sales potential from the onset of the project is estimated to be between 20 to 30 tons a month (Visser, 2012).

The Project will assess a range of aspects associated with environmental sustainability, technical feasibility and financial viability, including:

- various fishing methods
- different species of fish

- size off local and urban market
- a wide range of products (fresh, dried, salted, smoked)
- food safety and quality and
- logistics of supply from source to market.

This will lay the foundation for the structuring and roll-out of the project to other water bodies in the Province and beyond. The local community will receive training in water safety and fishing methods, while the Project will provide the linking between the fisherman and the market.

Although this project is only currently starting, it has received the requisite permits from CapeNature and should be taken into account in the RMP.

### **7.3 Characteristics of the Catchment**

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#### **7.3.1 Introduction**

The Breede River Catchment (12 600 km<sup>2</sup>) and its main tributary, the Riviersonderend River drain the greater part of the water management area. The Riviersonderend River itself rises upstream of Theewaterskloof Dam, in the Hottentots Holland and Franschoek Mountains. Downstream of the dam, a number of small tributaries join the Riviersonderend before it reaches its confluence with the Breede River. In the lower reach, the main tributary joining the Breede River is the Buffeljags River, which rises in the Langeberg Mountains (BOCMA, 20110).

The population of the Breede-Overberg WMA is estimated to be about half a million people, the majority of whom live in towns and villages. There are seven local municipalities in the region, including Theewaterskloof in the south-west (BOCMA, 2011).

The winters are typically wet and cold (17 °C average) with occasional frost and snow, while the summers are very hot and dry (37 °C average daily maximum). The far southeast is the exception with year round rainfall. Rainfall patterns also differ markedly from up to 3000 mm per year in the western mountains, to as low as 150 mm/a in the southern-central valleys.

#### **7.3.2 Catchment Management**

The Breede Overberg Catchment Management Agency (BOCMA) was established by the Minister of Water Affairs in July 2005, in terms of the National Water Act (36 of 1998). The Governing Board was appointed in October 2007 and the Catchment Management Agency became operational with the appointment of the Chief Executive Officer and staff in 2008.

The Catchment Management Agency is accountable to the Minister, but reports through the Department of Water Affairs. It has a close cooperative relationship with the Department of Water Affairs (BOCMA, 2011). The Guiding Principles for the Breede-Overberg CMS are as follows:

- Recognise that water is the engine of development in the Breede-Overberg area.
- Understand that the future is uncertain and there is a need to build multi-faceted institutional, infrastructural and natural resilience to adapt to change.
- Prevent aquatic ecosystems from deteriorating further by focusing simultaneously on flow, quality and habitat preservation.
- Be precautionary in decision making for stressed catchments, particularly where this is exacerbated by limited information.
- Enable opportunities for redress of historical inequities in allocation and then urgently address potential physical, political, social and economic consequences through other means.
- Act unambiguously against unauthorised or illegal use, while ensuring administrative justice for all users.
- Drive continual improvement in efficiency around the productive use of water and increase technical efficiency of municipal water use.
- Reduce waste discharge at point and non-point sources to avoid water quality problems.
- Engage catchment and land management roleplayers and ensure alignment of these spatial and development planning process with water strategies.
- Acknowledge existing policies and laws as the framework for management decisions, recognising distinct mandates, jurisdictions, and capacities of other institutions.
- Build the Breede-Overberg CMA as the primary credible institution for water management in the Breede-Overberg and ensure that it obtains the appropriate authority (delegations).
- Involve stakeholders in water resources decision making to ensure diversity, promote ownership, and build capacity in the implementation of the strategy (BOCMA, 2011).

### 7.3.3 Surface Water and River Systems

The Riviersonderend River has its source in the Groot Drakenstein and Franschhoek Mountains and flows eastwards to its confluence with the Breede River to the west of Swellendam. From its source, the river flows through a gorge in the Hottentots Holland Nature Reserve and enters the Theewaterskloof Dam. It then passes through another gorge bounded by the Donkerhoekberge and Keeromspoor and is joined further downstream by several tributaries (Baviaans, Gobos, Soetmelks and Tierkloof Rivers). The river then flows in a north easterly direction through the Bromberg range and eventually reaches its confluence with the Breede River (BOCMA, 2011).

The river systems in the catchment are largely classified as Class C – Moderately modified (below).

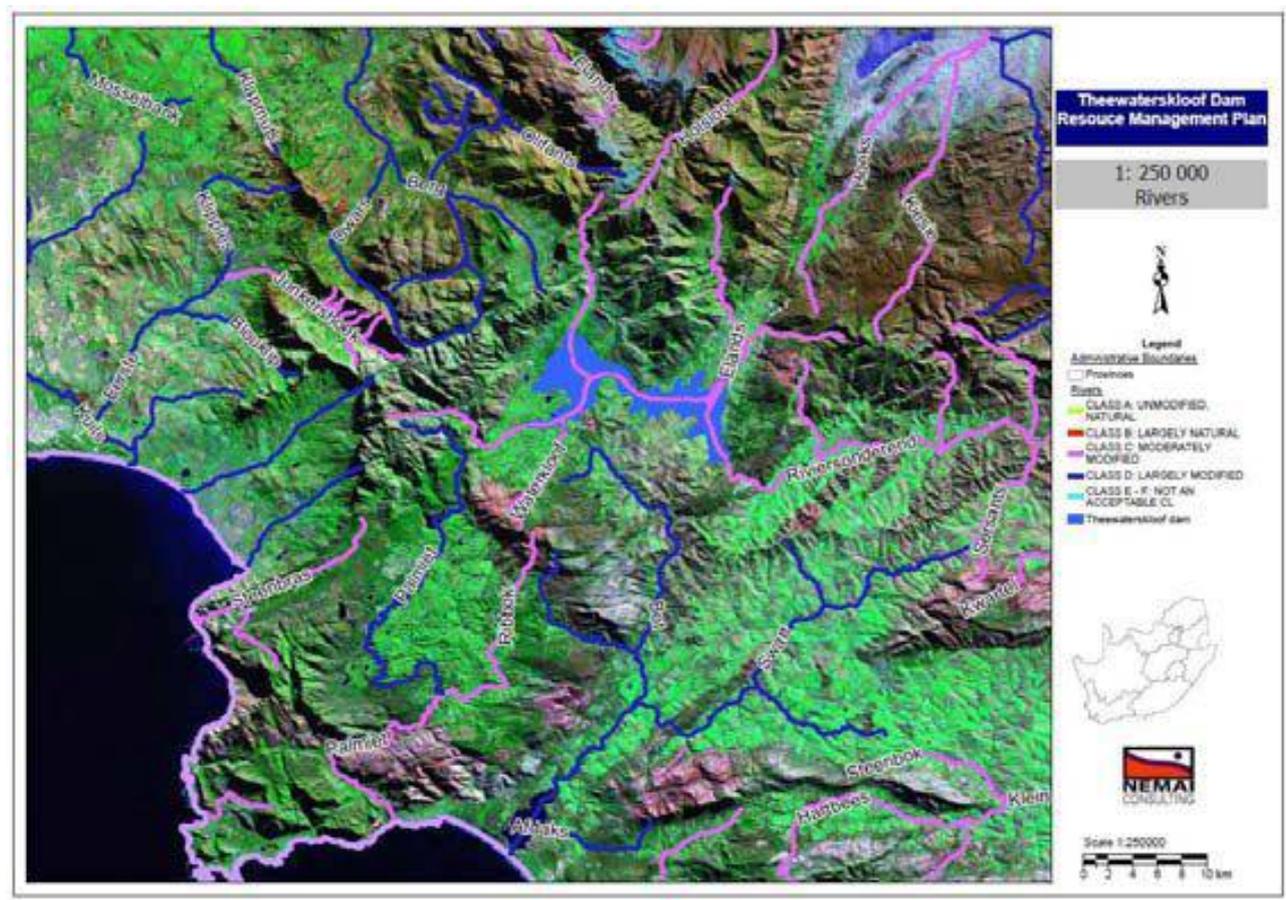


Figure 4: Rivers in the Catchment

The greatest threat to the indigenous fish of the Cape Floristic Region, which includes the Breede Water Management Area, is invasive alien fish. They are the prime reason why several indigenous fish species, especially small species (e.g. Barrydale redbin, Heuningnes redbin) are now restricted to tiny areas where alien fish are absent. Research by the University of Cape Town's Freshwater Research Unit has confirmed that the loss

of indigenous fishes in areas dominated by alien fish, has resulted in substantial changes in the structure and functioning of aquatic food webs (River Health Programme, 2011).

#### 7.3.4 Land Use

The economy of the Breede-Overberg region is primarily agricultural (with a third of the current R17 billion economic output is directly linked to agriculture) (BOCMA, 2011). This is supported by localised tourism mainly along the coastal strip. Most of the manufacturing, construction, trade and services economies of the various small towns in the region fundamentally support agriculture and the associated agro-processing industries (BOCMA, 2011).

An additional factor introducing regionally uneven development is the transfer of water to the Cape Town area, mainly from the Rivieronderend area. Even though Rivieronderend is well endowed with water and natural resources, two thirds of the water resource is transferred to supply Cape Town and Berg River agriculture, introducing constraints on the economy in this area.

The land use is dominated by commercial agriculture, ranging from intensive irrigation in the Breede and Rivieronderend valleys as well as in the west of the Overberg, to extensive rain fed cereal cultivation and livestock in the Overberg. This WMA produces 70% of South Africa's table grapes, apples and fynbos for international export.

Invasive alien plants are significant water users in several rivers in the Breede-Overberg WMA, consuming water that could be used for other social and economic growth or environmental purposes. Mountain headwaters, the eastern tributaries of the Breede and the Sout River feeding the De Hoop estuary are among the areas deemed the highest priority for rehabilitation programmes to remove alien vegetation. According to the River Health Programme (2011), programmes such as Working for Water and WWF's water neutral scheme have begun alien clearing projects.

The figure below highlights the extent of the issue with approximately 7,5 million hectares covered on *Acacia baileyana*, *Acacia dealbata* and *Acacia mearnsii* (Kotze *et al.*, 2010). Other problem species include *Eucalyptus* spp., *Opuntia* spp. and *Pinus* spp.

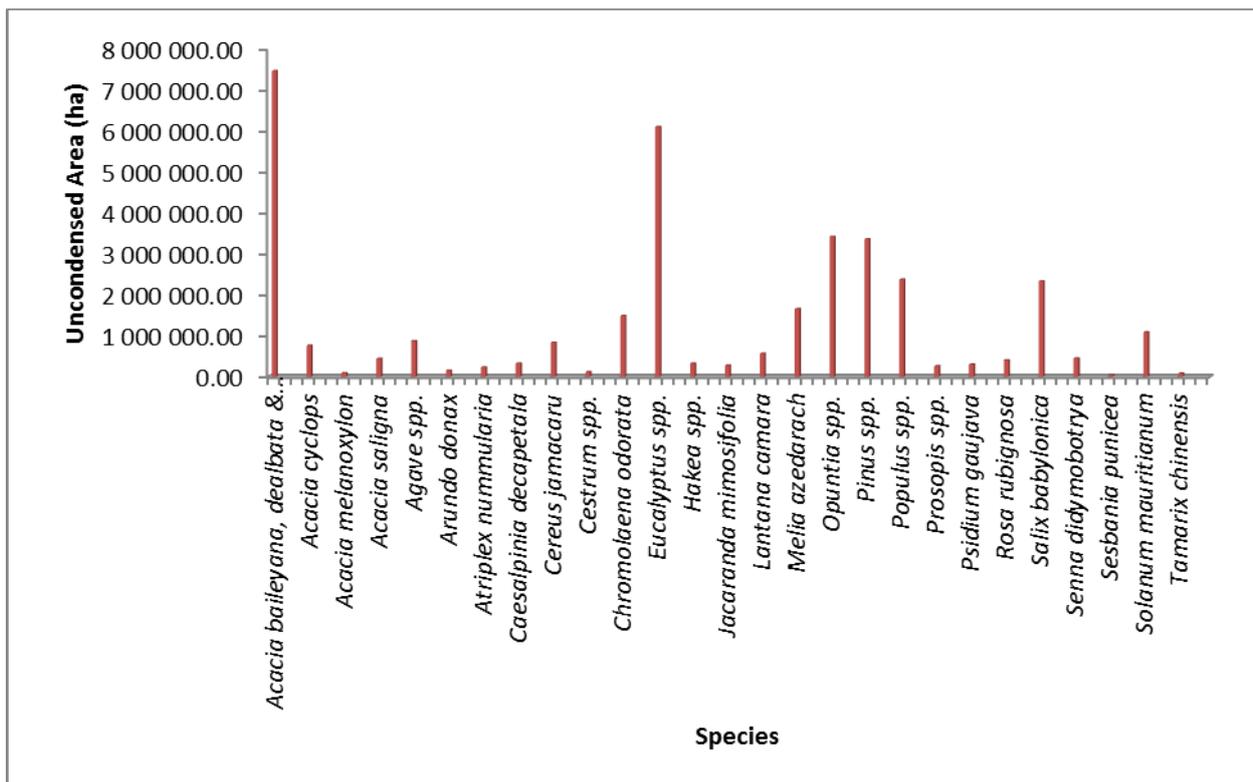


Figure 5: Alien Invasive Species in the Catchment

### 7.3.5 Water Quality

In its natural state the quality of surface water is of a high standard in the upper reaches of rivers and in the mountainous areas; due to the influence of geological formations, however, water quality does decrease in the middle reaches of the Breede River with an increase in salinity further downstream, exacerbated by irrigation return flows (BOCMA, 2011).

Water quality in the upstream sites is still within the target water quality ranges for aquatic life, however an increase in nutrients and salts to the rivers as a result of land use activities quickly reduces this quality from natural to good. For most of the rivers, the water quality is still in a good to fair condition in their lower reaches. Sites where the water quality has degraded to poor are mainly below urban areas (River Health Programme, 2011).

During the early 1990's Theewaterskloof was one of the prime largemouth bass fishing sites in the country, however suspected pollution from surrounding farms and Villiersdorp and the illegal introduction of catfish led to the bass almost disappearing. Carp proliferated, causing turbidity problems and adding the problem of algal blooms in the dam. These blooms in the dam, as well as taste and odour problems in the drinking water originating from the dam have also been increasing since the early 2000's. The water

transferred to the Berg River Catchment (into the Berg and Eerste Rivers) has also been noticeably more turbid (River Health Programme, 2011).

BOCMA undertakes water quality measurements along the Breede River to the north of Theewaterskloof dam (see below).

### BREEDERIVER MONITORING

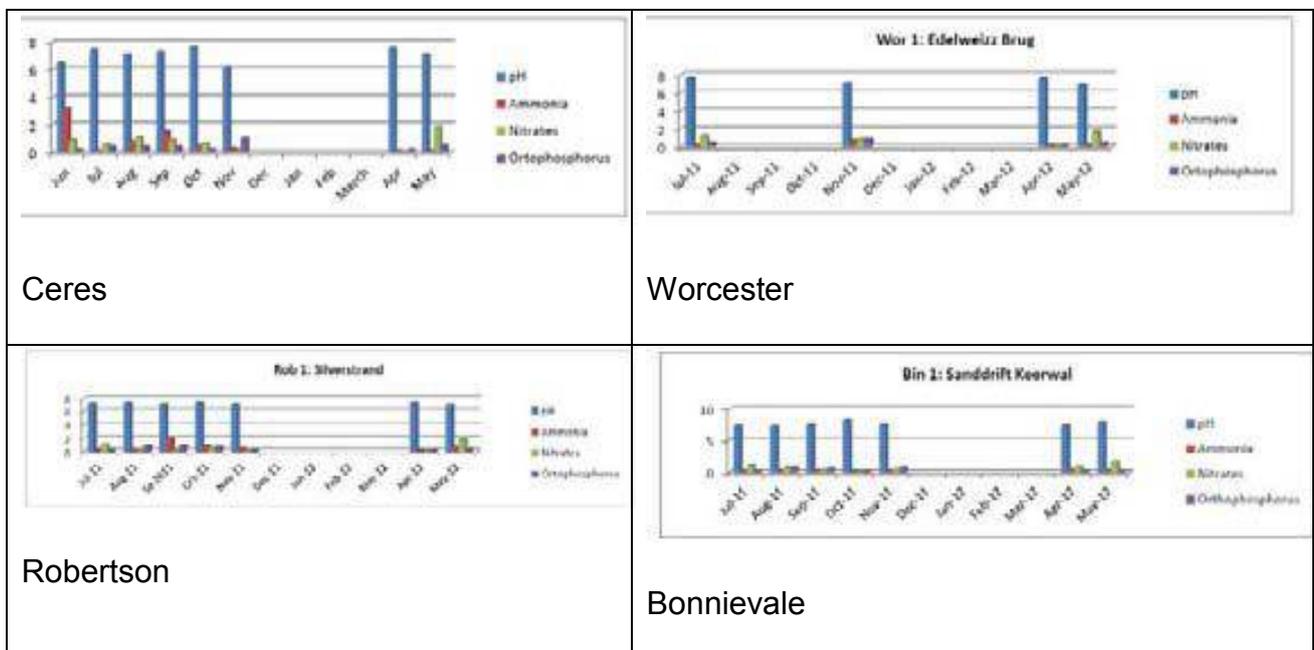
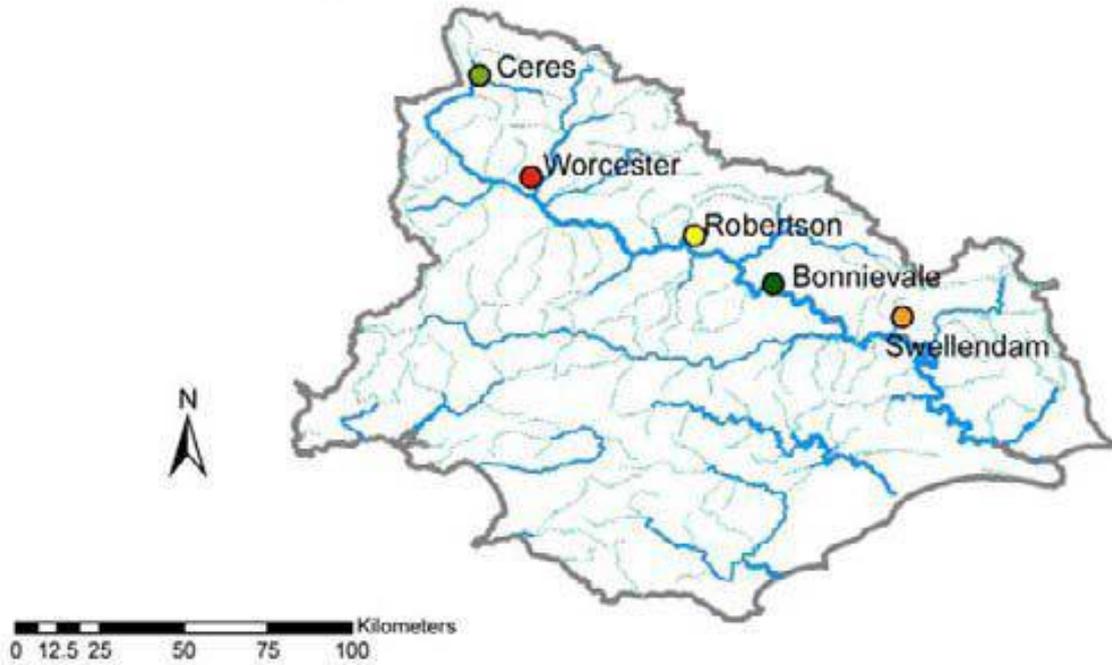


Figure 6: Water Quality Measurements by BOCMA

## Issues and drivers that impact on water quality

- Fertilisers and pesticides are often utilised to optimise production of grapes, deciduous and citrus fruits. Typically these chemicals can reach rivers via vapour/spray drift, surface runoff, spills or through leaching into groundwater. These chemicals, many of which are copper-based, adversely affect aquatic biota (e.g. reduce reproduction or cause mortality) resulting in the disappearance of important pollution-sensitive species.
- The land-use in the Upper Breede Water Management Area influences the water quality of the sub-catchment. The agricultural activities change from being dominated by orchards and some dryland crops in the Ceres management area to one where vineyards dominate. In response, the water quality in these reaches deteriorates and ranges from a fair to poor modified state as a result of the extensive farming..
- Urban development also plays an important role. Nutrient enrichment of the river through the addition of nitrogen and phosphorus present in domestic and industrial effluent and from diffuse sources impacts on water quality
- Contamination of water resources by municipal waste water and urban runoff, contributes high pathogen and nutrient loads to the system. The impact on fruit and vegetable irrigation and on recreational contact with rivers and estuaries is significant.
- Wetland Degradation, in general, also has an impact on water quality;
- The population growth of alien invasive bottom-dwelling fish such as carp which increase turbidity of the water.

### 7.3.6 Human Settlements

According to the Theewaterskloof 2030 vision, there is a need for consolidation of existing settlements and development of high-income housing options around Theewaterskloof Dam. The municipality has also purchased Destiny Farm outside Villiersdorp for R5 million (Theewaterskloof Municipality, 2012).

High income housing around the edge of the dam such as the Theewaterskloof Country Estate and the Gloria Bay residential developments have caused some concern with a number of stakeholders, with many feeling that these developments may impact on water quality and the natural environment. There is also some concern that these developments may will result in increased exclusivity of the dam and prevent equitable access.

### 7.3.7 The Social Environment

The Theewaterskloof Local Municipality (TWK LM) includes the towns of Grabouw, Villiersdorp, Botrivier, Genadendal, Greyton, Caledon, Tesselaarsdal, and Riversonderend plus a few small centres, and large tracts of agricultural land. The economy is primarily agrarian (almost 50% including the agro-processing activities, such as Appletiser, in the region) with growing tourism, construction, financial and business services sectors. Grabouw is the largest economic centre, followed by Caledon.

TWK is, and has been, economically stagnant. Population growth exceeds economic growth. Consequently, unemployment has grown. With the growth in unemployment the indigent population in the Municipality has grown and the Municipality has become less and less financially viable (Theewaterskloof IDP, 2012).

### 7.3.8 Tourism Potential

Theewaterskloof has a rich array of natural attractions. In particular, these include a unique combination of natural scenery, floral diversity and dams. Some of the more significant attractions are:

- The Cape Floral Kingdom, especially the Kogelberg and the Palmiet
- The Dams: Theewaterskloof, Eikenhof, Nuweberg, Elandskloof, Mofam and Palmiet
- The Nature Reserves which include seven Nature Reserves and various conservancies
- The Hot Springs in Caledon
- The Bot River Vlei – (birding)

The area also offers a wealth of heritage resources, including:

- Genadendal mission station, a recognised destination in TWK, with over 20 buildings listed as national monuments. It is also a listed national heritage site.
- The first railway station to have been constructed outside of Cape Town
- Old Cape buildings & structures
- Old Cape wagon and slave route
- Various museums including a Tractor Museum in Villiersdorp, a special interest attraction with a large number of vintage tractors, and museums at Caledon and Genadendal

- Cultural experiences that accompany these i.e. home-stays & community tours with local guides, storytelling, Khoisan history, religious tourism & churches

Overall, this heritage has not been show-cased for tourism, with no existing wagon tour, un-used station buildings, few home-stays or local tours and poor connections between the Genadendal offerings and the established tourism trade in Greyton or Elgin (Theewaterskloof IDP, 2012).

#### **7.4 Introduction to Theewaterskloof Dam**

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The Theewaterskloof Dam has a capacity of 487 million m<sup>3</sup> and provides water for the Rivieronderend-Berg-Eerste River Government Water Scheme, for urban use to the Greater Cape Town area and for agricultural use in the Eerste River and Berg River catchments. The dam stores runoff from its own catchment as well as water diverted into it during the winter months from the Berg Water Management Area by means of a system of diversion weirs and tunnels.

During summer a significant proportion of the total yield of the dam is transferred back to the Berg Water Management Area via the same tunnel system. The scheme has a 1 in 50 year yield of 217 million m<sup>3</sup>/a. This is inclusive of the yields of the Banhoek and Wolwekloof tributary diversions on the Upper Berg River, and of the local yield of Kleinplaas Dam on the Eerste River in the Berg Water Management Area (River Health Programme, 2011).

Some 60 % of the yield has been allocated for irrigation in the Berg and Eerste River catchments, the lower Rivieronderend catchment, and for supply to the Overberg Rural Water Supply Scheme in the adjacent Overberg. The balance is allocated to the Cape Town Metropolitan Area and there is no surplus yield available from the system. On average a net transfer of about 174 million m<sup>3</sup>/a into the Berg Water Management Area takes place via this scheme (River Health Programme, 2011).

## **8 THE RECEIVING ENVIRONMENT**

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### **8.1 BIOPHYSICAL ENVIRONMENT**

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#### **8.1.1 *Climate***

The climate in the area varies considerably. Rainfall is largely in the winter with occasional winter snowfalls occurring on the mountains in the south- and north west of the area. In the western mountainous regions rainfall can exceed 1 800 mm/a, while in the lower eastern parts the rainfall decreases to about 300 mm/a (River Health Programme, 2011).

### 8.1.2 Air Quality

The Theewaterskloof Local Municipality is currently drafting an Air Quality Management Plan (Theewaterskloof IDP, 2012) however at this stage not much information is currently available. The Overberg District Municipality has a draft Air Quality Management Plan (Overberg AQMP, 2012) which cites the following air pollution sources in the District:

- Industrial operations especially fish factories in Gansbaai and Hermanus and clay brick manufacturing
- Agricultural activities such as crop burning and spraying
- Biomass burning (veld fires)
- Domestic fuel burning (wood and paraffin)
- Vehicle emissions
- Waste treatment and disposal
- Dust from unpaved roads
- Other fugitive dust sources such as wind erosion of exposed areas

The ambient air quality is generally good; however, emissions from industrial boilers are likely to result in local areas of elevated concentrations of air pollutants. Ambient particulate concentrations are likely to be high in low – income residential areas where wood is used as primary fuel source. The motor vehicle congestion in holiday towns and along the N2 road results in elevated ambient concentrations of particulates and NO<sub>x</sub> (Nitrogen Oxides) at times (Overberg AQMP, 2012).

During 2006 passive sampling was conducted throughout the district and 19 samples were placed, monitoring all local municipal areas. The results obtained from the passive sampling project across the Overberg were low and well within the Lower Assessment Threshold (LAT) depicted in SANS 1929: 2005. The Sulphur dioxide levels recorded during the period at the 19 sites in the Overberg are low. The two higher levels were at Gansbaai 6µg/m<sup>3</sup> and Botriver 8µg/m<sup>3</sup> (µ = micro).

The nitrogen dioxide values recorded in the Overberg are low with an average across the area of 5µg/m<sup>3</sup>. The highest level recorded was at Zwelihle, Hermanus being 15µg/m<sup>3</sup>. The Benzene levels recorded at all sites within the Overberg reflect levels of <0.5µg/m<sup>3</sup>. The ozone levels monitored across the district were 48µg/m<sup>3</sup>. An overall perspective of the

sample analysis indicated that the pollution levels are low within the district (Overberg AQMP, 2012).

### 8.1.3 Geology and soil

According to AGIS (2007), the Theewaterskloof dam occurs on Bokkeveld shale.



Figure 7: Simplified Geology

### 8.1.4 Topography

The topography of the Breede-Overberg area is characterised by the Franschhoek and Du Toit's Mountains in the west, the Hex River Mountains to the north and the Langeberg Mountains in the east, with a wide Breede River valley and the rolling hills of the Overberg in the south (River Health Programme, 2011).

### 8.1.5 Water Quality

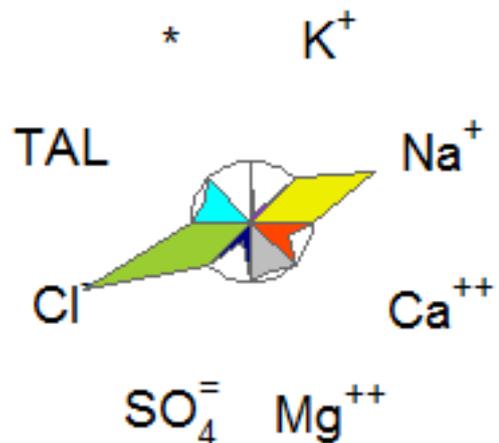
Pollution from surrounding farms and Villiersdorp and the illegal introduction of catfish led to the bass almost disappearing. Carp proliferated, causing turbidity problems and adding the problem of algal blooms in the dam. These blooms in the dam, as well as taste and odour problems in the drinking water originating from the dam have also been increasing since the early 2000's. The water transferred to the Berg River Catchment (into the Berg

and Eerste Rivers) has also been noticeably more turbid (River Health Programme, 2011).

Increased threats of eutrophication of the lower river reaches and estuaries during summer low flows is also caused by nutrient enrichment from municipal waste water and agricultural runoff. Increased salinity (BOCMA, 2011).

Some of the concerns regarding water quality are related to Villiersdorp Waste Water Treatment Works (WWTWs). However, according to the Theewaterskloof IDP (2012), the Villiersdorp WWTW is in a good condition and is well-maintained. The WWTW operates within 50 % of its hydraulic and 60 % of the organic design capacities. Bergstan Consulting Engineers have been appointed to oversee the upgrade of the works to comply with the special effluent quality standards as required by DWA (Theewaterskloof IDP, 2012). The Villiersdorp WWTW has 94.44% microbial compliance but only 48% waste water quality compliance.

DWA Resource Water Quality Services (RWQS) undertakes some monitoring at two points in Theewaterskloof dam. Monitoring at 102113 (see below) between 1999 and 2010. No monitoring has taken place since 2011. In 2010, the measured pH was high (4.64). The Maucha diagram also indicates higher levels of Chloride and Sodium ions (DWA, 2012).



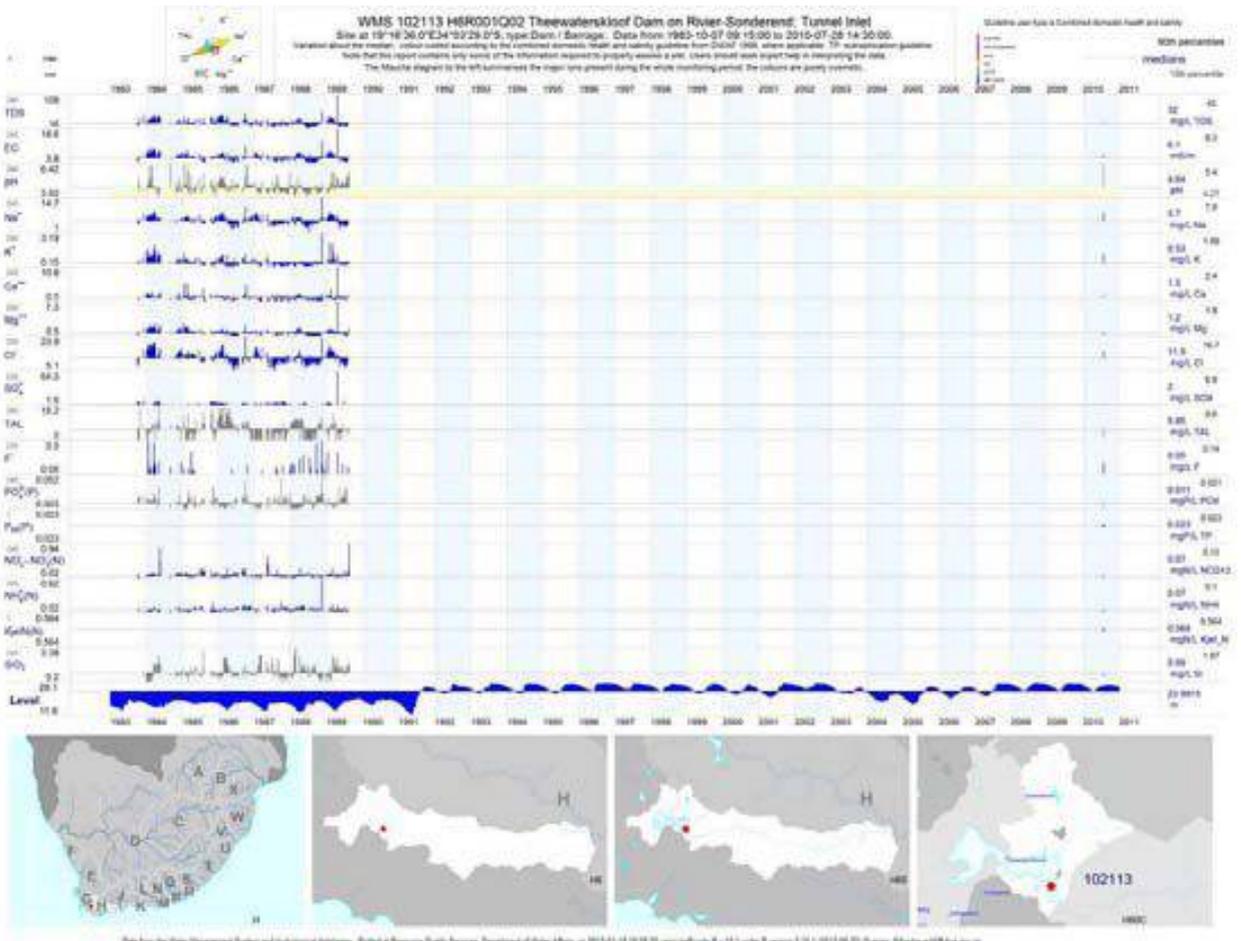
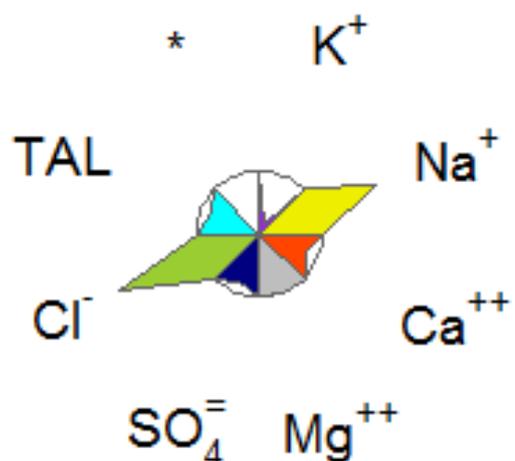


Figure 8: DWA Water Quality Monitoring

Monitoring at the second site (102112) below has been consistently undertaken by DWA (DWA, 2012). The Maucha diagram below follows the same trend with higher levels of Chloride and Sodium ions.





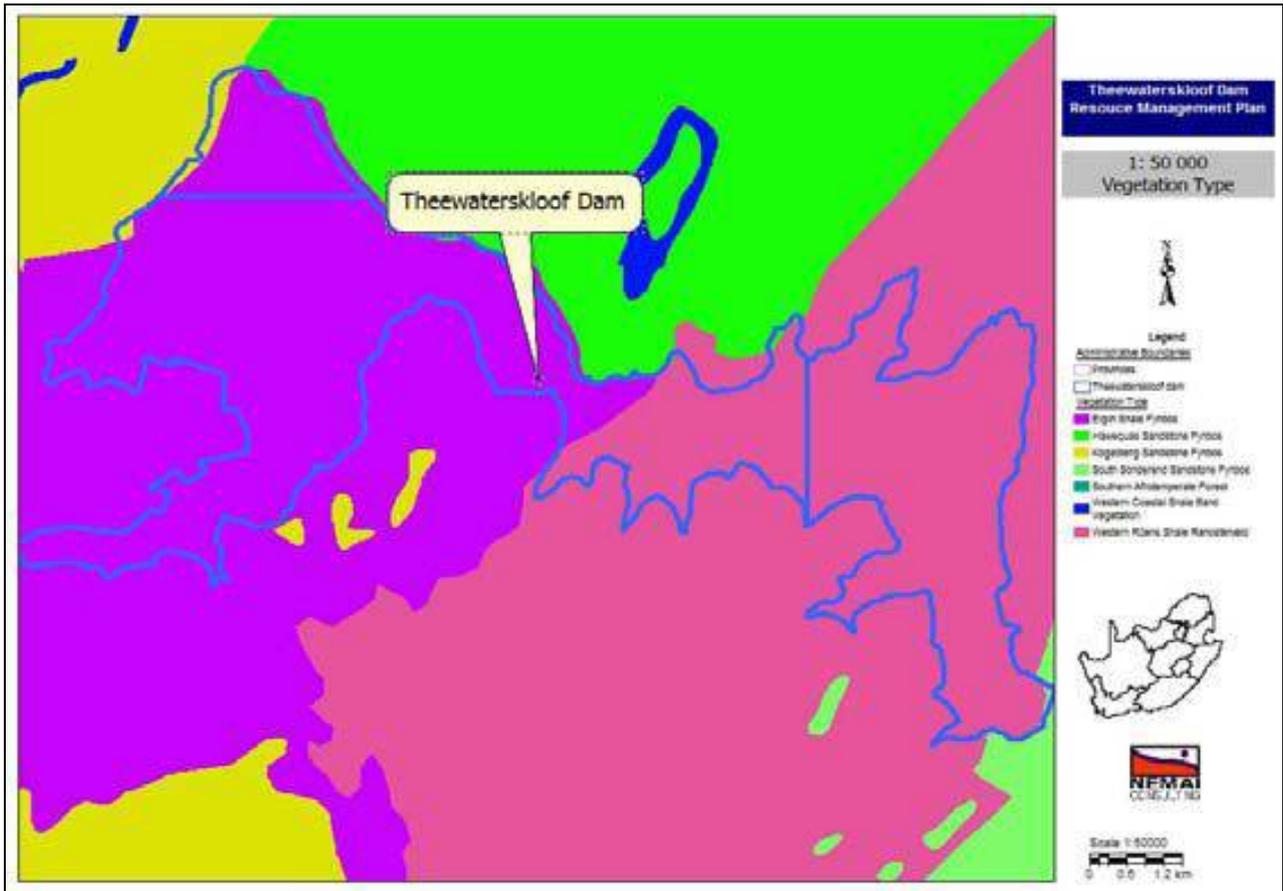


Figure 10: Vegetation Type

Table 2: Vegetation Types and Red Data List Status (+Roux et al., 2012; \*Mucina and Rutherford, 2006)

Vegetation Type	Red Data List Status	Percentage of the vegetation unit occurring in Western Cape	Percentage remaining of the vegetation unit in South Africa
Elgin Shale Fynbos	Critically endangered+	100%	16.1%
Western Ruens Shale Renosterveld	Critically endangered+	100%	9.3%
Hawequas Sandstone Fynbos	Vulnerable+	100%	96%
South Sonderend Sandstone Fynbos	Least Threatened *	100%	-
Kogelberg Sandstone Fynbos	Critically endangered+	100%	80.4%

### FFs 10 Hawequas Sandstone Fynbos

According to Mucina and Rutherford (2006), this vegetation type is distributed between Nuwekloof Pass near Gouda in the North to Franschoek Pass near Franshoek in the Western Cape. It occurs at an altitude of 250-1 800m. The vegetation type has a large number of endemic genera including *Spetaea* (Hyacinthaceae) and *Hydroidea* (Asteraceae).

### FFs 11 Kogelberg Sandstone Fynbos

Kogelstone Sandstone Fynbos is distributed between Franschoek, Groot-Drakensteinberge and Simonsberg in the north and passes southwards to include Hottentots Hollan and the Palmietberge Mountains (Mucina and Rutherford, 2006). This vegetation type occurs between 20m – 1590m. Main impacts include aliens such as *Pinus pinaster* and *Hakea sericea*. The species level endemism in this unit is staggering and includes two endemic genera (*Charadrophila* and *Glischrocolla*). In addition, this unit contains representatives of almost all endemic families of the Cape Floristic Region. It is mainly conserved within the Hottentot's Holland Nature Reserve Groenlandberg Nature Reserve (58%) (Mucina and Rutherford, 2006).

### FFs 14 South Sonderend Sandstone Fynbos

This vegetation type is found on the southern slopes of the Riviersonderend Mountains from Villiersdorp and Eseljagsberg in the west to Stormsvlei in the east (Mucina and Rutherford, 2006). It occurs in altitudes from 200m to 1 600m. According to Mucina and Rutherford (2006), this vegetation is least threatened and approximately 40% is protected in the Riviersonderend Nature Reserve.

### FFh 6 Elgin Shale Fynbos

Elgin Shale Fynbos is distributed between the Elgin basin east of Villersdorp with pockets occurring to the north at the uppermost part Stettynskloof, Kaaimansgat and Rooihoogte Pass (Mucina and Rutherford, 2006). This vegetation type is critically endangered and only some patches of the unit are statutorially protected in Theewaters and Limietberg Nature Reserve. Almost 80% of this rare fynbos type has been transformed due agriculture and the flooding of Theewaterskloof and Steenbras Dam. Many of the remnants of this vegetation type are small and burnt often which is resulting in a decline in species diversity.

### Western Rúens Shale Renosterveld

According to Mucina and Rutherford (2006), this vegetation unit is distributed from Bot River and Villiersdorp eastwards towards Caledon Swartberg and occurs at an altitude of 60m-450m. This vegetation type is also critically endangered with only 1% of the area

protected in the Witdraai Private Nature Reserve. Some 86% of the area has already been transformed.

The following critically endangered and endemic species are found in 3319 degree grid square which surrounds Theewaterskloof dam according to the South African National Biodiversity Institute (SANBI) Plants of South Africa (POSA) database (SANBI, 2010):

**Table 3: Critically endangered and endemic species in 3319 QDS (SANBI, 2010)**

Family	Species
AMARYLLIDACEAE	<i>Brunsvigia elandsmontana</i> Snijman
ASPHODELACEAE	<i>Bulbine monophylla</i> Poelln.
ASPHODELACEAE	<i>Haworthia herbacea</i> (Mill.) Stearn var. <i>flaccida</i> M.B.Bayer
ASPHODELACEAE	<i>Haworthia mirabilis</i> (Haw.) Haw. var. <i>beukmannii</i> (Poelln.) M.B.Bayer
ASPHODELACEAE	<i>Haworthia pubescens</i> M.B.Bayer var. <i>pubescens</i>
ASTERACEAE	<i>Arctotis angustifolia</i> L.
ASTERACEAE	<i>Cotula filifolia</i> Thunb.
ASTERACEAE	<i>Marasmodes oligocephala</i> DC.
ASTERACEAE	<i>Marasmodes undulata</i> Compton
ERICACEAE	<i>Erica alexandri</i> Guthrie & Bolus subsp. <i>alexandri</i>
ERICACEAE	<i>Erica bakeri</i> T.M.Salter
ERICACEAE	<i>Erica chrysocodon</i> Guthrie & Bolus
ERICACEAE	<i>Erica feminarum</i> E.G.H.Oliv.
ERICACEAE	<i>Erica hansfordii</i> E.G.H.Oliv.
ERICACEAE	<i>Erica hibbertii</i> Andrews
ERICACEAE	<i>Erica jasminiflora</i> Salisb.
ERICACEAE	<i>Erica margaritacea</i> Sol.
ERICACEAE	<i>Erica salicina</i> E.G.H.Oliv.
FABACEAE	<i>Cyclopia squamosa</i> A.L.Schutte
FABACEAE	<i>Rafnia crispa</i> C.H.Stirt.
GERANIACEAE	<i>Pelargonium heterophyllum</i> Jacq.
HYACINTHACEAE	<i>Lachenalia monilliformis</i> W.F.Barker
HYACINTHACEAE	<i>Lachenalia purpureo-caerulea</i> Jacq.
IRIDACEAE	<i>Babiana secunda</i> (Thunb.) Ker Gawl.
IRIDACEAE	<i>Babiana tubaeformis</i> Goldblatt & J.C.Manning
IRIDACEAE	<i>Ixia viridiflora</i> Lam. var. <i>minor</i> M.P.de Vos
IRIDACEAE	<i>Moraea angulata</i> Goldblatt
IRIDACEAE	<i>Moraea radians</i> (Goldblatt) Goldblatt
IRIDACEAE	<i>Moraea regalis</i> Goldblatt & J.C.Manning
IRIDACEAE	<i>Moraea worcesterensis</i> Goldblatt
IRIDACEAE	<i>Sparaxis maculosa</i> Goldblatt
IRIDACEAE	<i>Watsonia amabilis</i> Goldblatt
IRIDACEAE	<i>Watsonia humilis</i> Mill.
ISOETACEAE	<i>Isoetes stephansenii</i> A.V.Duthie

Family	Species
MESEMBRYANTHEMACEAE	<i>Circandra serrata</i> (L.) N.E.Br.
MESEMBRYANTHEMACEAE	<i>Lampranthus coccineus</i> (Haw.) N.E.Br.
MESEMBRYANTHEMACEAE	<i>Lampranthus schlechteri</i> (Zahlbr.) L.Bolus
ORCHIDACEAE	<i>Disa physodes</i> Sw.
OXALIDACEAE	<i>Oxalis natans</i> Thunb.
PROTEACEAE	<i>Diastella buekii</i> (Gand.) Rourke
PROTEACEAE	<i>Diastella myrtifolia</i> (Thunb.) Salisb. ex Knight
PROTEACEAE	<i>Diastella parilis</i> Salisb. ex Knight
PROTEACEAE	<i>Diastella proteoides</i> (L.) Druce
PROTEACEAE	<i>Leucadendron chamelaea</i> (Lam.) I.Williams
PROTEACEAE	<i>Leucadendron comosum</i> (Thunb.) R.Br. subsp. <i>homaephyllum</i> (Meisn.) I.Williams
PROTEACEAE	<i>Leucadendron flexuosum</i> I.Williams
PROTEACEAE	<i>Leucadendron floridum</i> R.Br.
PROTEACEAE	<i>Leucadendron globosum</i> (Kenn. ex Andrews) I.Williams
PROTEACEAE	<i>Leucadendron immoderatum</i> Rourke
PROTEACEAE	<i>Leucadendron lanigerum</i> H.Buek ex Meisn. var. <i>laevigatum</i> Meisn.
PROTEACEAE	<i>Leucadendron sericeum</i> (Thunb.) R.Br.
PROTEACEAE	<i>Leucadendron stellare</i> (Sims) Sweet
PROTEACEAE	<i>Protea caespitosa</i> Andrews
PROTEACEAE	<i>Protea convexa</i> E.Phillips
PROTEACEAE	<i>Protea mucronifolia</i> Salisb.
PROTEACEAE	<i>Serruria aemula</i> Salisb. ex Knight
PROTEACEAE	<i>Serruria florida</i> (Thunb.) Salisb. ex Knight
PROTEACEAE	<i>Serruria furcellata</i> R.Br.
PROTEACEAE	<i>Serruria pinnata</i> (Andr.) R.Br.
PROTEACEAE	<i>Sorocephalus imbricatus</i> (Thunb.) R.Br.
PROTEACEAE	<i>Sorocephalus scabridus</i> Meisn.
PROTEACEAE	<i>Spatalla salsoloides</i> (R.Br.) Rourke
PROTEACEAE	<i>Vexatorella latebrosa</i> Rourke
ROSACEAE	<i>Cliffortia acockii</i> Weim.

## 9.2 Alien Invasive Plant Species

### 9.2.1 Terrestrial Alien Invasive Species

A large number of alien species occur in the H60 catchment area which surround the dam. These include the following (Kotze *et al.*, 2010).

1. *Acacia baileyana*, *dealbata* & *mearnsii*
2. *Acacia cyclops*

3. *Acacia melanoxylon*
4. *Acacia saligna*
5. *Agave spp.*
6. *Arundo donax*
7. *Atriplex nummularia*
8. *Caesalpinia decapetala*
9. *Cereus jamacaru*
10. *Cestrum spp.*
11. *Chromolaena odorata*
12. *Eucalyptus spp.*
13. *Hakea spp.*
14. *Jacaranda mimosifolia*
15. *Lantana camara*
16. *Melia azedarach*
17. *Opuntia spp.*
18. *Pinus spp.*
19. *Populus spp.*
20. *Prosopis spp.*
21. *Psidium guajava*
22. *Rosa rubignosa*
23. *Salix babylonica*
24. *Senna didymobotrya*
25. *Sesbania punicea*
26. *Solanum mauritianum*
27. *Tamarix chinensis*

According to the River Health Programme (2011), there is considerable water loss from river systems by invasive alien plants. Indications are that further substantial losses in

river flow, particularly during the low flow season, are likely should the increased spread and densification of invasive alien plants not be actively and timeously prevented.

The Working for Water Programme is actively clearing alien invasive trees from priority areas in the water management area. Invasive alien plant removal priorities in the Breede Catchment are Witels, Witte, Holsloot, Du Toits, Riviersonderend above Theewaterskloof Dam (River Health Programme, 2011). The wetland around the northern part of the dam has also been cleared.

## 9.3 Fauna

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### 9.3.1 *Fresh Water Fish*

Freshwater Ecosystem Priority Area (FEPA) maps provide guidance on how many rivers, wetlands and estuaries, and which ones, are needed for protecting representative aquatic biodiversity and ecological functioning of South Africa's freshwater ecosystems. In the Breede-Overberg, river FEPAs are the only healthy tributaries remaining in the upper catchments and they support the sustainability of hard-working rivers in the middle and lower Riviersonderend and Breede rivers. Several of the wetland FEPAs also support the sustainability of priority estuaries in the Overberg subcatchment (River Health Programme, 2011).

Information obtained from SANBI's Biodiversity Advisor website (<http://bgis.sanbi.org>), provides spatial biodiversity information regarding the number of threatened fish per sub-water management area (figure below).

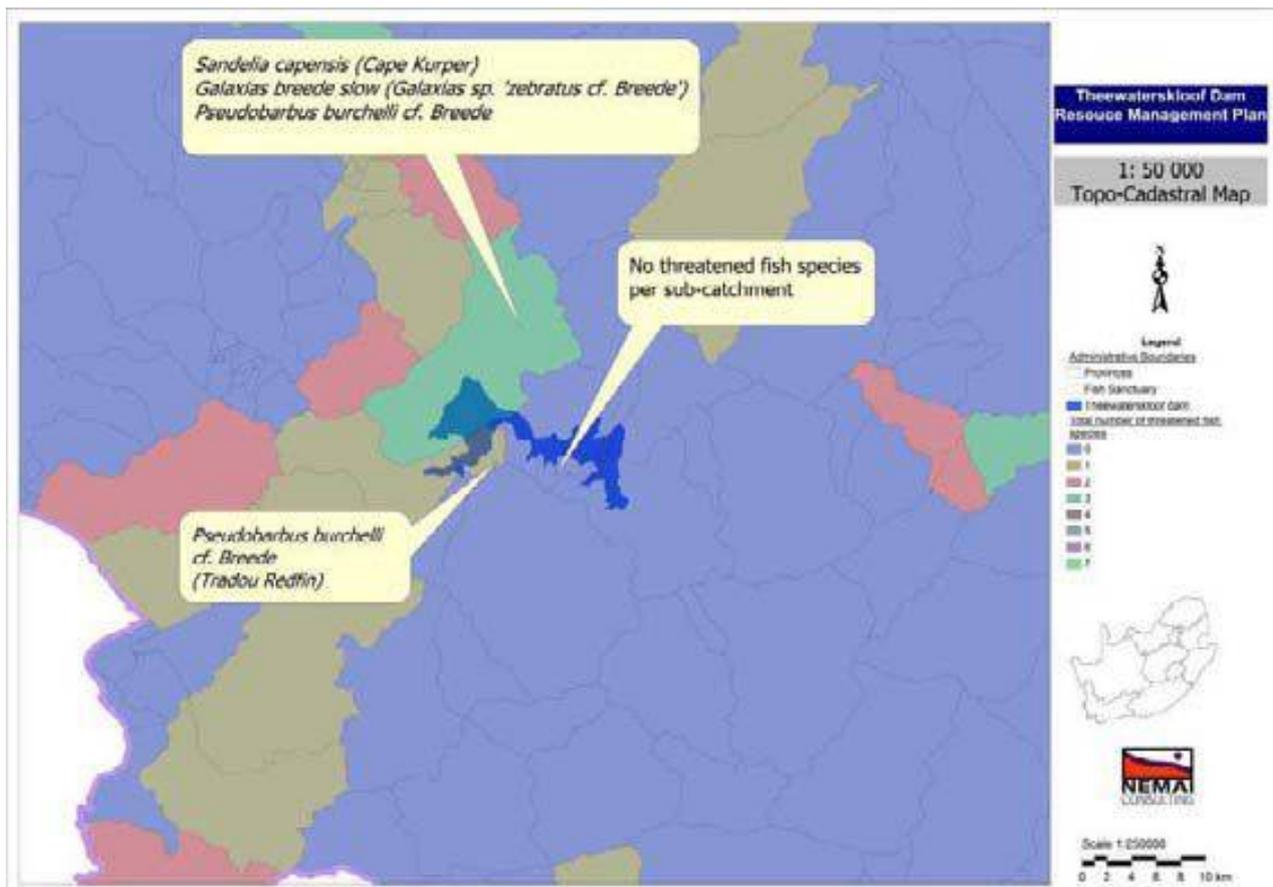


Figure 11: Threatened Fish Species per Sub-Catchment

Fish species such as *Sandelia capensis* (Cape Kurper), *Galaxias breede slow*; *Pseudobarbus burchelli* (Tradou Redfin) are found in the sub-water management areas surrounding the dams.

Both water quality and quantity in all major river systems in the Western Cape Province are under threat from over utilisation. Increased water usage and pollution from towns and cities are threatening aquatic ecosystems in urban areas while at the same time contributing to deteriorating water quality in main stream rivers. The alteration of hydrological regimes, mainly through construction of dams and abstraction can impact on water quality parameters and instream habitat quality (Nel et al. 2011). This can in turn affect the ability of resident species to survive within the river and these changes can fundamentally alter the ecological functioning of the system. Many mountain tributaries and smaller lowland rivers, which are often hotspots for conservation of indigenous fish species, are threatened by water over-abstraction for irrigation purposes which often results in a loss of critical habitats during summer months (Jordaan *et al.*, 2012).

### 9.3.2 Amphibians

The Western Cape Province (WCP) has 54 described frog species. Of these, three are Critically Endangered, four are Endangered, one is Vulnerable, six are Near Threatened and at least three remain to be described as new species and have their threat status formally evaluated. More than half of the frogs in the WCP are endemic to this province. Two South African species alien to the WCP have been recorded. There is only one invasive species (guttural toad) that is not indigenous at the provincial level although there are some large-scale movements of an indigenous species (painted reed frog) within the province.

No invasive alien amphibians originating outside South Africa are known from the WCP. The threats to amphibians in the WCP are habitat loss, invasive alien plant species, too frequent and intense fires, and emergent diseases (Turner and de Villiers, 2012).

Information on amphibians which occur in the immediate vicinity of the dam is not easily available. Using the South African Frog Atlas Project ([www.sarca.adu.org.za](http://www.sarca.adu.org.za)), the following species were found to occur in 3419 degree grid square which surrounds the Theewaterskloof Dam:

- *Amietophrynus rangeri*
- *Arthroleptella villiersi*
- *Heleophryne purcelli*
- *Hyperolius horstockii*
- *Poyntonia paludicola*
- *Strongylopus grayii*

### 9.3.3 Reptiles

One hundred and fifty-three reptile species and subspecies have been recorded in the Western Cape Province. Of these, 22 are endemic to the WCP and eight species are alien to the WCP. Only one of these eight alien species – the Cape Dwarf Day Gecko (*Lygodactylus capensis*) is known to have established breeding populations (Turner et al., 2012). Detailed information of species which occur in the immediate vicinity of the dam is not available however the following species have been recorded in the 3319 Degree Square (South African Reptile Assessment – [www.vmus.adu.org.za](http://www.vmus.adu.org.za) ).

- *Stigmochelys pardalis* Leopard Tortoise (Testudinidae)
- *Trachylepis capensis* Cape Skink (Scincidae)
- *Trachylepis homalocephala* Red-sided Skink (Scincidae)
- *Acontias meleagris* Cape Legless Skink (Scincidae)
- *Afrogecko porphyreus* Marbled Leaf-toed Gecko (Gekkonidae)
- *Agama atra* Southern Rock Agama (Agamidae)
- *Agama hispida* Spiny Ground Agama (Agamidae)
- *Bitis caudalis* Horned Adder (Viperidae)
- *Bitis arietans arietans* Puff Adder (Viperidae)
- *Bitis atropos* Cape Berg Adder (Viperidae)
- *Bitis caudalis* Horned Adder (Viperidae)
- *Boaedon capensis* Brown House Snake (Colubridae)
- *Bradypodion gutturale* Little Karoo Dwarf Chameleon (Chamaeleonidae)
- *Bradypodion pumilum* Cape Dwarf Chameleon (Chamaeleonidae)
- *Chamaesaura anguina anguina* Cape Grass Lizard (Cordylidae)
- *Chersina angulata* Angulate Tortoise (Testudinidae)
- *Cordylus cordylus* Cape Girdled Lizard (Cordylidae)
- *Dispholidus typus typus* Boomslang (Colubridae)
- *Duberria lutrix lutrix* South African Slug-eater (Colubridae)
- *Homopus areolatus* Parrot-beaked Tortoise (Testudinidae)
- *Karusasaurus polyzonus* Karoo Girdled Lizard (Cordylidae)
- *Lycodonomorphus inornatus* Olive House Snake (Colubridae)
- *Lycodonomorphus rufulus* Brown Water Snake (Colubridae)

- *Naja nigricincta woodi* Black Spitting Cobra (Elapidae)
- *Pachydactylus formosus* Southern Rough Gecko (Gekkonidae)
- *Pachydactylus geitje* Ocellated Gecko (Gekkonidae)
- *Pedioplanis burchelli* Burchell's Sand Lizard (Lacertidae)
- *Prosymna sundevallii* Sundevall's Shovel-snout (Colubridae)
- *Psammobates geometricus* Geometric Tortoise (Testudinidae)
- *Psammophis crucifer* Cross-marked Grass Snake (Colubridae)
- *Psammophis notostictus* Karoo Sand Snake (Colubridae)
- *Psammophis notostictus* Karoo Sand Snake (Colubridae)
- *Psammophylax rhombeatus rhombeatus* Spotted Grass Snake (Colubridae)
- *Pseudocordylus microlepidotus microlepidotus* Cape Crag Lizard (Cordylidae)
- *Rhinotyphlops lalandei* Delalande's Beaked Blind Snake (Typhlopidae)
- *Stigmochelys pardalis* Leopard Tortoise (Testudinidae)
- *Trachylepis capensis* Cape Skink (Scincidae)
- *Trachylepis sulcata sulcata* Western Rock Skink (Scincidae)

#### 9.3.4 Mammals

The Western Cape Province (WCP) has 172 described mammal taxa (species and subspecies). Of these, 19 are Threatened listed in the South African Red Data Book, based on regional assessments. Three are Critically Endangered, four are Endangered, ten are Vulnerable and 18 are Near Threatened. The plant diversity and diversity of vegetation communities of the WCP provides a diverse landscape and a variety of habitats for which evidence suggests an associated level of speciation in other taxa, including mammals (Birss and Palmer, 2012).

Due to the agricultural nature of much of the land surrounding Theewaterskloof dam, large mammal species are not expected. However in Hottentot's Holland Nature Reserve

(which adjoins Theewaterskloof Conservancy and the dam),, many animals have been re-introduced, including the rare Cape mountain zebra, eland, bontebok and red hartebeest. Populations of grey rhebuck, klipspringer, common duiker and grysbok occur and, while leopards frequent these mountains, they are seldom seen (CapeNature, 2010).

The following species have been recorded in the 3319 degree grid square which surrounds Theewaterskloof dam ([www.vmus.adu.org.za](http://www.vmus.adu.org.za)) (ADU, 2012). The large mammal species listed below are most likely found in the Nature Reserve or in the Theewaterskloof Conservancy area.

**Table 4: Mammals in 3319 QDS (ADU, 2012)**

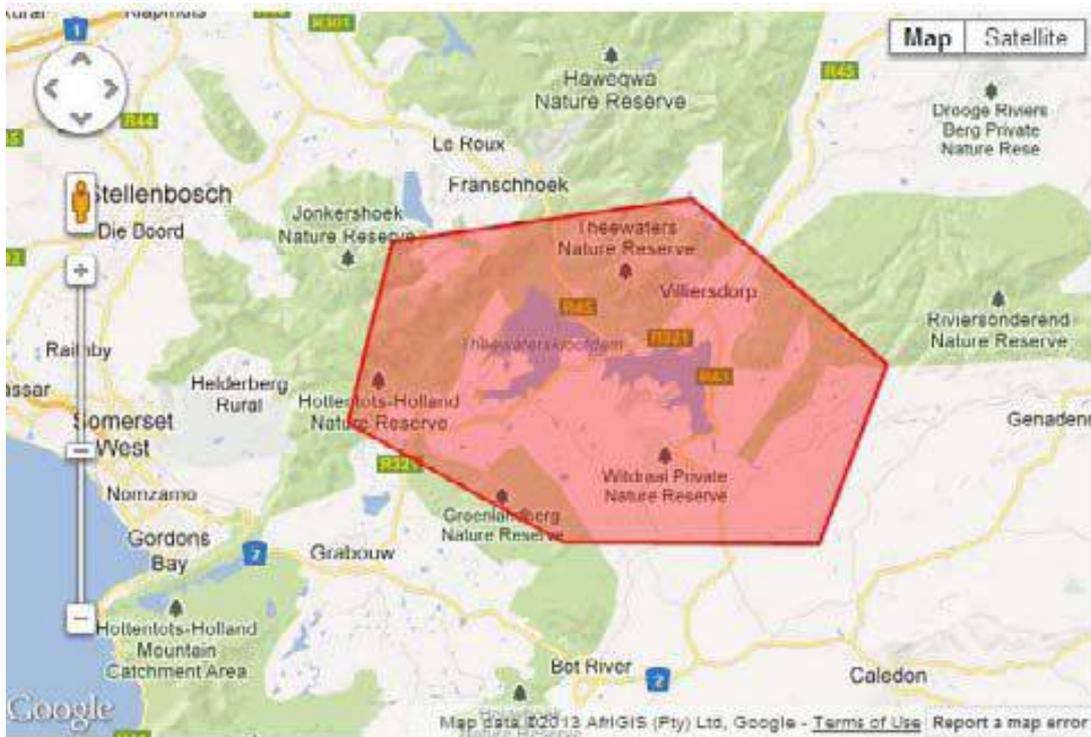
Genus	Species	Sub-species	Common name	Red list category
<i>Alcelaphus</i>	<i>buselaphus</i>		Red Hartebeest	Least Concern
<i>Antidorcas</i>	<i>marsupialis</i>		Springbok	Least Concern
<i>Damaliscus</i>	<i>pygargus</i>	<i>pygargus</i>	Bontebok	Vulnerable
<i>Oreotragus</i>	<i>oreotragus</i>		Klipspringer	Least Concern
<i>Pelea</i>	<i>capreolus</i>		Grey Rhebok	Least Concern
<i>Raphicerus</i>	<i>melanotis</i>		Cape Grysbok	Least Concern
<i>Sylvicapra</i>	<i>grimmia</i>		Common Duiker	Least Concern
<i>Taurotragus</i>	<i>oryx</i>		Eland	Least Concern
<i>Vulpes</i>	<i>chama</i>		Cape Fox	Least Concern
<i>Papio</i>	<i>ursinus</i>		Chacma Baboon	Least Concern
<i>Equus</i>	<i>zebra</i>	<i>zebra</i>	Cape Mountain Zebra	Vulnerable
<i>Caracal</i>	<i>caracal</i>		Caracal	Least Concern
<i>Felis</i>	<i>silvestris</i>		African Wild Cat	Least Concern
<i>Panthera</i>	<i>pardus</i>		Leopard	Least Concern
<i>Atilax</i>	<i>paludinosus</i>		Water Mongoose	Least Concern
<i>Galerella</i>	<i>pulverulenta</i>		Small Grey Mongoose	Least Concern
<i>Herpestes</i>	<i>ichneumon</i>		Large Grey Mongoose	Least Concern
<i>Hystrix</i>	<i>africaeaus-tralis</i>		Porcupine	Least Concern
<i>Lepus</i>	<i>capensis</i>		Cape Hare / Desert Hare	Least Concern
<i>Pronolagus</i>	<i>rupestris</i>		Smith's Red Rock Rabbit	Least Concern
<i>Aethomys</i>	<i>namaquensis</i>		Namaqua Rock Mouse	Least Concern
<i>Aonyx</i>	<i>capensis</i>		Cape Clawless Otter	Least Concern
<i>Ictonyx</i>	<i>striatus</i>		Striped Polecat	Least Concern
<i>Mellivora</i>	<i>capensis</i>		Honey Badger	Near Threatened
<i>Poecilogale</i>	<i>albinucha</i>		African Weasel	Data deficient
<i>Procavia</i>	<i>capensis</i>		Rock Hyrax	Least Concern
<i>Sciurus</i>	<i>carolinensis</i>		Eastern gray squirrel	Least Concern

				(IUCN 3.1)
<i>Genetta</i>	<i>genetta</i>		Small-spotted Genet	Least Concern
<i>Genetta</i>	<i>tigrina</i>		Large-spotted Genet	Least Concern

According to CapeNature, one of the concerns regarding mammals in the area is the large number of feral dogs in the area which have formed packs (D Dreyer, pers comm. 23 October 2012). In addition, during summer when the water level is low, it is possible for large herbivores to pass out of the reserve onto the road. This can result in accidents.

### 9.3.5 *Avifauna*

A list of recorded bird species was obtained using the Avian Demography Unit MyBirdPatch database ([www.mybirdpatch.adu.org.za](http://www.mybirdpatch.adu.org.za)) which includes data from the South African Bird Atlas Project 1 and 2 (ADU, 2013). An area around Theewaterskloof dam was selected (figure below) and a list of bird species occurring in this area was then generated. The list is provided below and contains 272 bird species.



**Figure 12: My Bird Patch Area**

The Western Cape Province is not known for its high diversity of birds. Despite this, nearly 600 species have been recorded for the province, approximately 45% of which are considered resident species. Significant proportions of populations of threatened species occur within the province placing a substantial responsibility on conservation authorities at all levels of government operating within the province. At the Western Cape provincial

scale, 10 additional species were uplisted to threat categories of a more severe scale, while 5 were downlisted between 2007 and 2012. The coastal and inshore species of the province are of particular conservation concern (Shaw and Waller, 2012).

Information obtained from the Theewaterskloof Sports Club website ([www.theewaters.co.za](http://www.theewaters.co.za)) highlights the following species: Sacred Ibis, Fish eagles, Hawks, Lanner falcons, Kites, Sunbirds, Herons, African Hoopoes, Aquatic waders, Cormorants, Gulls, Kingfishers, Blue Cranes, Egrets, Hamerkoppe and Egyptian geese, to mention but a few.

Species such as the Blue crane is also of concern and is listed as vulnerable in the Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Barnes, 2000) and is virtually endemic to South Africa with only a small population occurring around the Etosha Pans in Namibia and a few birds resident in Swaziland and Lesotho. The species has declined in much of its former stronghold mostly due to habitat loss, but has adapted well to the artificial habitat of the wheat producing areas of the Western Cape Province (Shaw, 2003) to such a degree that it is estimated that about 50% of the total population now occurs in the Western Cape Province (McCann, 2001) (Shaw and Waller, 2012).

**Table 5: Bird species found at Theewaterskloof Dam (ADU, 2013).**

Rec No.	Reference Number	Common Name	Species Name
1	622	Apalis, Bar-throated	<i>Apalis thoracica</i>
2	269	Avocet, Pied	<i>Recurvirostra avosetta</i>
3	432	Barbet, Acacia Pied	<i>Tricholaema leucomelas</i>
4	672	Batis, Cape	<i>Batis capensis</i>
5	404	Bee-eater, European	<i>Merops apiaster</i>
6	808	Bishop, Southern Red	<i>Euplectes orix</i>
7	810	Bishop, Yellow	<i>Euplectes capensis</i>
8	67	Bittern, Little	<i>Ixobrychus minutus</i>
9	722	Bokmakierie, Bokmakierie	<i>Telophorus zeylonus</i>
10	709	Boubou, Southern	<i>Laniarius ferrugineus</i>
11	543	Bulbul, Cape	<i>Pycnonotus capensis</i>
12	873	Bunting, Cape	<i>Emberiza capensis</i>
13	717	Bush-Shrike, Olive	<i>Telophorus olivaceus</i>
14	219	Bustard, Denham's	<i>Neotis denhami</i>
15	155	Buzzard, Forest	<i>Buteo trizonatus</i>
16	152	Buzzard, Jackal	<i>Buteo rufofuscus</i>
17	154	Buzzard, Steppe	<i>Buteo vulpinus</i>
18	861	Canary, Black-headed	<i>Serinus alario</i>
19	863	Canary, Brimstone	<i>Crithagra sulphuratus</i>
20	857	Canary, Cape	<i>Serinus canicollis</i>
21	865	Canary, White-throated	<i>Crithagra albogularis</i>
22	866	Canary, Yellow	<i>Crithagra flaviventris</i>
23	575	Chat, Anteating	<i>Myrmecocichla formicivora</i>
24	570	Chat, Familiar	<i>Cercomela familiaris</i>
25	566	Chat, Karoo	<i>Cercomela schlegelii</i>
26	631	Cisticola, Cloud	<i>Cisticola textrix</i>

Rec No.	Reference Number	Common Name	Species Name
27	638	Cisticola, Grey-backed	<i>Cisticola subruficapilla</i>
28	646	Cisticola, Levaillant's	<i>Cisticola tinniens</i>
29	629	Cisticola, Zitting	<i>Cisticola juncidis</i>
30	212	Coot, Red-knobbed	<i>Fulica cristata</i>
31	48	Cormorant, Cape	<i>Phalacrocorax capensis</i>
32	50	Cormorant, Reed	<i>Phalacrocorax africanus</i>
33	47	Cormorant, White-breasted	<i>Phalacrocorax carbo</i>
34	4131	Coucal, Burchell's	<i>Centropus burchellii</i>
35	356	Coucal, Burchells	<i>Centropus burchellii</i>
36	1036	Coucal, White-browed	<i>Centropus superciliosus</i>
37	203	Crake, Black	<i>Amauornis flavirostris</i>
38	216	Crane, Blue	<i>Anthropoides paradiseus</i>
39	621	Crombec, Long-billed	<i>Sylvietta rufescens</i>
40	523	Crow, Cape	<i>Corvus capensis</i>
41	522	Crow, Pied	<i>Corvus albus</i>
42	344	Cuckoo, Black	<i>Cuculus clamosus</i>
43	352	Cuckoo, Diderick	<i>Chrysococcyx caprius</i>
44	351	Cuckoo, Klaas's	<i>Chrysococcyx klaas</i>
45	343	Cuckoo, Red-chested	<i>Cuculus solitarius</i>
46	513	Cuckooshrike, Black	<i>Campephaga flava</i>
47	52	Darter, African	<i>Anhinga rufa</i>
48	317	Dove, Laughing	<i>Streptopelia senegalensis</i>
49	322	Dove, Lemon	<i>Aplopelia larvata</i>
50	318	Dove, Namaqua	<i>Oena capensis</i>
51	314	Dove, Red-eyed	<i>Streptopelia semitorquata</i>
52	940	Dove, Rock	<i>Columba livia</i>
53	319	Dove, Tambourine	<i>Turtur tympanistria</i>
54	517	Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>
55	95	Duck, African Black	<i>Anas sparsa</i>
56	103	Duck, Maccoa	<i>Oxyura maccoa</i>
57	1016	Duck, Mallard	<i>Anas platyrhynchos</i>
58	104	Duck, White-backed	<i>Thalassornis leuconotus</i>
59	100	Duck, White-faced	<i>Dendrocygna viduata</i>
60	96	Duck, Yellow-billed	<i>Anas undulata</i>
61	139	Eagle, Booted	<i>Aquila pennatus</i>
62	142	Eagle, Martial	<i>Polemaetus bellicosus</i>
63	133	Eagle, Verreaux's	<i>Aquila verreauxii</i>
64	367	Eagle-Owl, Cape	<i>Bubo capensis</i>
65	368	Eagle-Owl, Spotted	<i>Bubo africanus</i>
66	61	Egret, Cattle	<i>Bubulcus ibis</i>
67	58	Egret, Great	<i>Egretta alba</i>
68	59	Egret, Little	<i>Egretta garzetta</i>
69	60	Egret, Yellow-billed	<i>Egretta intermedia</i>
70	600	Eremomela, Yellow-bellied	<i>Eremomela icteropygialis</i>
71	114	Falcon, Lanner	<i>Falco biarmicus</i>
72	113	Falcon, Peregrine	<i>Falco peregrinus</i>
73	707	Fiscal, Common	<i>Lanius collaris</i>
74	149	Fish-Eagle, African	<i>Haliaeetus vocifer</i>
75	206	Flufftail, Buff-spotted	<i>Sarothrura elegans</i>
76	205	Flufftail, Red-chested	<i>Sarothrura rufa</i>
77	207	Flufftail, Striped	<i>Sarothrura affinis</i>
78	655	Flycatcher, African Dusky	<i>Muscicapa adusta</i>
79	678	Flycatcher, Fairy	<i>Stenostira scita</i>



Rec No.	Reference Number	Common Name	Species Name
80	665	Flycatcher, Fiscal	<i>Sigelus silens</i>
81	654	Flycatcher, Spotted	<i>Muscicapa striata</i>
82	176	Francolin, Grey-winged	<i>Scleroptila africanus</i>
83	178	Francolin, Red-winged	<i>Scleroptila levaillantii</i>
84	89	Goose, Egyptian	<i>Alopochen aegyptiacus</i>
85	88	Goose, Spur-winged	<i>Plectropterus gambensis</i>
86	160	Goshawk, African	<i>Accipiter tachiro</i>
87	162	Goshawk, Gabar	<i>Melierax gabar</i>
88	165	Goshawk, Southern Pale Chanting	<i>Melierax canorus</i>
89	618	Grassbird, Cape	<i>Sphenoeacus afer</i>
90	5	Grebe, Black-necked	<i>Podiceps nigricollis</i>
91	4	Grebe, Great Crested	<i>Podiceps cristatus</i>
92	6	Grebe, Little	<i>Tachybaptus ruficollis</i>
93	551	Greenbul, Sombre	<i>Andropadus importunus</i>
94	263	Greenshank, Common	<i>Tringa nebularia</i>
95	192	Guinea fowl, Helmeted	<i>Numida meleagris</i>
96	288	Gull, Grey-headed	<i>Larus cirrocephalus</i>
97	289	Gull, Hartlaub's	<i>Larus hartlaubii</i>
98	287	Gull, Kelp	<i>Larus dominicanus</i>
99	72	Hamerkop, Hamerkop	<i>Scopus umbretta</i>
100	169	Harrier, Black	<i>Circus maurus</i>
101	171	Harrier-Hawk, African	<i>Polyboroides typus</i>
102	55	Heron, Black-headed	<i>Ardea melanocephala</i>
103	54	Heron, Grey	<i>Ardea cinerea</i>
104	57	Heron, Purple	<i>Ardea purpurea</i>
105	115	Hobby, Eurasian	<i>Falco subbuteo</i>
106	443	Honeybird, Brown-backed	<i>Prodotiscus regulus</i>
107	440	Honeyguide, Greater	<i>Indicator indicator</i>
108	442	Honeyguide, Lesser	<i>Indicator minor</i>
109	418	Hoopoe, African	<i>Upupa africana</i>
110	507	House-Martin, Common	<i>Delichon urbicum</i>
111	81	Ibis, African Sacred	<i>Threskiornis aethiopicus</i>
112	83	Ibis, Glossy	<i>Plegadis falcinellus</i>
113	84	Ibis, Hageda	<i>Bostrychia hagedash</i>
114	228	Jacana, African	<i>Actophilornis africanus</i>
115	125	Kestrel, Lesser	<i>Falco naumanni</i>
116	123	Kestrel, Rock	<i>Falco rupicolus</i>
117	402	Kingfisher, Brown-hooded	<i>Halcyon albiventris</i>
118	395	Kingfisher, Giant	<i>Megaceryle maximus</i>
119	397	Kingfisher, Malachite	<i>Alcedo cristata</i>
120	394	Kingfisher, Pied	<i>Ceryle rudis</i>
121	130	Kite, Black-shouldered	<i>Elanus caeruleus</i>
122	129	Kite, Yellow-billed	<i>Milvus aegyptius</i>
123	225	Korhaan, Black	<i>Eupodotis afra</i>
124	220	Korhaan, Karoo	<i>Eupodotis vigorsii</i>
125	4134	Korhaan, Southern Black	<i>Afrotis afra</i>
126	245	Lapwing, Blacksmith	<i>Vanellus armatus</i>
127	242	Lapwing, Crowned	<i>Vanellus coronatus</i>
128	3550	Lark, Agulhas Clapper	<i>Mirafra marjoriae</i>
129	4123	Lark, Agulhas Long-billed	<i>Certhilauda brevirostris</i>
130	4124	Lark, Benguela Long-billed	<i>Certhilauda benguelensis</i>
131	4140	Lark, Cape Clapper	<i>Mirafra apiata</i>
132	4125	Lark, Cape Long-billed	<i>Certhilauda curvirostris</i>



Rec No.	Reference Number	Common Name	Species Name
133	466	Lark, Clapper	<i>Mirafra apiata</i>
134	1183	Lark, Eastern Clapper	<i>Mirafra fasciolata</i>
135	4126	Lark, Eastern Long-billed	<i>Certhilauda semitorquata</i>
136	4127	Lark, Karoo Long-billed	<i>Certhilauda subcoronata</i>
137	463	Lark, Large-billed	<i>Galerida magnirostris</i>
138	475	Lark, Longbilled	<i>Mirafra curvirostris</i>
139	488	Lark, Red-capped	<i>Calandrella cinerea</i>
140	703	Longclaw, Cape	<i>Macronyx capensis</i>
141	167	Marsh-Harrier, African	<i>Circus ranivorus</i>
142	510	Martin, Banded	<i>Riparia cincta</i>
143	509	Martin, Brown-throated	<i>Riparia paludicola</i>
144	506	Martin, Rock	<i>Hirundo fuligula</i>
145	508	Martin, Sand	<i>Riparia riparia</i>
146	803	Masked-Weaver, Southern	<i>Ploceus velatus</i>
147	210	Moorhen, Common	<i>Gallinula chloropus</i>
148	392	Mousebird, Red-faced	<i>Urocolius indicus</i>
149	390	Mousebird, Speckled	<i>Colius striatus</i>
150	391	Mousebird, White-backed	<i>Colius colius</i>
151	637	Neddicky, Neddicky	<i>Cisticola fulvicapilla</i>
152	69	Night-Heron, Black-crowned	<i>Nycticorax nycticorax</i>
153	373	Nightjar, Fiery-necked	<i>Caprimulgus pectoralis</i>
154	312	Olive-Pigeon, African	<i>Columba arquatrix</i>
155	172	Osprey, Osprey	<i>Pandion haliaetus</i>
156	1	Ostrich, Common	<i>Struthio camelus</i>
157	359	Owl, Barn	<i>Tyto alba</i>
158	231	Oystercatcher, African Black	<i>Haematopus moquini</i>
159	682	Paradise-Flycatcher, African	<i>Terpsiphone viridis</i>
160	42	Pelican, Great White	<i>Pelecanus onocrotalus</i>
161	531	Penduline-Tit, Cape	<i>Anthoscopus minutus</i>
162	311	Pigeon, Speckled	<i>Columba guinea</i>
163	692	Pipit, African	<i>Anthus cinnamomeus</i>
164	693	Pipit, Long-billed	<i>Anthus similis</i>
165	694	Pipit, Plain-backed	<i>Anthus leucophrys</i>
166	233	Plover, Common Ringed	<i>Charadrius hiaticula</i>
167	241	Plover, Grey	<i>Pluvialis squatarola</i>
168	237	Plover, Kittlitz's	<i>Charadrius pecuarius</i>
169	238	Plover, Three-banded	<i>Charadrius tricollaris</i>
170	235	Plover, White-fronted	<i>Charadrius marginatus</i>
171	102	Pochard, Southern	<i>Netta erythrophthalma</i>
172	1049	Prinia, Drakensberg	<i>Prinia hypoxantha</i>
173	4139	Prinia, Karoo	<i>Prinia maculosa</i>
174	651	Prinia, Spotted	<i>Prinia hypoxantha</i>
175	189	Quail, Common	<i>Coturnix coturnix</i>
176	844	Quailfinch, African	<i>Ortygospiza atricollis</i>
177	197	Rail, African	<i>Rallus caerulescens</i>
178	524	Raven, White-necked	<i>Corvus albicollis</i>
179	606	Reed-Warbler, African	<i>Acrocephalus baeticatus</i>
180	581	Robin-Chat, Cape	<i>Cossypha caffra</i>
181	540	Rock-jumper, Cape	<i>Chaetops frenatus</i>
182	559	Rock-Thrush, Cape	<i>Monticola rupestris</i>
183	560	Rock-Thrush, Sentinel	<i>Monticola explorator</i>
184	256	Ruff, Ruff	<i>Philomachus pugnax</i>
185	609	Rush-Warbler, Little	<i>Bradypterus baboecala</i>



Rec No.	Reference Number	Common Name	Species Name
186	307	Sandgrouse, Namaqua	<i>Pterocles namaqua</i>
187	258	Sandpiper, Common	<i>Actitis hypoleucos</i>
188	251	Sandpiper, Curlew	<i>Calidris ferruginea</i>
189	262	Sandpiper, Marsh	<i>Tringa stagnatilis</i>
190	264	Sandpiper, Wood	<i>Tringa glareola</i>
191	511	Saw-wing, Black (Southern race)	<i>Psalidoprocne holomelaena</i>
192	583	Scrub-Robin, Karoo	<i>Cercotrichas coryphoeus</i>
193	105	Secretarybird, Secretarybird	<i>Sagittarius serpentarius</i>
194	869	Seedeater, Protea	<i>Crithagra leucopterus</i>
195	867	Seedeater, Streaky-headed	<i>Crithagra gularis</i>
196	90	Shelduck, South African	<i>Tadorna cana</i>
197	94	Shoveler, Cape	<i>Anas smithii</i>
198	855	Siskin, Cape	<i>Crithagra totta</i>
199	146	Snake-Eagle, Black-chested	<i>Circaetus pectoralis</i>
200	145	Snake-Eagle, Brown	<i>Circaetus cinereus</i>
201	250	Snipe, African	<i>Gallinago nigripennis</i>
202	786	Sparrow, Cape	<i>Passer melanurus</i>
203	784	Sparrow, House	<i>Passer domesticus</i>
204	4142	Sparrow, Southern Grey-headed	<i>Passer diffusus</i>
205	159	Sparrowhawk, Black	<i>Accipiter melanoleucus</i>
206	158	Sparrowhawk, Little	<i>Accipiter minullus</i>
207	156	Sparrowhawk, Rufous-chested	<i>Accipiter rufiventris</i>
208	485	Sparrowlark, Grey-backed	<i>Eremopterix verticalis</i>
209	85	Spoonbill, African	<i>Platalea alba</i>
210	181	Spurfowl, Cape	<i>Pternistis capensis</i>
211	733	Starling, Common	<i>Sturnus vulgaris</i>
212	744	Starling, Pale-winged	<i>Onychognathus nabouroup</i>
213	746	Starling, Pied	<i>Spreo bicolor</i>
214	745	Starling, Red-winged	<i>Onychognathus morio</i>
215	735	Starling, Wattled	<i>Creatophora cinerea</i>
216	270	Stilt, Black-winged	<i>Himantopus himantopus</i>
217	253	Stint, Little	<i>Calidris minuta</i>
218	576	Stonechat, African	<i>Saxicola torquatus</i>
219	78	Stork, Abdim's	<i>Ciconia abdimii</i>
220	79	Stork, Black	<i>Ciconia nigra</i>
221	80	Stork, White	<i>Ciconia ciconia</i>
222	749	Sugarbird, Cape	<i>Promerops cafer</i>
223	772	Sunbird, Amethyst	<i>Chalcomitra amethystina</i>
224	758	Sunbird, Greater Double-collared	<i>Cinnyris afer</i>
225	751	Sunbird, Malachite	<i>Nectarinia famosa</i>
226	753	Sunbird, Orange-breasted	<i>Anthobaphes violacea</i>
227	760	Sunbird, Southern Double-collared	<i>Cinnyris chalybeus</i>
228	493	Swallow, Barn	<i>Hirundo rustica</i>
229	502	Swallow, Greater Striped	<i>Hirundo cucullata</i>
230	498	Swallow, Pearl-breasted	<i>Hirundo dimidiata</i>
231	495	Swallow, White-throated	<i>Hirundo albigularis</i>
232	604	Swamp-Warbler, Lesser	<i>Acrocephalus gracilirostris</i>
233	208	Swamphen, African Purple	<i>Porphyrio madagascariensis</i>
234	380	Swift, African Black	<i>Apus barbatus</i>
235	386	Swift, Alpine	<i>Tachymarpis melba</i>
236	384	Swift, Horus	<i>Apus horus</i>
237	385	Swift, Little	<i>Apus affinis</i>
238	383	Swift, White-rumped	<i>Apus caffer</i>



Rec No.	Reference Number	Common Name	Species Name
239	713	Tchagra, Southern	<i>Tchagra tchagra</i>
240	98	Teal, Cape	<i>Anas capensis</i>
241	99	Teal, Hottentot	<i>Anas hottentota</i>
242	97	Teal, Red-billed	<i>Anas erythrorhyncha</i>
243	298	Tern, Swift	<i>Sterna bergii</i>
244	305	Tern, Whiskered	<i>Chlidonias hybrida</i>
245	304	Tern, White-winged	<i>Chlidonias leucopterus</i>
246	275	Thick-knee, Spotted	<i>Burhinus capensis</i>
247	274	Thick-knee, Water	<i>Burhinus vermiculatus</i>
248	1104	Thrush, Karoo	<i>Turdus smithi</i>
249	553	Thrush, Olive	<i>Turdus olivaceus</i>
250	1105	Thrush, Olive	<i>Turdus olivaceus</i>
251	525	Tit, Grey	<i>Parus afer</i>
252	658	Tit-Babbler, Chestnut-vented	<i>Parisoma subcaeruleum</i>
253	659	Tit-Babbler, Layard's	<i>Parisoma layardi</i>
254	316	Turtle-Dove, Cape	<i>Streptopelia capicola</i>
255	106	Vulture, Cape	<i>Gyps coprotheres</i>
256	686	Wagtail, Cape	<i>Motacilla capensis</i>
257	619	Warbler, Rufous-eared	<i>Malcorus pectoralis</i>
258	612	Warbler, Victorin's	<i>Cryptillas victorini</i>
259	599	Warbler, Willow	<i>Phylloscopus trochilus</i>
260	843	Waxbill, Common	<i>Estrilda astrild</i>
261	825	Waxbill, Sweet	<i>Coccyzygia melanotis</i>
262	799	Weaver, Cape	<i>Ploceus capensis</i>
263	568	Wheatear, Capped	<i>Oenanthe pileata</i>
264	564	Wheatear, Mountain	<i>Oenanthe monticola</i>
265	775	White-eye, Cape	<i>Zosterops pallidus</i>
266	1172	White-eye, Cape	<i>Zosterops virens</i>
267	1171	White-eye, Orange River	<i>Zosterops pallidus</i>
268	846	Whydah, Pin-tailed	<i>Vidua macroura</i>
269	362	Wood-Owl, African	<i>Strix woodfordii</i>
270	450	Woodpecker, Cardinal	<i>Dendropicus fuscescens</i>
271	445	Woodpecker, Ground	<i>Geocolaptes olivaceus</i>
272	452	Woodpecker, Olive	<i>Dendropicus griseocephalus</i>

## 9.4 Alien Fauna

Alien fish species were introduced into the rivers and dams of the water management area from 1880 onwards for angling purposes and to provide food. Many of these species found the inland waters of this region much to their liking and 12 species have become invasive, with severe predatory and competitive impacts on indigenous fish species and associated biota (River Health Programme, 2011).

In addition, alien fish species are one of the greatest threats to the indigenous fish in the region. They are the prime reason why several indigenous fish species, especially small species (e.g. Barrydale redbfin, Heuningnes redbfin) are now restricted to tiny areas where alien fish are absent (Jordaan et al., 2012).

Numerous stakeholders have also raised concerns regarding the population growth of Carp which has resulted in increased turbidity in the dam (Sean Hermann, pers comm, 07 February 2013). The increased population is also seen to have impacted the bass fishing as well as the freshwater biodiversity in the dam.

## 10 SOCIAL ENVIRONMENT

Unless otherwise indicated, all information in the section was obtained from the Census 2011 (Statistics South Africa, 2011) data.

### 10.1 Overview

Most of the population lives within the Overberg West and Upper to Central Breede areas. Demographic projections indicate a population growth in the coastal areas, but a decline in inland areas. The total population is therefore expected to remain relatively constant. (River Health Programme, 2011).

Theewaterskloof Municipality is the largest local authority in the Overberg District, embracing the City of Cape Town on its western boundary and sharing the eastern coastline with the Overstrand Municipality. It is the most populous municipality in the Overberg District (44% of the total district population). Its economic activity, as measured by Gross Regional Product, accounts for 41% of the broader District economy.

### 10.2 Population

Theewaterskloof Local Municipality has a population of 108 790 persons. . The population of 15 – 34 age groups and the 35-64 age group account for 34 percent and 34 percent of the population respectively. This means that 70 percent of the TLM population are of working age.

Youth in total account for 61 percent of the population indicating that youth are expected to contribute towards the households bearing more responsibility than what is normal. Only 5 percent of the population are over 65 years of age.

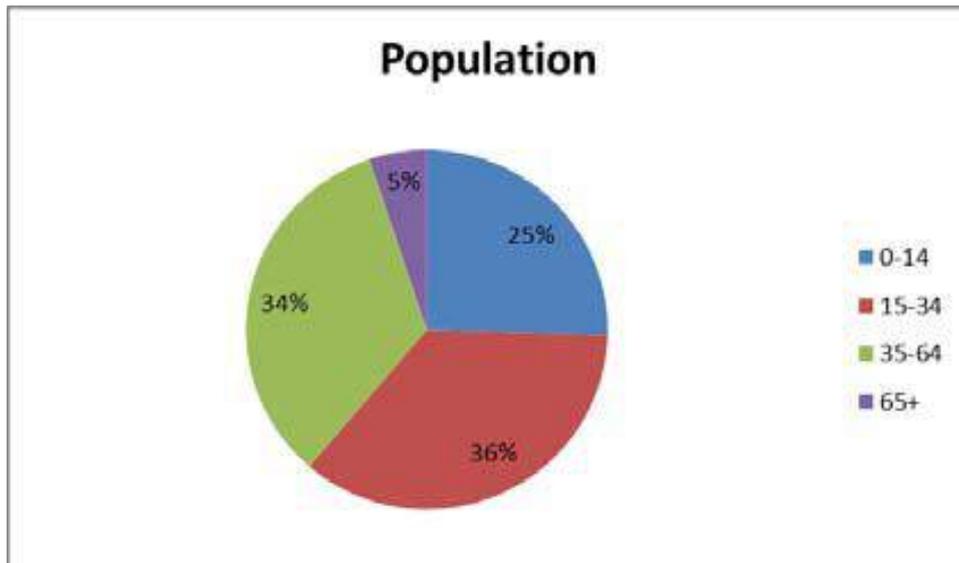


Figure 13: Population

### 10.3 Education

87 percent of the population in TLM have received some level of education. 45 percent of the population has received some form of higher education. This indicates that with a trend of a large section of the population being of working age, that there should be sufficient capacity within the local community to accommodate an increase in the tourism sector.

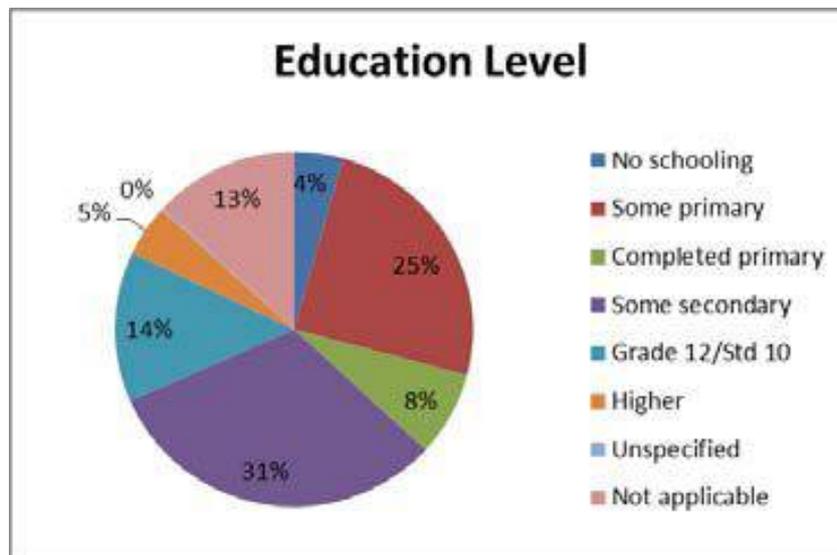


Figure 14: Education Level

## 10.4 Employment

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The unemployment rate in TLM is 28 percent. 43 percent of persons in MLM are employed while 17 percent are unemployed. 40 percent of the population is not economically active.

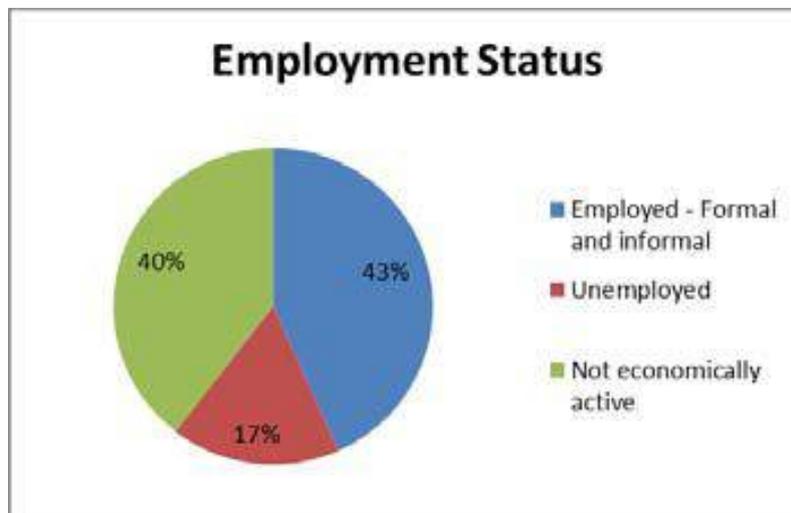


Figure 15: Employment Status

## 10.5 Monthly Personal Income

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Personal income is grouped into the following brackets:

- No income R0
- Low Income R1 - R3 200
- Middle Income R3 201 - R 25 600
- High Income R25 601+

The table below shows monthly income per person for 2011. 39 percent of the population earn no income at all. 34 percent of the population are low income earners while. Only 1 percent of the TLM population earn in the high income bracket.

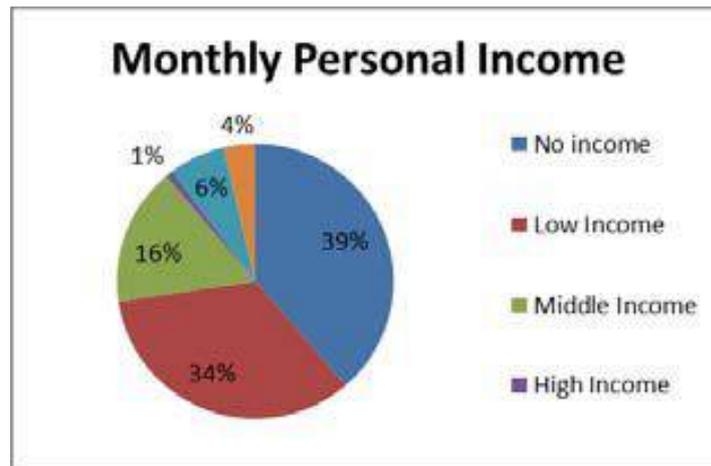


Figure 16: Monthly personal income

## 10.6 GVA

Gross Value Added (GVA) is defined as the total value of all the goods produced in a specific area during a specific period.

Quantec Research defines the major sectors into Primary Sector, which is extractive, Secondary Sector, made up of manufacturing and the Tertiary Sector, which comprises of services. The Figure 1 below shows the GVA per sector for 2011. This data is taken from Quantec Research and the variables are explained below.

Primary Sector:

- Agriculture, forestry and fishing; and
- Mining and Quarrying

Secondary Sector:

- Manufacturing. This includes food, beverages and tobacco; textiles, clothing and leather goods; wood, paper, publishing and printing; petroleum products, chemicals, rubber and plastic; other non-metal mineral products; metals, metal products, machinery and equipment; electrical machinery and apparatus; radio, TV, instruments, watches and clocks; transport equipment; and furniture and other manufacturing.
- Electricity, gas and water; and
- Construction

Tertiary Sector:

- Wholesale and retail trade, catering and accommodation. This sector represents the tourism sector through catering and accommodation and the sale of goods through trade.
- Transport, storage and communication;
- Finance, insurance, real estate and business services;
- Community, social and personal services; and
- General Government

In total, TLM contributed R 2727.34 million to GVA. General government contributed 30 percent to GVA of TLM indicating a dependence on the municipality of job creation. Agriculture contributed 21 percent to GVA while community and social services contributes 16 percent to GVA.

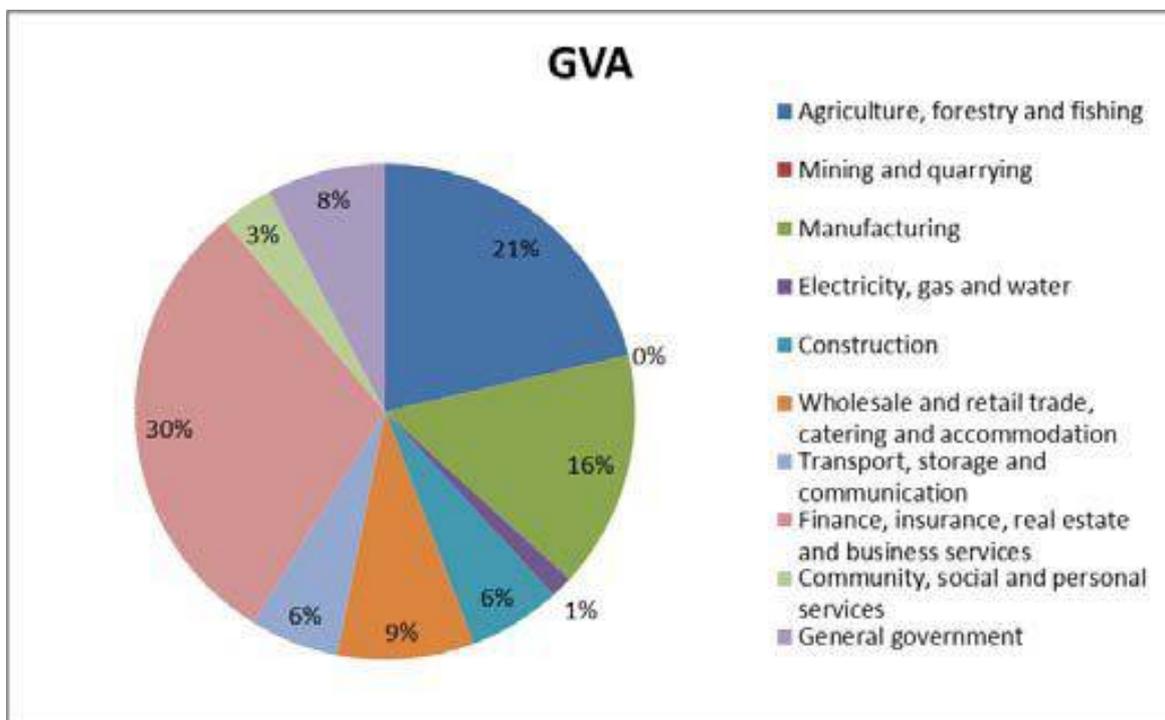


Figure 17: GVA

The economy of the region is mainly agriculture-based, with tourism at resort towns along the coast. Extensive vineyards and fruit orchards are grown under irrigation, fed by water from mountain streams and the Breede River as well as groundwater. Dryland wheat is cultivated between the Riversonderend and the coastal mountains, while livestock farming is practised throughout the region. Less than 1% of the national Gross Domestic Product originates from the Breede Area, however a large proportion of the water

available in the area is utilised within the Berg Water Management Area for economic gain. Because of a poor performance of the region's agricultural sector in recent times, no significant economic growth is foreseen over the short term (River Health Programme, 2011).

Its economic activity, as measured by Gross Regional Product, accounts for 41% of the broader District economy. Theewaterskloof Municipality can be categorised as a rural area with open spaces and farming activities as is clear from the land and areas occupied by agriculture, small holdings and other land uses (Theewaterskloof IDP, 2012).

## 11 LAND USE

Land-use consists of large expanses of dry land cultivation in the southern Overberg areas, where wheat is the main crop type. Intensive irrigation takes place along the Breede, Riviersonderend and Palmiet River catchments. Irrigated crop types include orchard crops, vineyards for wine and table grapes, citrus, as well as some cash crops and lucerne. Afforestation is confined to the high rainfall mountainous areas, almost entirely in the Palmiet and Upper Riviersonderend River catchments (River Health Programme, 2012).

In the figure below, it is possible to land satellite imagery of the area around the dam. It is clear that agriculture is the dominant land use. Along the north-western edge of the dam, land is conserved as part of Hottentot's Holland Nature Reserve and the Theewaterskloof Nature Conservancy.

Villiersdorp is to the north-east of the dam and the land use in the town is mainly residential.



Figure 18: Water Management Areas and Rivers

## 11.1 Developments

The main developments in the area around Theewaterskloof Dam include the high income residential developments of Theewaterskloof Country Estate (which is also a nine hole golf course) and Gloria Bay.

In addition, one of the issues facing the Villiersdorp area is lack of worker housing. Three housing priorities for Villiersdorp are discussed in the IDP. These include land acquisition of Destiny's farm for housing development, civils and top structures as part of 70 PHP TS as well as the 225 PHP TS (IDP, 2012). The municipality spent R5 million on the purchase of Destiny's farm for a housing development. This is still at the planning phase.

## 11.2 Agriculture, Forestry and Fisheries

Agricultural production generates 36,5% of the Theewaterskloof local economy, making both primary production and manufacturing agriculture, the predominant sector (Theewaterskloof IDP, 2012). The sector is well organised with various produce-based organisations. The fruit producers are organised in the Elgin-Grabouw- Villiersdorp-Vyeboom Farmers' Association with an office based in Grabouw.

In the last 10 years, the Theewaterskloof agricultural sector has out-performed the national agricultural sector growth despite the slump in the forestry, pome, grain and wine markets globally (Theewaterskloof IDP, 2012).

### **11.3 Manufacturing:**

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Both nationally and in Theewaterskloof, manufacturing has been in decline. Manufacturing in the area is largely agri-processing (90% of turnover). Beverages account for 41% of the manufacturing sector with well-known fruit juice brands and Appletiser located in the Grabouw-Elgin Valley and SAB's largest malt processing plant in the southern hemisphere located in Caledon. A further 37% of the area's manufacturing is classified as processed and canned fruit and vegetables. This sector, together with the fresh fruit industry, accounts for the bulk of the exports out of the area.

### **11.4 Mining**

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According to the Theewaterskloof IDP (2012), no unique mineral resource areas that exist within the Municipality have been identified. No mining activities take place in the area surrounding the dam.

### **11.5 Conservation**

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A large portion of the land use around Theewaterskloof dam is conservation. Using Google Earth Imagery (Google, 2013), it can be seen that the following nature reserves are found in the area:

- Hottentot's Holland Nature Reserve;
- Theewaterskloof Nature Reserve;
- Witdraai Private Nature Reserve;
- Jonkershoek Nature Reserve;
- Groenlandberg Nature Reserve; and
- Riviersonderend Nature Reserve.



Figure 19: Conservation areas

## 12 HERITAGE

### 12.1 Historic Overview

Early records of human life in the Breede-Overberg area indicate that it was first occupied by Stone Age people, ancestral San, who lived mainly along the coast where food and water were plentiful. Archaeologists believe that they may have been responsible for the intertidal fish traps built between 7 000 and 3 300 years ago, remnants of which can be found at Cape L'Agulhas. Rock paintings are also found in the Tradouw's Pass and in the De Hoop Reserve.

The Khoekhoe, who originated in the Zambezi Valley, migrated southwards into the area approximately 2 000 years ago. They were pastoralists and pottery-makers and introduced the first cattle and sheep to the area. They were also nomadic and moved regularly from place to place to make use of seasonally available grazing and other resources such as water. Three Khoekhoe tribes were known to occur in this area, the Chainouqua who lived east of the Hottentots Holland Mountains and south-west of the Riviersonderend River, the Hessequa between the Riviersonderend and Mossel Bay (River Health Programme, 2011).

After 1707, the Dutch in the Cape began to encourage the expansion of agriculture into the Breede and Overberg areas. This occurred mostly along the transport routes from the present day Sir Lowry's Pass, to Caledon, and along the Riviersonderend River to Swellendam.

## 13 TOURISM

### 13.1 Overview

According to the Theewaterskloof IDP (2010), there is also a growing tourism sector captured in the wholesale & retail trade, catering & accommodation sector, which contributed R 203,6 million or 13,9% of the local economy.

However, it appears that Theewaterskloof has not made enough of its biodiversity offerings. The absence of direct access to Kogelberg from the area is a key constrain. In addition, the dams in the municipality are underutilised attractions in the area. This is in part because of the limited public facilities available on each of the dams. As mentioned in Section 9.3.5, a wealth of bird species have been recorded in the area however despite this, birding opportunities in the area are also under-developed (Theewaterskloof IDP, 2012).

Villiersdorp also has a Tractor Museum which is a special interest attraction with a large number of vintage tractors (Theewaterskloof IDP, 2012).

The following tourist attractions are currently on offer ([www.villiersdorptourism.co.za](http://www.villiersdorptourism.co.za)):

- Tractor tours,
- Wine Tasting;
- Kroonland 4 x 4 adventure route;
- Hiking trails;
- Elliots Art Facility which offers premier art courses;
- The Dagbreek Museum which that dates back to 1845 and was declared a monument in 1994.
- Tractor museum at Kelkiewyn;
- The historical home, Oude Radyn, which is possibly the only building in the Cape to have Batavian wooden gutters and downpipes; and
- Water sports at Theewaterskloof Sports Club.

## 14 TRANSPORTATION AND ROADS

Theewaterskloof dam is located approximately 40km from the N2 highway which links Cape Town to Port Elizabeth. The dam is bisected by the R321 which links Villiersdorp to Cape Town. Other important roads include the R45 to Franschoek and R43 to Caledon. Information on transportation services is not provided in the Theewaterskloof IDP. Due to the short distance between the town and the dam (4.3km), dedicated transportation lines are unnecessary.

## 15 INFRASTRUCTURE

### 15.1.1 Villiersdorp Infrastructure

The majority of erven in Villiersdorp are connected to a waterborne sanitation system while the remaining households make use of septic tanks. The sewer system is in a fair condition, however, a phased replacement program has been initiated. In addition, Bergstan Consulting Engineers have been appointed to oversee the upgrade of the Villiersdorp WWTWs to comply with the special effluent quality standards as required by DWA (Theewaterskloof IDP, 2012). An upgrade of Goniwe Sports Facility is also prioritised by the IDP (2012).

### 15.1.2 Theewaterskloof Dam Infrastructure

Theewaterskloof Sports Club manages recreational infrastructure such as ablutions, picnic sites and accommodation at the dam. Additional ablution facilities were highlighted as important by the Western Province Bank Angling Association as well as some local community members. No other concerns regarding infrastructure were raised.

## 16 OBJECTIVES IDENTIFIED TO DATE

Strategic objectives are short, medium or longterm goals that are informed by the vision. These goals are vital in that they allow the vision to be achieved in a real and practical manner. Objectives basically form a 'to do' list to achieve the vision, and prioritise these objectives according to what can be achieved within the annual Business Plan cycle. However, as discussed in Section 4.2, one of the main functions of the Research report is to provide a solid foundation to determine the feasibility of objectives in light of the local environment.

## 17 FEASIBILITY OF POTENTIAL OBJECTIVES

### 17.1 Objectives and Status Quo

In order to ensure that the Theewaterskloof RMP takes into account the needs and requirements of both local and affected community members, several methods of consultation were used to understand the varying objectives of Interested and Affected Parties (I&APs). In addition, although the prioritization of objectives must be achieved through open consultation with stakeholders, the feasibility of such objectives needs to be determined in light of the local environmental conditions.

The following objectives were identified through the stakeholder consultation process. These have now been prioritised (in blue) in light of the status quo conditions described in this research report. Where necessary, carrying capacity will be determined in the following section.

Proper policing and safety	
Objective	Status Quo
Safety officer with power	<ul style="list-style-type: none"> <li>Theewaterskloof sports club hires a safety officer for the dam.</li> <li>However this Safety officer does not have any specific authority and policing can sometimes be difficult.</li> </ul>
Formalised institutional agreements	<ul style="list-style-type: none"> <li>Theewaterskloof Sports Club has a caretaker agreement which mentions some aspects regarding access and safety. This agreement has yet to be signed by DWA.</li> <li>There is no specific gatekeeper agreement in place</li> </ul>
Wash Bay system with safety check	<ul style="list-style-type: none"> <li>The wash bay has been built however it is not in use at this point.</li> </ul>
Improved water quality	
Objective	Status Quo
Study to determine pollution points;	<ul style="list-style-type: none"> <li>The water quality in the dam is a concern however where this pollution is coming from is not known.</li> </ul>

Discussions between DWA, BOCMA, CCT and Theewaterskloof Mun regarding water quality;	<ul style="list-style-type: none"> <li>Water Quality monitoring is done by CCT.</li> </ul>
Sharing of information;	<ul style="list-style-type: none"> <li>Information on water quality issues is not necessarily available for all stakeholders.</li> </ul>
Rehabilitation of wetland;	<ul style="list-style-type: none"> <li>The wetland to the north of the dam has been slightly rehabilitated by the removal of invasive tree species. Discussions with working for water regarding wetland rehabilitation should be undertaken.</li> </ul>
Watershed services study	<ul style="list-style-type: none"> <li>A number of catchment level studies are available for the Breede-Overberg WMA However, these do not focus specifically on the origins of pollution.</li> </ul>
Management of fishing	
Objective	Status Quo
Proper institutional management.	<ul style="list-style-type: none"> <li>There is no specific institutional arrangements regarding fishing.</li> </ul>
Re-establishment of Theewaterskloof Steering committee including representatives from fishing;	<ul style="list-style-type: none"> <li>The current steering committee does not meet or provide input regarding management.</li> </ul>
Permit system for fishing in restricted area.	<ul style="list-style-type: none"> <li>The WCBA has an email from CapeNature regarding fishing in the restricted area however there is no specific permit system.</li> </ul>
Formalised education and skills programmes	
Objective	Status Quo
Formalised agreements regarding skills training;	<ul style="list-style-type: none"> <li>There is currently no formalised skills training project in place.</li> </ul>
Formalised agreements with sports and fishing clubs	<ul style="list-style-type: none"> <li>There is currently no formalised skills training project in place.</li> </ul>

regarding educational trips	
Equitable access	
Objective	Status Quo
Implementation of a local community access card for discounted prices for community members.	<ul style="list-style-type: none"> <li>• There is currently a reduced price for local community members.</li> </ul>
Information programmes to be implemented by steering committee to educate local community about the benefits of the dam.	<ul style="list-style-type: none"> <li>• Some educational and training programmes do occur however these are not formalised.</li> </ul>
Feasibility of subsidising local access to the dam to explored;	<ul style="list-style-type: none"> <li>• To be discussed in the Business Plan.</li> </ul>
Access for education programmes to be subsidized	<ul style="list-style-type: none"> <li>• To be discussed in the Business Plan.</li> </ul>
Management of development pressure	
Objective	Status Quo
Steering committee to play active role in EIA's and BAR and to act as a custodian for the dam	<ul style="list-style-type: none"> <li>• The development pressure in the area is mainly high income residential developments.</li> </ul>
Recreational use	
Objective	Status Quo
Creation of functioning steering committee including Cape Nature and all recreational user bodies;	<ul style="list-style-type: none"> <li>• The steering committee does exist however currently it is not active.</li> </ul>
Educational programmes to	<ul style="list-style-type: none"> <li>• There are no formalised education programmes in</li> </ul>

be formalised;	place.
All recreational user bodies to be affiliated to national bodies;	<ul style="list-style-type: none"> <li>• Currently the main recreational users are affiliated to national bodies.</li> </ul>
All recreational user bodies to form part of the Theewaterskloof Steering committee	<ul style="list-style-type: none"> <li>• The steering committee does exist however currently it is not active.</li> </ul>
Natural Resource Management	
Objective	Status Quo
Watershed services study.	<ul style="list-style-type: none"> <li>• The Breede-Overberg CMA is in place and has done a catchment management strategy.</li> </ul>
Wetland rehabilitation programme to be developed.	<ul style="list-style-type: none"> <li>• Alien invasive trees have been removed from the wetland. However no rehabilitation programme has been formalised.</li> </ul>
Fire management plan to be developed for state land including farmer and taking into account impacts of fire on erosion and siltation;	<ul style="list-style-type: none"> <li>• Caretaker agreements have been signed by the farmers on adjacent land however these have not yet been signed by DWA.</li> </ul>
Alien invasive plants (terrestrial and aquatic) to be managed through partnerships with Cape Nature and Working for Water.	<ul style="list-style-type: none"> <li>• There is no specific alien invasive management programme.</li> </ul>
Impact of the road to be determined.	<ul style="list-style-type: none"> <li>• The purpose and impact of the road should be determined and discussed with adjacent farmers.</li> </ul>
The use of wash bays to prevent spread of aquatic invasive plants.	<ul style="list-style-type: none"> <li>• The wash bay has been built however the institutional arrangements regarding the management need to be finalised.</li> </ul>
Water Allocation	

Objective	Status Quo
Assessment of water use to be undertaken to better understand pressures on water allocation;	<ul style="list-style-type: none"> <li>Currently there is great concern by agricultural users regarding water allocation.</li> </ul>
Water recycling and saving programmes to be developed in conjunction with agricultural sector to ensure maximum water saving	<ul style="list-style-type: none"> <li>There are no specific programmes in place to address this issue.</li> </ul>
Assessment of water use to be undertaken to better understand pressures on water allocation.	<ul style="list-style-type: none"> <li>There are no specific programmes in place to address this issue.</li> </ul>

## 17.2 Feasibility of Prioritised Objectives

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The following categories of objectives were discussed in the section above:

- Proper Policing and Safety;
- Improved Water Quality;
- Management of Fishing;
- Formalised education and skills training;
- Equitable Access;
- Recreational Use;
- Natural Resource Management; and
- Water Allocation management Management.

A number of sub-objectives within these categories can be categorised together. Based on the current status quo, objectives related to 1.) water quality, 2.) equitable access and education and 3.) institutional arrangements have been prioritised because of their importance in regards to managing the dam.

### 17.2.1 Water Quality

Currently, the burden of water purification falls to the CCT. In addition, there is little information on water pollution points. Due to Theewaterskloof dam's function as a source of drinking water, it is important to understand where pollution is coming from so that management plans can be put in place to improve the water quality.

### 17.2.2 Equitable Access and Education

The local community does have access to the dam at a discounted rate however it seems that many local community members cannot afford this rate daily or do not know of it. In addition, the Theewaterskloof Sports Club and WCBA both run community educational training however this has not been formalised in an agreement. .

### 17.2.3 Institutional Arrangements

Theewaterskloof Sports Club has a formalised caretaker agreement although no specific gatekeeper agreement exists. There is a steering committee however it is inactive and therefore does not provide support in regards to management decisions. The steering committee has to be re-organised to include all recreational users. In addition, permit systems for fishing in the restricted area also need to be formalised.

## **18 CONCLUSION**

This document serves to provide an overview of the status quo of Theewaterskloof Dam and the catchment around it. Following the overview it provides a list and feasibility analysis of the objectives outlined in the previous visioning stage. This provides the framework for the development of a Resource Management Plan as it provides an understanding of the state of the resource, the interaction between the resource and the surrounding environment and the people who use, manage and plan around it

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