



FINAL RESOURCE MANAGEMENT PLAN

VOËLVLEI DAM



water & sanitation

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- West Coast District Municipality; and
- Cape Nature.



Title and Approval Page

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Review:

Review Period	Month	Year				
Annual Review of Business Plans	August	2015	2016	2017	2018	2019
Five (5) Yearly review of RMP	August	2019				



Amendments Page

Date	Nature of Amendment	Amendment No.
6 May 2014	First Draft for DWS Review	1
29 June 2014	Draft RMP for PSC Review	2
8 September 2014	Draft RMP for Public Review	3
15 October 2014	Final RMP for PSC Review	4
31 October 2014	Final RMP for Public Review	5
14 March 2015	Final RMP	6



Executive Summary

According to the Guidelines for the Compilation of Resource Management Plans (2006), the main aim of Resource Management Plans 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”. A Resource Management Plan is thus a planning tool aimed at working within the requirements of existing policies, while taking into account the needs and interests of stakeholders.

A Resource Management Plan can also be described as a systematic process for the sustainable development and management of a water resource in the context of social, economic and environmental objectives. One of the main functions of the Resource Management Plan process is to implement an **Institutional Plan**. The focus on institutional arrangements is accompanied by a **Zonal Plan** together with a detailed **Strategic Plan**. In addition, a **Financial Plan** provides guidance on funding opportunities and how these should be used for the improved management of the Dam. Together these components provide a comprehensive guide on the “what?”; “why?”; “how?” and “who?” of the management of prioritised Government Waterworks.

Voëlvlei Dam was commissioned in 1952 and was the first large water supply scheme in the Berg River Catchment. It was constructed by impounding the natural Vogelvlei Lake near Gouda in the Drakenstein Local Municipality (DWAF 2004). The catchment of the Dam was 31 km² and additional water was obtained via a canal from the Klein Berg River (max 1.3 million cubic metres per day; DWAF 2004). In 1969, Cape Town’s increasing water demand resulted in the Dam wall being raised. More water was abstracted from the Klein Berg River (max. 1.7 million cubic metres per day). In addition, a new canal was constructed to divert water from the Vier-en-Twintig and Leeu Rivers (max. 2.9

million cubic metres per day) to the Dam (DWAF 2004).

The main purpose of the Dam is to supply water for domestic use to the West Coast District Municipality including Riebeek-Kasteel, Riebeek-Wes, Malmesbury, Darling, Moorreesburg and the City of Cape Town Metropolitan Municipality. The Dam also supplies water for irrigation purposes.

The main recreational clubs that make use of the Dam are the Vogelvlei Yacht Club, the Western Province Artificial Lure Angling Society, the Western Province Freshwater Angler's Association, the Tulbagh Angling Club, the Witzenberg Angling Club and the Cape Piscatorial Society.

The following recreational activities commonly take place at the Voëlvlei Dam:

- Bird-watching;
- Shoreline and Boat Fishing;
- Boardsailing/windsurfing;
- Swimming;
- Yachting; and
- Picnicking and sunbathing.

A number of events are held at the Dam including various angling competitions (for Bass and Carp) as well as a number of Regattas. Vogelvlei Yacht Club has also organised a triathlon at the Dam in recent years. The Stanford Bird Club have also visited the Dam for their bird fairs in the past.

There are various protected areas around the Voëlvlei Dam. These include the Voëlvlei Nature Conservancy and Waterval Nature Reserve. These reserves are home to the Geometric Tortoise which is critically endangered as well as a number of sensitive plant species including King Protea. The Dam also occurs in close proximity to Du Toits Kloof Mountain Range.



There are a number of cycling and hiking trails which are run in the area as well as adventure races such as Western Cape Adventure cycling race.

In compiling the Resource Management Plan for Voëlvlei Dam the following process was applied.

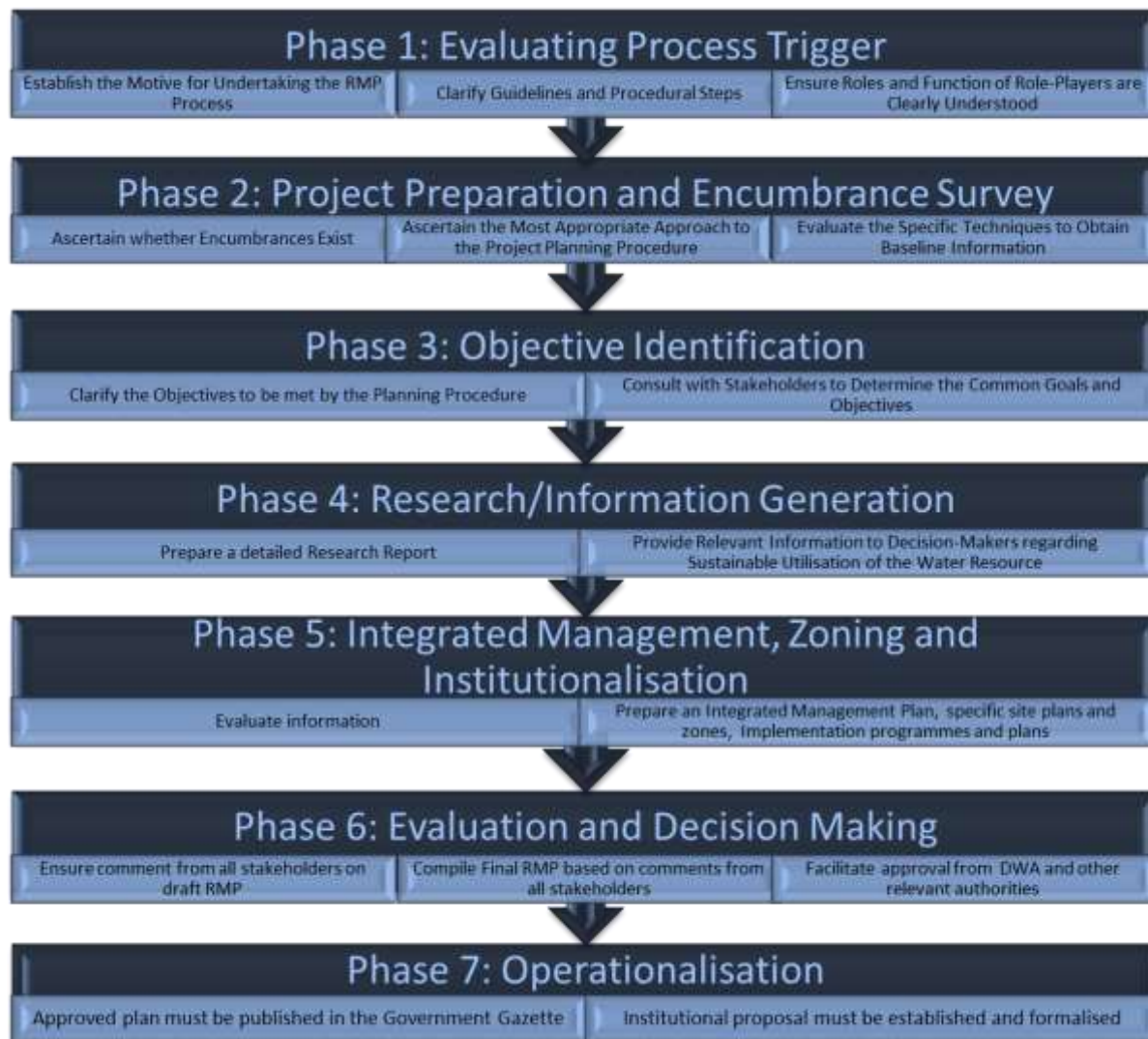


Figure 1: RMP Process (DWA, 2006)

It is important to note that the Resource Management Plan was compiled based on detailed stakeholder input and engagement. This formed the cornerstone of the Resource Management Plan through the establishment of a Vision for the Dam with a number of Key Objectives.

The key recommendations of the Voëlvlei Dam Resource Management Plan are as follows:

- Implementation of the Institutional Plan including the formation of a Dam Management Committee, Operations Management Committee and Resource Management Plan Steering Committee. As part of this Institutional Plan, it is vital that all agreements are updated to take into account the findings of the Resource Management Plan;



- Implementation of standardised and harmonised Aids to Navigation and Demarcation Markers and Unique Positioning Number System and the Wash Bay System at the Dam;
- Resolution of all land matters including putting in place new agreements;
- Public day visitors and fishing area to be created and the feasibility of a community access card to be assessed. Further, information brochures to be developed to inform communities about the potential uses of the Dam and how to join recreational clubs;
- Land matters to be resolved and new agreements with adjacent landowners to be drawn up;
- The potential for nature sensitive overnight facilities to be assessed. Dark sky principles should be incorporated into all development planning;
- Potential of creating an overall “Back to Basics” hiking trail which includes astronomy, Rock Art, plant and animal biodiversity. This could be linked to skills development and job creation initiatives in the area. . Dark sky principles should be incorporated into all development planning;
- Potential cycling trails to be assessed.
- Containment Plan for invasive fish species;
- Expansion of the Working for Water Programme to remove alien plant species in the area;
- Potential for commercial fishing or small scale fisheries programme to be assessed;
- Heritage assessment/study of the state of the Rock Art site and to determine methods of preservation;
- Wash bay system to be implemented to prevent alien invasive species infestations;
- Coordination between Yacht Club, local schools and South African Sailing to introduce youth sailing programme at the Dam.;
- The potential for School science education programmes including elements of botany, zoology, geology, meteorology, astronomy to be assessed; and
- Skills training programmes including life guard training, first aid training, astronomy, rock art, and biodiversity to be developed as part of eco-tourism development and community skills training.





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Acronyms

AGIS	Agriculture Geographic Information System
AtoN	Aids to Navigation
BMAA	β -N-methylamino-L-alanine
BP	Business Plan
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
CCA	Carrying Capacity Assessment
CCTMM	City of Cape Town Metropolitan Municipality
CITES	Convention on the International Trade in Endangered Species
CIWSP	Cooperative Inland Waterways Safety Programme
CMA	Catchment Management Agency
COGTA	Department of Cooperative Governance and Traditional Affairs
CPA	Cape Piscatorial Society
CPSI	Centre for Public Service Innovation
CWDM	Cape Wineland District Municipality
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEA	Department of Environmental Affairs
DLM	Drakenstein Local Municipality
DMC	Dam Management Committee
DoT	Department of Transport
DRDLA	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
ECC	Effective Carrying Capacity
EDCs	Endocrine Disrupting Compounds
ESA	Early Stone Age
GDP	Gross Domestic Product
GIS	Geographical Information System
GN	Government Notice
GVA	Gross Value Added
Ha	Hectares
I&APs	Interested and Affected Parties
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IBA	Important Bird Area



IDP	Integrated Development Plan
IWRM	Integrated Water Resource Management
LAAP	Local Accountable AtoN Parties
LED	Local Economic Development
LSA	Later Stone Age
mASL	Metres above Sea Level
MSA	Middle Stone Age
NEMA	The National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Amendment (Act 15 of 2009)
NSDP	National Spatial Development Perspective
NTU	Nephelometric Turbidity Units
NWRI	National Water Resources Infrastructure
NWRI: IEE	National Water Resources Infrastructure: Integrated Environmental Engineering
NWRI:SO	National Water Resources Infrastructure: Southern Operations
OMC	Operational Management Committee
PCC	Physical Carrying Capacity
PFMA	Public Finance Management Act (Act 29 of 1999)
POPs	Persistent Organic Pollutants
PPP	Public Private Partnership
PSDES	Provincial Spatial Economic Development Strategy
QDS	Quarter Degree Square
RCC	Real Carrying Capacity
RHIB	Rigid-Hulled Inflatable Boat
RMP	Resource Management Plan
RSC	RMP Steering Committee
RWU	Recreational Water Use
SAMSA	South African Maritime Safety Authority
SANBI	South African National Biodiversity Institute
SAPIA	South African Plant Invaders Atlas
SAPS	South African Police Service
SAS	South African Sailing
SASCOC	South African Sports Confederation and Olympic Committee
SDF	Spatial Development Framework
SoER	State of the Environment Report
SMME	Small, Medium and Micro Enterprises
SPC	Strategic Plan for Commercialisation
SRP	Soluble Reactive Phosphorus



SRSA	Department of Sports and Recreation
TAC	Tulbagh Angling Club
THETA	Tourism, Hospitality and Sports Education Training Authority
ToR	Terms of Reference
TR	Treasury Regulations
UPN	Unique Positioning Number (used in the CIWSP)
VYC	Vogelvlei Yacht Club
WAC	Witzenberg Angling Club
WCAD	Western Cape Adventure
WCDM	West Coast District Municipality
WCWSS	Western Cape Water Supply System
WCP	Western Cape Province
WIP	Weeds and Invasive Plants
WMA	Water Management Area
WPALAS	Western Province Artificial Lure Angling Society
WPFAA	Western Province Freshwater Angler's Association
WULA	Water Use License Application
WWTWs	Waste Water Treatment Works



1 WHAT IS A RMP AND WHY IS IT NECESSARY?

A RMP is a management tool which provides guidance on how recreational use at Government Waterworks, such as Dams, should be managed. RMPs focus on the current and future uses of the Dam, as well as requirements that must be met, to ensure the optimal, equitable and sustainable management of the Dam.

According to the Guidelines for the Compilation of RMPs (DWA, 2006), the main aim of the RMP 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”. A RMP is thus, a planning tool aimed at working within the requirements of existing Government Policy, while taking into account the needs and interests of stakeholders.

A RMP can also be explained as a systematic process for the sustainable development and management of a water resource in the context of social, economic and environmental objectives. In many ways, it shares similarities with Integrated Water Resource Management (IWRM). Hence, one of the main functions of the RMP process is to implement an **Institutional Plan** for the effective management of State Dams. The focus on institutional arrangements is accompanied by a **Zonal Plan** together with a detailed **Strategic Plan**. In addition, a **Financial Plan** provides guidance on funding requirements and funding options. Together these components provide a comprehensive guide on the “what?”; “why?”; “how?” and “who?” of the management of prioritised Government Waterworks.

The RMP lays the foundation required to consolidate objectives for the resource, within the framework of existing policy priorities. The RMP also informs decision-making which may have a direct impact on the resource. Further, the RMP creates a platform to unlock economic potential at the Dam without compromising environmental principles and recreational use of the Dam.

Recreational use includes activities which range from leisure, sport to culture and religion. Although recreational use is not consumptive, it is still a major water use and needs to be managed correctly to ensure increased personal, societal and economic benefits with minimal disturbances and environmental impacts.

RMPs are managed by the National Water Resources Infrastructure Branch (NWRI) of the Department of Water and Sanitation (DWS). This Branch is tasked with developing, operating and maintaining strategic water resource infrastructure in an efficient way to ensure that the needs of the Nation are met.

The RMP also provides a platform for coordination between different spheres of government that have official mandates regarding the management of the Dam. These Departments include:



Table 1: Government Departments and Agencies

DEPARTMENT	MANDATE
Department of Transport (DoT)	Responsible for legislation, policy and regulations for all transportation in South Africa, including shipping and other transport by water or sea, including inland waterways.
Department of Environmental Affairs (DEA)	Responsible for biodiversity management within the Dam including Invasive alien species.
Nature Conservation	In the case of Voëlvlei Dam, Cape Nature is responsible for managing the land south and east of the Dam as it falls within the Voëlvlei Nature Reserve.
Department of Water and Sanitation (DWS)	DWS is the official custodian of all surface water in South Africa. DWS is also responsible for the establishment, operation and maintenance of Government Waterworks (as per the National Water Act, 1998 (Act 36 of 1998). This includes management of Dam Safety and operation and management of Dams.
South African Maritime Safety Authority (SAMSA)	Administers and executes maritime related legislation and regulations.

Each Government Department has its own suite of Legislation to govern the use and management of the Dam. The RMP consolidates these roles and functions into a coherent management platform.

The RMP presents the twenty-year vision of the Dam which is distilled into 5 year goals and annual Business Plans (BPs). Hence, the RMP is a tool aimed at meeting the expectations of users without sacrificing the environment.





2 WHERE ARE WE NOW?

2.1 Overview of the Catchment

Voëlvlei Dam falls within the Berg River Catchment which is approximately 9 000 km² in size (the largest catchment in the Western Cape) (DWAF, 2007). The catchment also falls within the Berg Water Management Area (WMA).

Based on geographic and topographic characteristics, the catchment can be divided into three distinct areas, namely the broad, flat extensive western portion west of Moorreesburg and Koringberg, the river valley portion east of Koringberg to just south of Paarl, and the upper mountainous source area south of Paarl (DWAF, 2007). Major towns in the western portion include Saldanha, Vredenburg and Hopefield while key towns in the central river valley area include Piketberg, Porterville, Paarl and Wellington. Franschhoek is found at the base of the Franschhoek Mountains.

Much of the catchment area is flat, with an average topographical gradient between Paarl and the mouth of the Berg River at Laaiplek of 0.001. Topographically, a north-trending ridge of mountains (Piketberg, Swartberg) divides the catchment in two, with the Berg River flowing through a poort between Koringberg and De Hoek Mountains that reach in excess of 1 000 m elevation flank the north trending valley in the eastern part of the catchment, including the Groot Winterhoek Mountains, Kasteelberg, Perdeberg, Paarl Mountain and the Wemmershoek Mountains (DWAF, 2007). The topography of the 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).

The climate of the catchment differs extensively with the season. 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).

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.

2.1.1 Surface Water and River Systems

The Berg River is a naturally perennial system, which rises near Dwarsberg in the Franschhoek and Drakenstein mountains at an altitude of 1 500 m. It drains an area of approximately 8 980 km² (DWAF 2004), before passing into the Atlantic Ocean via the Berg River Estuary, near Veldrif, some 285 km away, on the West Coast (RHP, 2004) (DLM, 2009).

The major perennial tributaries of the Berg River include the Franschhoek, Wemmershoek, Dwars, Matjies, Klein Berg and Twenty-four Rivers/Leeu Rivers (DLM, 2009). The other important tributaries are the Wildeperdejag, Palmiet//Hugos, Krom/Spruit, Doring, van Wyks, Werda, Groot, Dal, Bot/Sand, Blousloot, Limiet/Kompagnjies, Koopmans and Kleinberg Rivers (DLM, 2009).

Total natural runoff from the Berg River Catchment amounts to 931 million m³/a, 45% of which is generated in quaternary catchments G10A, G10B and G10C (DWAF, 2007).

Three major dams have been built in the catchment (DLM, 2009). The Wemmershoek Dam south east of Paarl has a surface area of 3 km² and a storage capacity of 66 Mm³. The Berg River Dam in close proximity to the Wemmershoek Dam covers an area of 5 km² and has a storage capacity of 130 Mm³. The Voëlvlei Dam west of Tulbagh covers an area of 15 km² and has a storage capacity of 170 Mm³. Numerous smaller farm dams are found throughout the eastern part of the catchment. Despite all the dams, which have controlled natural flood regimes in the downstream catchment, the Berg River in the Drakenstein region has a very high energy potential and regularly overflows its banks. In certain areas the banks are eroded causing damage to farmlands (DLM, 2009).

The main transfer scheme in the catchment is the Riviersonderend/Berg River Government Water Supply Scheme which transfers water between the Upper Berg, Upper Riviersonderend (Theewaterskloof Dam) and Eerste River catchments through a series of tunnels. Water from this scheme is mainly used for urban supply as part



of the Western Cape Water Supply System (WCWSS) and for irrigation in the Berg River catchment. The net export from the Breede WMA is $161 \text{ Mm}^3\text{a}^{-1}$, while about $25 \text{ Mm}^3\text{a}^{-1}$ is diverted from the Upper Berg River into Theewaterskloof Dam. The tunnels transfer water as follows:

- Theewaterskloof Tunnel;
- Banhoek Tunnel;
- Wolwekloof Tunnel; and
- Jonkershoek Tunnel.

Another transfer in the catchment is the Upper Breede Inter-basin transfer (White Bridge Diversion) which involves the diversion of water from the Upper Breede River (Breede WMA) to the Klein Berg River Catchment (Berg WMA) via a canal, which diverts water immediately upstream of Gauge H1H006 in Michell's Pass. The water is mainly used for irrigation in the Wolseley and Tulbagh areas and the annual volume is estimated to be $18.5 \text{ Mm}^3\text{a}^{-1}$. A portion of this water is abstracted from the canal and used for local irrigation in the Breede River catchment, before the canal crosses the watershed into the Klein Berg catchment. This abstraction is estimated to be about $12.2 \text{ Mm}^3\text{a}^{-1}$ (DWAF, 2007).

In addition, Kleinberg Leeu River and Twenty Four Rivers diversion also occurs. The Twenty Four Rivers canal conveys water that has been diverted from both the Twenty Four Rivers and Leeu River catchments to Voëlvlei Dam. The Klein Berg River canal diverts water from the Klein Berg River, a short distance downstream of Gauge G1H008, to Voëlvlei Dam (DLM, 2009).

2.1.2 Land Use

The Berg River traverses both urbanised areas (24%) and areas developed for agricultural purposes (60%) (DWAF, 2007). Main land use within the catchment consists of agriculture, livestock farming, plantation forestry, commercial industries, fruit farming, residential areas and nature conservation (DWAF, 2007). The major industries are agriculturally based (grapes and deciduous fruits) and includes wineries, canneries and other food processing factories (DWAF, 2007). Grain farming is also a dominant land use in the Catchment.

2.1.3 Water Quality

De Villiers (2007) investigated the long term trends of the nutrient status of the Berg River and found that inorganic nitrogen and phosphorus levels increase downstream by a factor of more than 10, in response to anthropogenic inputs. Similarly, nutrient levels fluctuate seasonally by more than an order of magnitude, in response to input from diffuse and point sources of pollution. These changes of more than 1 000% far exceed the 15% maximum change stipulated by the South African water quality guidelines for aquatic ecosystems.

Further, total phosphorus levels indicate that hypertrophic conditions prevail at least episodically at all of the Berg River monitoring stations and most of the time at some of them. Additionally, river water phosphate levels show a dramatic increase over the past 20 years. There is also strong evidence that the trophic status of the Berg River is very sensitive to reduced river runoff and thus the construction of Dams such as the Berg River Dam can act to exacerbate the trophic status (De Villiers, 2007).

Evidence for increased NO_x levels during low runoff conditions suggests an increased number of point-sources of pollution. It is also suggested that overloading of water treatment plants during high runoff conditions or flooding of informal human settlements during winter storm events may result in nutrient enrichment during high runoff, related to these 'point sources'.

The two most likely anthropogenic sources of nutrients along the Berg River are agricultural runoff and effluent from overloaded municipal sewage works and un-serviced communities. Both sources are expected to peak in magnitude along the middle section of the Berg River, between Paarl and Hermon, the most heavily cultivated and most populated area along the river. This includes informal human settlements that have developed along the banks of the river.

Diffuse nutrient sources, such as agricultural runoff, produce seasonal concentration profiles coincident with river runoff, i.e. concentrations that peak during high runoff conditions. In contrast, point sources such as sewage effluent from municipal waste water treatment works (WWTW) generally



result in seasonal concentration profiles that have no relation to runoff, i.e. relatively constant input throughout the year, or an inverse relation to river runoff (De Villiers, 2007).

Further, according to the Western Cape Integrated Water Resource Management (IWRM) Action Plan (DEA&DP, 2011), the following water quality issues occur in the Berg WMA:

- A significant water quality problem in the Berg River catchment is salinization in the middle and lower reaches. This is caused by leaching from the natural geology, which extends from the north of Paarl to the Berg River mouth, consists of Malmesbury shale, as well as agricultural practices and the wash-off of salts from irrigated and dryland agricultural lands. The problem is exacerbated during the first winter rains, when accumulated salts are washed into the river resulting in elevated salinity in Misverstand Dam;
- A further concern in the Berg River is nutrient enrichment as a result of the discharge of treated sewage effluent from WWTWs, irrigation with winery effluent, and the discharge of some winery effluent that may not have been adequately pre-treated. Diffuse pollution which includes runoff from informal settlements, for example in the Klein Berg catchment (Tulbagh) impacts on the quality of water diverted into Voëlvlei Dam. This has led to increasing problems with nuisance algae in the middle and lower Berg River reaches and in Voëlvlei Dam. This has led to higher domestic water treatment costs;
- Concerns have been expressed about the microbial quality of rivers affected by treated wastewater effluent discharges and runoff from informal settlements. Rivers such as the Plankenberg and Eerste River near Stellenbosch, Stiebeul River near Franschhoek, and the Kuils River in Bellville are affected by poor quality effluents and runoff from informal settlements and high density settlements with poor sanitation services. Aging sewerage infrastructure and pump station breakdowns contribute to these problems. Some improvements in microbial water quality have in recent times been achieved in areas such as Stellenbosch and Paarl and Wellington due to interventions by the relevant Local Municipalities. Concerns have also been expressed about the management and impacts of many small package plants that fall outside local authorities such as on golf estates and wineries;
- Many of the urban river systems in the Berg WMA serve as conduits for treated effluent discharged to the sea. The Bellville, Scottsdene, Kraaifontein, Zandvliet, Stellenbosch, and Macassar WWTWs discharge treated effluent into the Kuils/Eerste River system. Borchards Quarry and Athlone WWTWs discharge into the Black/Salt River and the Potsdam WWTW discharges into the Diep River, which feeds into the ecologically sensitive Rietvlei wetland system. The Cape Flats WWTW discharges into the canal downstream of the Zeekoevlei outlet control weir. These rivers no longer display seasonal flow patterns, and some, notably the Black/Salt and Kuils Rivers have become severely modified. High residual nutrients can lead to eutrophication related problems such as nuisance algal growth and excessive growth of aquatic weeds. Other problems associated with urban rivers include leaking sewers, contaminated storm water runoff, litter, oil, and toxic spills. The constant and high base flows in these rivers also impact on the estuaries and many have lost their tidal variation;
- There are concerns about the accumulation of pesticide and herbicide residues in the surface waters, biota and sediments downstream of intensive irrigation areas. Concerns have also been expressed about the presence of Endocrine Disrupting Compounds (EDCs) in surface waters near intensive irrigation systems. Persistent Organic Pollutants (POPs) and EDCs are not monitored routinely in the Berg River WMA.
- Concerns have been expressed about the impacts of many piggeries in the WMA on the organic loads to rivers. Organic



compounds consume oxygen when they decompose in rivers thereby reducing the dissolved oxygen concentrations and negatively impacting aquatic organisms. Discharges not complying with Chemical Oxygen Demand standards and irrigated effluents high in organic content that are washed into rivers have similar impacts on aquatic ecosystems (DEA&DP, 2011).

2.1.4 The Social Environment

In 1997 2.5% of the National Gross Domestic Product (GDP) originated from the Berg WMA with the main drivers of local economy including:

- Agriculture;
- Trade;
- Manufacturing;
- Finance; and
- Government.

Agriculture is the only sector in which the economy of the Berg WMA is competitive in the South African interior. This is largely due to the Mediterranean climate. Most of the economic production is from the areas where irrigation is practised and where processing and packaging plants are located (DWA, 2004).

2.1.5 Tourism Potential

Drakenstein Local Municipality (DLM) has a rich array of attractions. Some of these attractions include a unique combination of natural scenery, biological diversity and dams. Some of the more significant attractions are:

- The mountain bike trail is a moderate ride which leads through the Forest & through savannah along the Voëlvlei Dam;
- There is a variety of birds to be seen on in the Reserve which range from Water, Forest, Savannah to Mountain and Fynbos Birds;
- Old Cape wagons and slave routes. Cultural experiences that accompany these i.e. home-stays & community tours with local guides, storytelling, Khoisan history, religious tourism and churches;

- The Limietberg Nature Reserve is nestled by the Du Toitskloof Mountains. This nature reserve offers superb outdoor opportunities like a day or multi-day trail, within a pristine natural environment.
- Paarl also offers endless outdoor entertainment such as Butterfly World, Die Vonds Snake Centre, Drakenstein Lion Park, Le Bonheur Crocodile Park, and Paarl Bird Sanctuary.

The proximity of the dam to Cape Town is significant in terms of tourism potential and harnessing the tourism market created by Cape Town could improve the economy of the region.

2.1.6 Catchment Management Agency

There is no Catchment Management Agency (CMA) in place for the catchment. The Regional Office of DWS is responsible for this function.

2.1.7 Safety of Navigation

In addition to its common law responsibility, DWS is, in terms of the requirements described in the National Water Act (Act 36 of 1998), amongst others, responsible for the safety of Government's waterways and watercourses, including its Dams. DWS, its delegated public sector partner, or a delegated water management institution, has therefore the responsibility to provide the required fixed and/or floating¹ Aids to Navigation (AtoN) for general navigation.

Furthermore, Local Accountable AtoN Parties (LAAP) and other Bodies (clubs, commercial enterprises etc.) which provide access to the Dam have a responsibility to ensure that the required fixed and/or floating AtoN are provided. These bodies are required to obtain the necessary support and permission from DWS and SAMSA.

¹ A marine Aid to Navigation (AtoN) is defined by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) as "A device or system external to vessels that is designed and operated to enhance the safe and efficient navigation of vessels and/or vessel traffic".



2.2 Purpose of Voëlvlei Dam

Voëlvlei Dam was commissioned in 1952 and was the first large water supply scheme in the Berg River catchment. It was constructed by impounding the natural Vogelvlei Lake near Gouda in the Drakenstein Local Municipality. The initial purpose of the Dam was to supply domestic water to towns such as Riebeeck-Kasteel, Riebeeck-Wes, Malmesbury, Darling, Moorreesburg and farms along the supply route (DWAF 2004). The Dam also supplied irrigation water.

In 1969 and 1971, the capacity of the Dam was increased so to provide domestic water to Cape

Town's. This increased capacity was achieved via the construction of an additional canal to divert water from the Vier-en-Twintig and Leeu rivers (DWAF 2004).

2.3 Overview of the Dam

The Voëlvlei Dam falls within the DLM in the Western Cape Province and the Cape Winelands District Municipality (CWDM) (Figure 2). The dam also falls within the Berg River Catchment in the Berg WMA.

Below is an overview of the catchment and the Dam.

Table 2: Overview of Voëlvlei Dam

Catchment Details	
Total Berg Catchment Area	7,715 km ²
Incremental Berg Mean Annual Runoff (MAR)	1056 million m ³ /a
Total Overberg Catchment Area	7186 km ²
Dam Characteristics	
Year of completion	1971
Purpose	Supply of water to nearby towns, farmers and Cape Town and irrigation
Nearest Town and Province	Gouda, Western Cape
Type	Off-channel dam
Net Storage capacity	170 million m ³
Wall height	10 m
Crest length	2905 m (north embankment) 1073 (south embankment)
Material content of Dam wall	Concrete
Type and length of spillway	No spillway
Capacity of spillway	
Surface area of Dam at full supply	15 km ²
Owner, designer and construction	Department of Water and Sanitation



Figure 2: Location of Voelvlei Dam

2.4 Legislative Framework

The RMP forms the overarching framework for the management of Voelvlei Dam. It is informed by relevant policy, legislation and planning documents administered by other Government Departments. Similarly, these Government Departments are required to use the RMP to inform the development of future policy, legislation and planning documents.

The Voelvlei Dam RMP was informed by the following policies, legislation, frameworks and strategies:

- Constitution of the Republic of South Africa, (Act 108 of 1996);
- National Water Act (Act 36 of 1998);
- Municipal Systems Act, 2000 (Act 32 of 2000);
- The Development Facilitation Act, 1995 (Act 67 of 1995);
- Communal Land Right Act, 2004 (Act 11 of 2004);
- Restitution of Land Rights Act, 1994 (Act 22 of 1994);
- Intergovernmental Relations Framework Act, (Act 13 of 2005);
- Disaster Management Act, 2002 (Act 57 of 2002);
- Water Services Act, 1997 (Act 108 of 1997);
- State Land Disposal Act, 1961 (Act 48 of 1961);
- Land Administration Act, 1995 (Act 2 of 1995);
- Environment Conservation Act (Act 73 of 1989);



- | | |
|--|--|
| <ul style="list-style-type: none"> ▪ National Environmental Management Act (Act 107 of 1998); ▪ National Environmental Management Air Quality Act (Act 39 of 2004); ▪ National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004); ▪ National Environmental Management: Protected Areas Act (Act 57 of 2003); ▪ National Environmental Management: Waste Act (Act 59 of 2008); ▪ National Veld and Forest Fire Act, (Act 101 of 1998); ▪ Minerals and Petroleum Resources Development Act (Act 28 of 2002); ▪ National Heritage Resources Act (Act 25 of 1999); ▪ Conservation of Agricultural Resources Act (Act 43 of 1983); ▪ Tourism Act (Act 72 of 1993); ▪ South African Maritime Safety Authority Act (Act 5 of 1998); ▪ National Sport and Recreation Act (Act 110 of 1998 as amended); ▪ Safety at Sports and Recreational Events Act (Act 2 of 2010); ▪ Game Theft Act (Act 105 of 1991); ▪ Fire Arms Control Act (Act 60 of 2000); ▪ Merchant Shipping (National Small Vessel Safety) Regulations, 2007 ▪ National Environmental Management Act EIA Regulations (2010); ▪ Nature and Environmental Conservation Ordinance, 1974 (No 19 of 1974); | <ul style="list-style-type: none"> ▪ South African National Biodiversity Institute (SANBI) Biodiversity GIS information; ▪ The Mountain Catchment Areas Act. 1970 (Act 63 of 1970); ▪ Western Cape Nature Conservation Laws Amendment Act, 2000(Act 3 of 2000); ▪ Cape Nature and Environmental Conservation Ordinance, 1974 (Act 19 of 1974); ▪ Land Use Planning Ordinance, 1985 (Act 15 of 1985); ▪ Western Cape Nature Conservation Board, 1998 (Act 15 of 1998); and ▪ Sport and Recreation SA Strategic Plan - 2011-2015. |
|--|--|

The Section below provides an overview of how the RMP has considered some of key policies, legislation and strategies.

2.4.1 National Water Act (Act 36 of 1998)

The Act aims 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.

Further, Section 113 of the Act makes provision for the recreational use of Dams. It further allows that the Minister may control or prohibit access to Dams and make reasonable charges for the a.) use of; b.) entrance into; and c.) use of any water surface or land associated with any Government Waterworks for recreational purposes.

The definition of water use in the Act includes the use of water for recreational use (Section 21k). Based on this requirement, the Department has published guidelines for recreational use of water and requires the following:

- DWS structures or infrastructure in and around water resources need to be constantly protected and maintained;
- Enforcement through mechanisms such as a Zonal Map, which is developed as part of the RMP process, is essential to resolve conflict amongst users both within the recreational water use; e.g. skiing vs. angling, or with other uses; e.g. agriculture;
- An appropriate degree of policing of irresponsible use should be maintained;
- Establishing water management institutions for the water resource users allows the institutions to charge for their activities therefore improving management and policing which instils a sense of ownership and responsibility among users; and
- Involving Public Private Partnerships (PPPs) could address commercial use but also assist with safety management at the Dam.

Once the RMP has been gazetted, the RMP will regulate access and use of the Dam. It is important to note that users will need to comply with other relevant legislation including the

Merchant Shipping (National Small Vessel Safety) Regulations, 2007, The National Water Act, 1998 (Act No 36 of 1998), SAMSA Marine Notices and its Directive on the Standardisation of fixed and floating AtoN and Demarcation Markers on all navigable Inland Waterways in the Republic of South Africa and the relevant provincial ordinances.

According to DWAF (2007) Internal Guideline: Generic Water Use Authorisation Application Process, the term Recreational Water Use (RWU) encompasses the uses of water, including the surface, for:

- The exclusive purpose of sport, tourism or leisure;
- Personal or commercial recreational water use; and
- Activities which contribute to the general health, well-being and skills development of individuals and society.

In addition, the only water use entitlement that currently applies to RWU is Schedule 1 of the Act. Currently the Act is silent on Commercial RWU (although the Strategic Plan for Commercialisation (2009) does deal with Commercial RWU) and thus it is necessary for the RMP to provide guidance this regard.

2.4.2 GN 654 of May 1964

The only Departmental Regulations limiting RWU at Government Waterworks is Government Notice R654, dated 1 May 1964.

These Regulations are read together with section 113 of the National Water Act (Act 36 of 1998) and only apply to the water surface and surrounding State Land of a State Dam, and not to other water resources.

The Regulations provide guidance on access control, use of firearms and other weapons, speed limits, parking areas, trading, reserved areas, fire management, hygiene, camping and accommodation, access to works, photography, safety rules, reckless and unseemly conduct, damage to property, prohibited areas,



protection of fauna and flora, swimming, angling, boat Regulations, water skiing and hydroplaning; and general rules.

2.4.3 Water Services Act (Act 108 of 1997)

The Act outlines the roles and responsibilities for the supply of water and sanitation to citizens. It also recognises the rights of all humans to basic water supply and sanitation services. The management of the Dam cannot compromise the purpose of the Dam especially if it is for domestic water supply.

2.4.4 National Environmental Management Act (Act 107 of 1998) as Amended

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 in South Africa.

Section 2 of the Act has the largest impact on the RMP in that future development and management of the Dam must ensure the following:

- The disturbance of ecosystems and loss of biological diversity both in and around the Dam must be avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- Pollution and degradation of the Dam is avoided, or, where it cannot be altogether avoided, is minimised and remedied;
- 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;
- 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;
- 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

- 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." **(National Environmental Management Act, 1998 (Act 107 of 1998))**

2.4.5 National Environmental Management: Protected Areas Amendment Act (Act 15 of 2009)

The National Environmental Management: Protected Areas Amendment Act (NEMPA) (Act 15 of 2009) ensures the protection and conservation of ecologically viable areas in the country. It further seeks to achieve co-operative environmental governance and to promote sustainable and equitable utilisation and community participation.

2.4.6 The National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004) provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities.



Chapter 4, Part 2 of the Biodiversity Act provides a listing of species as threatened or protected. If a species is listed as threatened, it must be further classified as critically endangered, endangered or vulnerable. The Act defines these classes as follows:

- **Critically endangered species:** any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered species:** any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- **Vulnerable species:** any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- **Protected species:** any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain restricted activities are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the Act are keeping, moving, having in possession, importing and exporting, and selling. The first list of threatened and protected species published under NEMBA was published in the government gazette on the 23rd of February 2007 along with the Regulations on Threatened or Protected Species. Many Dams around South Africa are likely to have threatened or protected species. The management of these species in line with NEMBA must be taken into account in the RMP and by managers at the Dam.

2.4.7 National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Lists, 2014 (GN 599 of 2014)

The Alien and Invasive Species Lists were promulgated on 1 August 2014. They provide certain prohibitions of use of Invasive alien species. This includes Catch and release of a specimen of a listed invasive fresh-water fish or listed invasive fresh-water invertebrate species. However certain exemptions apply depending on the area and species in question. The details are provided in Notice 3 of the Species List and include:

Species	Category/Area
Small-mouth bass	<ul style="list-style-type: none"> a. 1b in National Parks, Provincial Reserves, Mountain Catchment Areas and Forestry Reserves declared in terms of the Protected Areas Act. b. 2 for release into dams within discrete catchment systems in which it occurs c. 3 in all rivers, wetlands, natural lakes and estuaries in which it occurs. d. Subject to (b), each listed bass species is not listed for dams within discrete catchment systems in which it (the specific listed bass species) occurs.
Common carp	<ul style="list-style-type: none"> e. 1b in National Parks, Provincial Reserves, Mountain Catchment Areas and Forestry Reserves declared in terms of the Protected Areas Act. f. 2 for release into a dam within a discrete catchment system in which it occurs. g. 3 in all rivers, wetlands, natural lakes and estuaries in which it occurs. h. Subject to b, common carp is not listed for dams within discrete catchment systems in which it occurs.

Smallmouth Bass and Carp occur at the Dam which is adjacent to the Voëlvlei Nature Reserve and Waterval Nature Reserve. The Dam also adjacent to the Hawequas Mountain Catchment Area however and are thus seen as Category 2.

2.4.8 The National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations (GN 33683 of 19 July 2013)

The Alien and Invasive Species Regulations require the development and coordination of Species Management Programmes for all



Invasive Species listed in Category 1B. No fish species occurring at the Dam are currently listed as Category 1 B however should this be changed, a species management programme would be required.

These species management programmes must stipulate the following:

- The listed invasive species to which it relates;
- The measures to eradicate or control the listed invasive species;
- The areas in which the measures are to be applied; and
- The schemes to fund the measures, if applicable.

Species monitoring, control and eradication plans are also required and the Department will publish guidelines on the compilation of these documents within a year of the publication of the regulations.

The Regulations provide for a register of alien and listed invasive species to be compiled. In addition, all research on invasive species needs to be lodged. This has implications for the RMP as any small-scale fishery proposals or alien invasive management plans will need to be approved in line with these regulations.

2.4.9 The Municipal Systems Act (Act 32 of 2000)

The Municipal Systems Act (Act 32 of 2000) 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 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, planning and initiatives.

2.4.10 Conservation of Agricultural Resources Act (Act 43 of 1983)

The Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983) 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.

Given that much of the land surrounding the Dam is State Owned Land it needs to be managed in such a way that it reduces the threat and spreading of invasive alien species.

In addition, Invasive Alien Plants are known to use significant volumes of water in correlation to the plants biomass and thus affect the volume of water available for use.

2.4.11 Public Finance Management Act (PFMA) (Act 29 of 1999)

Section 76 of the Public Finance Management Act (PFMA) (Act 29 of 1999) provides for the making of Regulations for governing the efficient use and financial management of State Resources.

The object of the Act is to secure transparency, accountability and sound management of the revenue, expenditure, assets and liabilities of Government Departments.

The Act promotes the objective of good financial management in order to maximise service delivery. The Act allows DWS to enter into PPP agreements with the private sector for the commercial use of state assets.

2.4.12 Treasury Regulations of 15 March 2005

Section 16 of the Treasury Regulation provides guidance on PPP including the process that



needs to be followed, procurement and management of PPPs.

2.4.13 Safety at Sports and Recreational Events Act (Act 2 of 2010)

The purpose of the Safety at Sports and Recreational Events Act (Act 2 of 2010) is to provide measures to safeguard the physical wellbeing and safety of people at sports, recreational, religious, cultural or similar events held at stadiums, venues or along a route. It also provides for the accountability of event role-players. The Act also provides for Access Control Officers which can be appointed by the Event Organisers. These officers control access of both people and motor vehicles to an event and prevent a person from entering or requesting that a person leaves should the need arise. The act also allows for Peace Officers to be in charge of search and seizures at an event.

The Act also specifies that an Event Planning and Safety Committee must be set up for all events categorized as medium or high risk. This committee should include the following stakeholders:

- The National Commissioner or an authorised member;
- A local authority disaster management department or centre;
- A controlling body, in respect of high-risk events only;
- A stadium or venue owner;
- The event organiser; and
- An emergency service provider.

2.4.14 Merchant Shipping (National Small Vessel Safety) Regulations (GN.R 705 of 8 August 2007)

The National Small Vessel Safety Regulations, 2007 were promulgated under Section 356 of the Merchant Shipping Act (Act 57 of 1951) and provides a number of requirements including:

- Vessel Safety Requirements;
- Crewing; and

- Requirements for Water Skiing.

It also provides for the provision of an Enforcement Officer who can go aboard a vessel and search it and take possession of any intoxicating drugs or liquor. The Enforcement Officer may also request that the Identification Documents, Skipper's Licenses etc. be produced. The Officer may also direct the movement of the Small Vessel where necessary.

2.4.15 South African Maritime Safety Authority Act (Act 5 of 1998)

One of the South African Maritime Safety Authority's (SAMSA's) three legislative mandates is "to ensure safety of life and property at sea". The Act enables SAMSA to administer and execute the relevant maritime legislation.

2.4.16 The Mountain Catchment Areas Act (Act 63 of 1970)

The purpose of the Mountain Catchment Areas Act (Act 63 of 1970) is to provide for the conservation, use, management and control of land situated in mountain catchment areas. The Act empowers the DWS to declare a mountain catchment area and to define its boundaries by notice in the Gazette. Cape Nature's legal responsibility to conserve the natural resources in mountain catchment areas is challenged by two major phenomena - namely the spread of uncontrolled wild fires and the proliferation of invasive alien plants.

2.4.17 Nature and Environmental Conservation Ordinance (No 19 of 1974)

The aim of the Nature and Environmental Conservation Ordinance, 1974 was to consolidate and amend the laws relating to nature and environmental conservation including the establishment of the Department of Nature and Environmental Conservation, establishment of provincial and local nature reserves, protection of fish in inland waters, management of angling, management of noxious aquatic weeds and protection of wildlife and flora.



The NEMBA regulations as described in Section 2.4.7 and 2.4.8 above control management of alien invasive species in Dams however the Nature and Environmental Conservation Ordinance controls the management of indigenous fish species.

2.4.18 Land Use Planning Ordinance, (Act No 15 of 1985)

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

2.4.19 Western Cape Nature Conservation Board (Act 15 of 1998)

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

2.4.20 Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000)

The Act contains amendments to the Cape Nature Act, 1998 and the Nature Conservation Ordinance, 1974. 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 Cape Nature.

Further, it amends Cape Nature 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.

2.5 Existing Plans

An RMP cannot function in isolation and so all associated planning initiatives must be considered and used to inform the development of the RMP.

The following planning initiatives were taken into account in developing the RMP:

- The IDP of DLM and Cape Winelands District Municipality;
- The Water Services Development Plan of DLM;
- State of the Environment Report (SoER) for DLM;
- Air Quality Management Plan for DLM;
- Biodiversity Policy for DLM;
- Environmental Policy for DLM;
- Integrated Waste Management Plan for DLM;
- Integrated Transport Plan for DLM;
- Spatial Development Framework for DLM;
- Local Economic Development Strategy for DLM;
- Integrated Human Settlement Plan for DLM;
- Disaster Management Plan for DLM;
- The Strategic Framework of Water Services, 2003;
- The Provincial Spatial Economic Development Strategy, 2003;
- National Spatial Development Perspective, 2006; and
- The New Growth Path, 2012.

Figure 3 below provides an overview of how the RMPs is informed by existing plans at different spheres of government.



Figure 3: Relationship between RMP and Planning Initiatives

2.5.1. The Cooperative Inland Waterways Safety Programme (CIWSP)

The Cooperative Inland Waterways Safety Programme (CIWSP) project is a partnership between multiple government entities and between the government and the community. The aim is to enhance the development of a best practice model to ensure a safe and structured inland maritime environment and culture, whilst protecting the country's precious water resources.

Although Voëlvlei Dam is not one of the Pilot Dams for this project, this RMP integrates information from the CIWSP into the management objectives for this Dam.

2.6 Socio-Economic Environment

Voëlvlei Dam occurs in DLM, a Category B municipality which forms part of the larger CWDM.

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

2.6.1 Population

The DLM has a population of 251 262 people. The population of 15 – 34 age groups and the 35-64 age group account for 36 % and 33 % of the population respectively. This means that 69 % of the population are of working age (Figure 4).

Youth in total account for 35 % of the population indicating that youth are expected to contribute towards the households bearing more responsibility than what is normal. Only 5% of the population are over 65 years of age.

There are 59 774 households in the municipality, with an average household size of 3.9 persons per household. Almost 93.8 % of households have access to piped water either in their dwelling or in the yard. Only 0.6 % of



households do not have access to piped water and 95.0% of households have access to electricity for lighting.

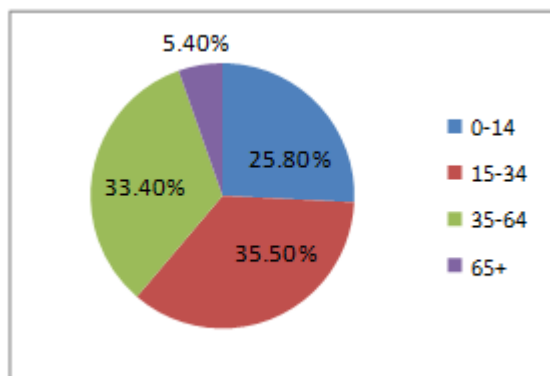


Figure 4: Population

2.6.2 Education

Of those aged 20 years and older, 6.5% have completed primary school, 37.7% have some secondary education, 27.9% have completed matric and 11.9% have some form of higher education. Approximately 3.3% of those aged 20 years and older have no form of schooling (Figure 5).

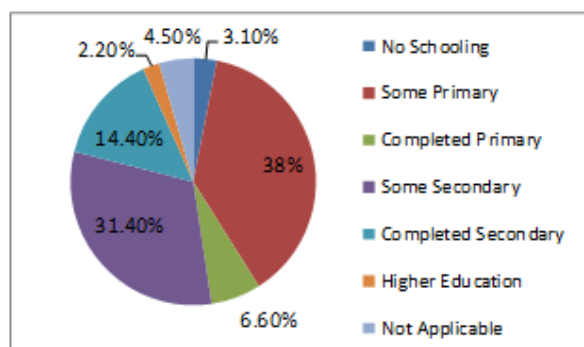


Figure 5: Education Level

2.6.3 Employment

There are 106 030 economically active people in the municipality, and of these 17.6% are unemployed (Figure 6).

Of the 50 279 economically active youth (aged 15 – 34) in the municipality, 24.6% are unemployed.

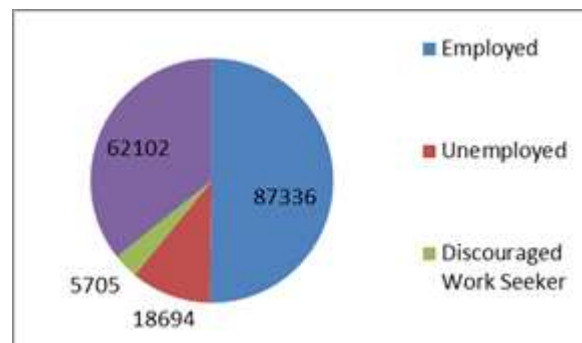


Figure 6: Employment Status

2.6.4 Average Household Income

Table 3 below shows the average household income. 13% of households earn no income at all.

Table 3: Average Household Income for DLM (Census 2011)

Income	Percentage
No income	13%
R1 - R4,800	1,7%
R4,801 - R9,600	3,1%
R9,601 - R19,600	10,7%
R19,601 - R38,200	17,2%
R38,201 - R76,4000	18,4%
R76,401 - R153,800	13,9%
R153,801 - R307,600	11%
R307,601 - R614,400	7,4%
R614,001 - R1,228,800	2,5%
R1,228,801 - R2,457,600	0,7%
R2,457,601+	0,4%

2.6.5 Gross Value Added

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 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;
- 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

The figure below shows that the greatest contribution is from Finance, Insurance, Real Estate and Business Services (R2 591 million) and Manufacturing (R2 144 million).

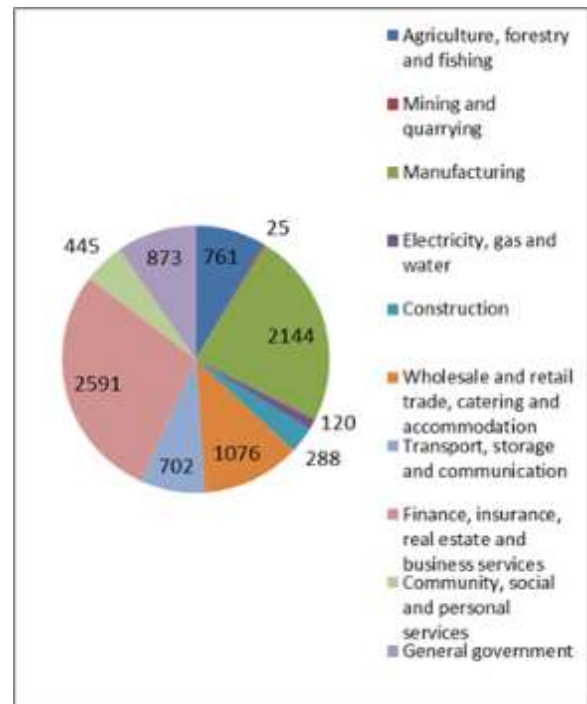


Figure 7: GVA for DLM in R million at 2005 constant prices

2.7 Development Potential

DLM has adopted a Marketing Strategy which focuses mainly on the two main centres in the region, Paarl and Wellington taking into account the natural and cultural features offered in the area. There is a wealth of potential especially in terms of tourism and eco-developments. This includes:

- Paarl has huge natural assets in being nestled between two mountains with a very distinctive river running through it yet there is no activity that utilises this resource other than small private initiatives. The municipality has created tourist friendly embankments, a pedestrian bridge to link the arboretum and redeveloped the weir. The opportunity therefore lends itself to stimulate development opportunities with iconic presence that could service present and future needs. Paarl supports natural and healthy lifestyle options and therefore developments in the area



- need to offer an example of sustainable utilisation/development of local resources whilst maintaining the fabric of natural beauty associated with the area;
- The Drakenstein Mountains form the eastern boundary of the municipal area and in addition to its visual importance to tourism it also provides thoroughfares to the Boland and Witzenberg hinterlands and hosts numerous recreational activities such as camping, hiking, etc.;
 - The Paarl Mountains feature three enormous granite domes (namely Paarl Rock, Bretagne and Gordon Rock). The name Paarl was derived from these domes and is an important historic and cultural point of reference for Drakenstein. These domes are also a unique feature as tourism attraction, in particular for the Afrikaans speaking communities as it hosts the Taal Monument;
 - The area has the Limietberg Nature Reserve and hiking trails, Paarl Wild Flower Reserve and Paarl Bird Sanctuary;
 - Although spatially separated, DLM encapsulates a wide diversity of cultures, religion and historical backgrounds that are economically and socially all intertwined. There are historic Homesteads; Church Buildings and Museums. Examples of these include The Vergenoegd Homestead in Paarl Farm Champagne and Twist Niet Homestead near Wellington, the Wellington blockhouses are located on the road to Hermon and were introduced by Lord Kitchener during Anglo-Boer War to protect bridges and strategic points. Ikhwezi Community Centre was originally an old slave house and located on Vlakkeland farm to the north of Dal Josafat;
 - Paarl is an integral part of the wine industry in the Western Cape with most farms located on the outskirts of the town around Paarl Rock, south of N1 and between Wellington and Paarl. Some farms have table grapes as an enterprise, while others focus on wine grapes;
 - Fruit farms also occur especially in Wellington and surrounding areas. In particular, Wellington is the centre of South Africa's dried fruit industry. Other fruit produced in Drakenstein include plums, olives, citrus and proteas.
 - There are a number of routes of outstanding scenic quality in Drakenstein and these include the following: 1.) Bain's Kloof linking Drakenstein with Ceres and the hinterland 2.) Du Toits Kloof Pass linking Drakenstein with Worcester and the Breede Valley, 3.) The R44 linking with Stellenbosch and other wine routes, 4.) The R 45 that becomes Paarl Main Road and links with its historic core 5.) The R 301 that links Paarl with Wellington and the Bain's Kloof Pass 6.) The N1 that links Drakenstein with Cape Town and the Worcester via the Du Toit's Kloof Tunnel, and 7.) The Pass linking Gouda and Tulbagh.
- Further, the development potential of Voëlvlei Dam and the surrounding area is relatively high especially in terms of tourism and water sport activities.
- Voëlvlei Dam is popular with water sport enthusiasts. It is the home of the Vogelvlei Yacht Club (VYC). Fishing is also very popular especially fishing for carp and catfish. The Parrot's Den is a historical pub, one of the oldest in South Africa, and is located at the Gouda Hotel. The area has unique biodiversity, the Voëlvlei Nature Reserve and Waterval Nature Reserve are adjacent to Voëlvlei Dam which has a wealth of bird species.



There is the potential to make the Voëlvlei Dam a regular competition destination for water sports in the Western Cape. This can be done through new and continued partnerships with South African Sailing (SAS) and other SASCOC accredited bodies.

More accommodation around the reserve (including camping facilities) is needed to increase this reserves income potential and attract more visitors (DLM, 2012).

2.8 Access and Infrastructure

There is no formal public access area at Voëlvlei Dam. Day visitors contact the Water Control Officer at the Dam for access to the fishing area which is across the Dam wall. However for safety and security reasons, the whole Dam is fenced so without prior arrangement there is no way to access the Dam.

Current recreational use at the Dam is through membership at the VYC or one of the angling clubs. The Western Province Artificial Lure Angling Society (WPALAS) has a recreational club with facilities for camping. However a number of angling clubs access the Dam just for shoreline fishing. There are no information programmes in place to ensure local community members are aware of the clubs. There are also no community training programmes aimed at increasing community use.

The main infrastructure at the Dam includes:

- The WCDM Water Treatment Works and intake tower;
- The CCTMM Water Treatment Works and intake tower;
- Housing and offices for DWS, CCTMM and WCDM;
- VYC club house and camping facilities;
- WPALAS facilities including accommodation; and
- Two Dam walls.

2.9 Biophysical Environment

2.9.1 Water Quality

The water quality at Voëlvlei Dam has been monitored by DWS since 1969. However sampling has not occurred since 2011. The average values during the period between 1969 and 2011 are provided in Table 4.

It should also be noted that both CCTMM and WCDM undertake water quality monitoring at the Dam as part of their water treatment process.

In general, poor quality effluent discharged from the Tulbagh WWTW, winery effluent discharged into the Klein Berg River, and pollution from informal settlements contributes to the poor water quality in the river and therefore at the Dam. The extent of the direct discharge from the wineries into the river is not well established but may have a considerable cumulative effect. Similarly, the impact on water quality of the return flows arising from over-irrigation (with winery effluent) in close proximity to the river, is also of concern. The Tulbagh WWTW is designed for domestic effluent, however traces of fruit waste are common. Vandalism and pipe blockages in the reticulation system cause spills from manholes into the stormwater system. In addition, the water quality problem in the Klein Berg River is exacerbated at the start of winter due to diffuse pollution being washed into the river from adjacent informal settlements. As a result it is desirable that the runoff from the first winter rains is not diverted into Voëlvlei Dam (DWAF, 2004).

Turbidity is also an issue at the Dam and may be due to a number of issues including the proliferation of the illegally introduced alien sharptooth catfish (*Clarias gariepinus*). Carp are known to increase turbidity as they are bottom feeders and stir up the sediment.

Further, during stakeholder consultation both CCTMM and WCDM raised concerns regarding decreasing water quality in the Dam. This may be partly due to water issues in the Tulbagh catchment as the Tulbagh WWTWs discharges



treated wastewater (0.2 million cubic metres per annum) into a tributary of the Klein Berg (River Health Programme, 2004).

Table 4: Water Quality at Voëlvlei Dam

Variable	Average (1976-2013)
Calcium (Ca)	3.71
Chloride (Cl)	20.19
Dimethyl sulphide (DMS)	63.93
Electrical Conductivity (EC)	11.72
Fluoride (F)	0.12
Potassium (K)	1.02
KJEL_N_Tot_Water	0.38
Magnesium (Mg)	2.94
Sodium (Na)	11.51
Amonia (NH ₄ _N)	0.05
Nitrates (NO ₃ _NO ₂)	0.07
Phosphorous (P)	0.32
pH	7.21
Phosphates (PO ₄ _P)	0.17
Silicon (Si)	0.79
Sulphates (SO ₄)	6.41
Total Alkalinity (TAL)	14.64

The Maucha Diagram below shows that the sodium and chlorine levels in the water are relatively high.

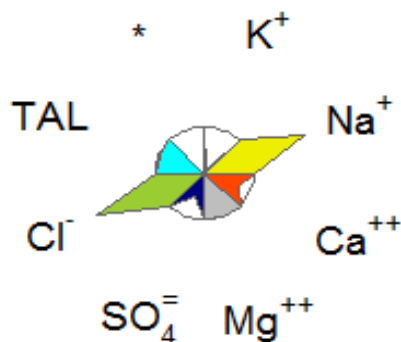


Figure 8: Maucha Diagram

In addition, main water quality issues in the Berg WMA include the following (Western Cape Government, 2011):

- Natural geology, notably in areas of Shale;

- Discharge of effluent that does not comply with the required standards from many WWTWs in the province;
- Return flows from intensive irrigation practices; and
- Runoff from dense urban settlements and areas with inadequate sanitation services.

A significant water quality problem in the Berg River catchment is salinization in the middle and lower reaches (DEA&DP, 2011.). This is caused by leaching from the natural geology, as well as agricultural practices and the wash-off of salts from irrigated and dryland agricultural lands. However, this problem is exacerbated during the first winter rains, when accumulated salts are washed into the rivers resulting in elevated salinity. In the past, DWS operational policy was such that the water after the first winter rains was not transferred into the Dam however due to water constraints this policy was stopped and thus this water (with high salinity) is transferred into the Dam.

The Tulbagh WWTWs discharges directly into the Klein Berg River and thus may also impact water quality at the Dam. Run off from chicken farms, wineries, informal settlements and WWTWs etc. may also negatively impact water quality.

It was also noted during consultation that algal blooms occur in the Dam during the summer months. Research by the University of Stellenbosch (Kamish, ND) indicated that nutrient loading played a role in algal blooms. This was further impacted by strong winds (which are common at the Dam) which cause re-suspension of bottom sediments in shallow reservoirs. CCTMM has found that phosphorus content of the sediments at the Dam is high which also leads to algal blooms.

As an additional issue, cyanobacteria are capable of producing a number of toxins including β -N-methylamino-L-alanine (BMAA). Studies by Esterhuzien-Londt (2010) shows that evaluated BMAA which is produced in most cyanobacterial blooms found that there are also potential



negative impacts on human health as very low BMAA concentrations are required to yield neurological damage and even motor neuron death. However, the extent of the risk to humans from direct exposure of free BMAA in these waters remains unknown (Esterhuizen-Londt, 2010).

Fortunately, Esterhuizen-Londt (2010) found that in the absence of dissolved organic carbon in the water, BMAA is efficiently removed by sand filtration, chlorination by calcium hypochlorite, and powdered activated carbon during water treatment.

In addition, BMAA was detected as both free and protein-associated fractions in *Clarias gariepinus* (Catfish), and *Crocodylus niloticus* (Crocodile) liver samples. BMAA content increased from the fish to the crocodile. BMAA content in the crocodile samples increased with age and thus bioaccumulation does appear to occur. Catfish is consumed occasionally by humans as recreational and competitive angling takes place at the dam.

2.9.2 Aquatic Invasive Plant Species

Another key biophysical encumbrance is the presence of aquatic invasive species. Currently 14 alien aquatic and wetland plant species are declared weeds or invader plants in South Africa and their control is subject to the Conservation of Agricultural Resources Act (CARA), Act 43 of 1983, and amended in 2001. Another 13 species have been proposed for listing under CARA and the National Environmental Management Biodiversity Act (NEMBA), Act 10 of 2004. There are also a number of indigenous or cosmopolitan (world-wide) species that can flourish and become troublesome in disturbed aquatic habitats.

No aquatic invasive plant species were noted as a problem during the stakeholder consultation however according to the Agricultural Geographic Information System (AGIS) Weeds and Invasive Plants (WIP) Database, there are three known aquatic invasive species in the 3319AC Quarter Degree Square (QDS) around the Dam. These include:

- *Arundo donax* ;
- *Eichhornia crassipes*; and
- *Myriophyllum aquaticum*.

Water Hyacinth is known to cause major ecological and socio-economic impacts. According to Villamagna and Murphy (2010), these impacts include:

- Altering of water clarity and decrease in phytoplankton production, dissolved oxygen, nitrogen, phosphorous, heavy metals and concentrations of other contaminants;
- Decreasing abundance and diversity of aquatic invertebrates through decreased phytoplankton (food) availability;
- Decreased dissolved oxygen concentrations and decreased phytoplankton negatively impact fish species.
- Increasing of sedimentation rates within the plant's complex root structure; and
- Increased evapotranspiration rates from water hyacinth leaves when compared to evaporation rates from open water.



Figure 9: *Eichhornia crassipes* (SAPIA, 2010)

Myriophyllum aquaticum is a spirally leafed, aquatic plant capable of forming dense infestations in waterways with pale green, finely divided, feather-like leaves arranged in whorls. Tiny, solitary, inconspicuous cream flowers forming in the axils of the leaves from May-September. It invades still or slow-moving water on the banks of rivers, lakes and ponds. The



species is known to be a problem in the Western Cape.

The species forms dense rooted mats which disrupt recreational activities, threaten aquatic ecosystems and irrigation schemes. Dense mats clog waterways, reduce water flow and block irrigation equipment. The mats provide ideal breeding conditions for mosquitoes and bilharzia-carrying snails



Figure 10: *Myriophyllum aquaticum*
(www.invasives.org.za)

Further, invasive aquatic plants are known to disrupt navigation, fishing and other recreational activities, adversely affect waterflow, increase the loss of water from storage dams and pose a threat to hydro-electric installations. High densities of the plants degrade aquatic ecosystems and are a threat to biodiversity. They can also result in the deaths of cattle and livestock, walking on 'beds' of aquatic weeds often results in drowning.

2.9.3 Terrestrial Invasive Plant Species

Invasive alien plants are widely regarded as the single greatest threat to South Africa's biological diversity. The water taken up by alien plants affects not only the water supply, but can also have negative impacts on water quality.

A large number of alien species occur in the 3319AC QDS surrounds the Dam. These include the following.

- *Acacia baileyana*;
- *Acacia elata*;

- *Acacia longifolia*;
- *Acacia mearnsii*;
- *Acacia melanoxylon*;
- *Acacia podalyriifolia*;
- *Acacia pycnantha*;
- *Acacia saligna*;
- *Anredera cordifolia*;
- *Bauhinia variegata*;
- *Callistemon viminalis*;
- *Echium plantagineum*;
- *Echium plantagineum/vulgare*;
- *Eucalyptus camaldulensis*;
- *Eucalyptus cladocalyx*;
- *Eucalyptus diversicolor*;
- *Eucalyptus sp.*;
- *Ficus carica*;
- *Hakea sericea*;
- *Hypericum perforatum*;
- *Lantana camara*;
- *Melia azedarach*;
- *Nicotiana glauca*;
- *Opuntia ficus-indica*;
- *Pennisetum setaceum*;
- *Pinus canariensis*;
- *Pinus halepensis*;
- *Pinus pinaster*;
- *Pinus pinea*;
- *Pinus radiata*;
- *Pinus sp.*;
- *Populus X canescens*;
- *Populus deltoids*;
- *Prunus armeniaca*;
- *Prunus persica*;
- *Pyracantha angustifolia*;
- *Quercus robur*;
- *Rapistrum rugosum*;
- *Ricinus communis*;
- *Rubus fruticosus*;
- *Rubus sp.*;
- *Salix babylonica*;
- *Sesbania punicea*;
- *Spartium junceum*; and
- *Vitis sp.*

This has potential negative implications for the management of the Dam as terrestrial invasive plant species are known to result:

- Loss of indigenous species as a result of competition for space and resources with alien species;



- Disruption of aquatic and riparian ecosystems;
- Erosion of river banks and riparian areas;
- Alterations in environmental flows as a result of water use by invasive alien plants; and
- An increased fire risk, which destroys indigenous habitats.

2.9.4 Sensitive Vegetation

The Western Cape Province has 13 489 recorded plant taxa (species, subspecies and varieties). This constitutes more than 56% of the 24 008 taxa recorded for the whole of South Africa. A large number of plant taxa, 6 776, are endemic to the province. In addition, the high species diversity at a provincial level, the vegetation along the shoreline comprises Renosterveld, a highly threatened vegetation type, which includes numerous endangered plant species. Less than 3% of renosterveld remains (River Health Programme 2004).

2.9.5 Fauna

2.9.5.1 Fresh Water Fish

Voëlvlei Dam, from its establishment until around 2005, was one of the prime smallmouth bass Dams in South Africa. The Dam mainly contained bass, but also other alien species such as some rainbow trout (*Oncorhynchus mykiss*), bluegill (*Lepomis macrochirus*) and very large carp (*Cyprinus carpio*). The Dam used to contain small numbers of Endangered Berg-Breede whitefish (*Barbus andrewi*), which never became abundant due to bass predation in the Dam. Rivers which feed the dam contain Endangered Berg River redfin (*Pseudobarbus burgii*), Cape kurper (*Sandelia capensis*) and Cape Galaxias (*Galaxias zebratus*) in river areas which lack alien fish. The last 15 years has seen the proliferation of the illegally introduced alien sharptooth catfish (*Clarias gariepinus*), and collapse of bass numbers, which has also resulted in carp numbers exploding, and contributing to water quality problems. Recent

fish surveys show that alien Mozambique tilapia (*Oreochromis mossambicus*) is also now present in the Dam. Large numbers of carp and catfish present subsistence fishing opportunities to poor communities using legal angling methods, and harvesting of these problem fishes should be encouraged.

2.9.5.2 Amphibians

Using the Frogmap Atlas (www.vmus.adu.org.za) which is run by the Avian Demography Unit (ADU, 2013), three species were found in the 3319AC Quarter Degree Square (QDS) which surrounds the Dam.

Table 5: Frog species occurring in QDS 3319AC around Voëlvlei Dam (ADU, 2013)

Genus	Species	Common name	Red list category
Breviceps	gibbosus	Cape Rain Frog	Vulnerable
Vandijkophrynus	angusticeps	Sand Toad	Least Concern
Amietia	fuscigula	Cape River Frog	Least Concern
Arthroleptella	bicolor	Bainskloof Moss Frog	Least Concern
Cacosternum	boettgeri	Common Caco	Least Concern
Cacosternum	capense	Cape Caco	Vulnerable
Strongylopus	bonaespei	Banded Stream Frog	Least Concern
Strongylopus	grayii	Clicking Stream Frog	Least Concern
Tomopterna	delalandii	Cape Sand Frog	Least Concern

2.9.5.3 Reptiles

Thirty-four reptile species are recorded in the 3319AC QDS according the Reptile Map Atlas run by the Avian Demography Unit (ADU, 2013). The majority of these species are listed as Least Concern.

Table 6: Reptile species occurring in QDS 3319ACDA around Voëlvlei Dam (ADU, 2013)

Genus	Species	Comon Name
Agama	hispidia	Spiny Ground Agama



Genus	Species	Comon Name
Homoroselaps	lacteus	Spotted Harlequin Snake
Bradypodion	gutturale	Little Karoo Dwarf Chameleon
Amplorhinus	multimaculatus	Many-spotted Snake
Prosymna	sundevallii	Sundevall's Shovel-snout
Psammophis	crucifer	Cross-marked Grass Snake
Psammophis	leightoni	Cape Sand Snake
Psammophis	notostictus	Karoo Sand Snake
Psammophylax	rhombeatus	Spotted Grass Snake
Pseudaspis	cana	Mole Snake
Cordylus	cordylus	Cape Girdled Lizard
Cordylus	oelofseni	Oelofsen's Girdled Lizard
Karusasaurus	polyzonus	Karoo Girdled Lizard
Pseudocordylus	microlepidotus	Cape Crag Lizard
Naja	nigricincta	Black Spitting Cobra
Naja	nivea	Cape Cobra
Afrogecko	porphyreus	Marbled Leaf-toed Gecko
Goggia	hexapora	Cederberg Pygmy Gecko
Goggia	lineata	Striped Pygmy Gecko
Pachydactylus	formosus	Southern Rough Gecko
Pachydactylus	geitje	Ocellated Gecko
Tetradactylus	tetradactylus	Cape Long-tailed Seps
Pedioplanis	burchelli	Burchell's Sand Lizard
Pedioplanis	lineocellata	Common Sand Lizard
Tropidosaura	montana	Common Mountain Lizard
Trachylepis	capensis	Cape Skink
Trachylepis	homalocephala	Red-sided Skink
Trachylepis	variegata	Variegated Skink
Chersina	angulata	Angulate Tortoise
Homopus	areolatus	Parrot-beaked Tortoise
Psammobates	geometricus	Geometric Tortoise
Rhinotyphlops	lalandei	Delalande's Beaked Blind Snake
Bitis	arietans	Puff Adder

However, the Cape Sand Snake is listed as Vulnerable while the Geometric Tortoise is listed as Critically Endangered. This species is protected under the Nature Conservation

Ordinance of the Western Cape Province and Schedule I of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES). It is also listed as one of the top 25 most endangered tortoises and turtles in the world. One of the main conservation priorities of the Voëlvlei Nature Reserve is the conservation and protection of this species. According to Cape Nature the following conservation actions are required in the area:

- The establishment of additional statutory conservation areas; private landowners with geometric tortoise populations on their properties can establish conservation stewardship sites and conservancies;
- A Biodiversity Management Plan for this species must be developed; and
- Funding for further conservation actions and awareness programmes must be sourced.

The geometric tortoise occurs only in the low-lying renosterveld shrublands of the Swartland, Upper Breede River Valley and Ceres Valley, where wheat and wine farming, as well as urban development have led to the destruction of more than 90% of its habitat. The main threats to the species include:

- Urban and agricultural expansion (wheat, other crop farming and vineyards) threatens remaining habitats;
- Severe fragmentation of remaining habitat puts pressure on small and isolated populations;
- Invasive alien vegetation and animals, such as feral pigs, lead to further habitat degradation;
- Too frequent fires in small, isolated habitats will destroy these populations, however, the absence of fire may also negatively affect the



quality of these isolated habitat patches; and

- The poaching of specimens from the wild remains a significant potential threat.



Figure 11: Geometric Tortoise
(www.capenature.co.za)

2.9.5.4 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 Voëlvlei Dam, large mammal species are not expected. According to Mammal Map run by Avian Demography Unit (ADU, 2013), only Striped polecats (*Ictonyx striatus*) are found in the 3319AC QDS in which the Dam falls.

2.9.5.5 Avifauna

A list of recorded bird species was obtained using the Avian Demography Unit MyBirdPatch database (www.mybirdpatch.adu.org.za) which

includes data from the South African Bird Atlas. The list contains 221 bird species including:

- Sacred Ibis;
- Hawks;
- Lanner falcons;
- Kites;
- Sunbirds;
- Herons;
- African Hoopoes;
- Aquatic waders;
- Cormorants;
- Gulls;
- Kingfishers;
- Blue Cranes;
- Egret;
- Hamerkop; and
- Egyptian geese.

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). 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 WCP (Shaw, 2003) to such a degree that it is estimated that about 50% of the total population now occurs in the WCP (McCann, 2001) (Shaw and Waller, 2012).

2.10 Climatic Conditions

Average annual rainfall the Gouda/Hermon Farming Area decreases rapidly from moderate along the slopes of the mountains forming the eastern boundary to poor in the west. Rainfall is concentrated in the winter months, Summer temperatures are generally very high and there are also strong south-easterly winds in the area.

Voëlvlei Dam, itself is located to the north west of Voëlvlei Nature Reserve and Waterval Nature Reserve which includes the DuToitskloof Mountains. This mountain range channels winds across the Dam. This results strong winds



spraying water across the Dam wall and onto the R44. The wind also sprays across the WCDM WTWs which is located to the north west of the Dam. Lastly, the strong winds can create large waves on the Dam. The wind rose from Porterville (which is about 30-40km from the Dam) shows there are also strong northerly and southerly winds (Figure 12).

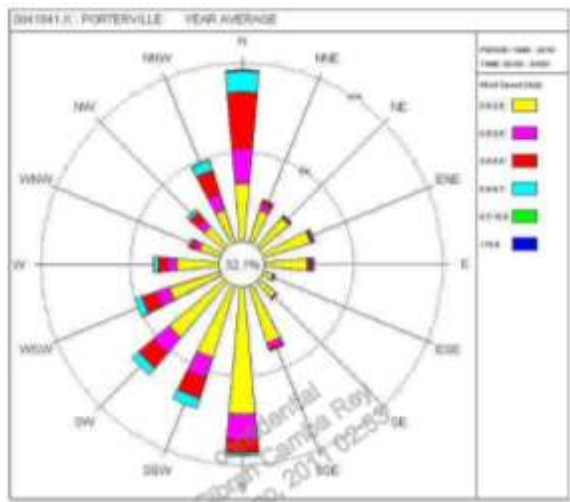


Figure 12: Porterville Wind Rose

The strong winds have also resulted in the region around Gouda being used as Wind Farms. For example, the Gouda Wind Facility which is located North of the town of Gouda, has a total capacity of 138MW.

2.11 Heritage

According to Orton (2012), the area around Gouda is underlain by deposits of the Malmesbury Group. According to Almond and Pether (2008) the Malmesbury Group is of low palaeontological significance with no fossils recorded as yet.

In terms of Pre-colonial Archaeology, only two archaeological research projects have been carried out in the nearby vicinity. One involved a survey of the Swartland area around Porterville (Hart 1984, 1987), while the second saw two small rock shelters being excavated near Voëlvlei Dam (Smith *et al.* 1991) with a view to exploring the relationship between hunter-gatherers and herders in the south-western Cape. A few impact assessments have also been conducted (Orton,

2008a, 2008b, 2010; Webley & Hart, 2010). These studies inform the following archaeological review and the following has been noted:

- The earliest period of pre-colonial archaeology present in the region is the Early Stone Age (ESA) which occurred until about 200 000 years ago. Artefacts pertaining to this period of prehistory are commonly encountered all along the western edge of the Cape Fold Belt Mountains. Most often they are associated with river terraces where the cobbles served as a source of stone material for making artefacts. Such artefacts have been recorded in the vicinity of the study area where Hart (1984, 1987) found ESA artefacts to be closely associated with rivers and focused on stony hills and ridges. Orton (2008b, 2010) found ESA artefacts scattered in farmland on the lower mountain slopes north of Saron as well as on the farm immediately east of the present study area. Most were likely in secondary context with some in the latter area associated with a large mound of alluvial gravel. Closer to the study area, Webley and Hart (2010) found no archaeology in an area to the southwest of Gouda, but in the town Orton (2008a) found a large number of ESA artefacts. These artefacts were suggested to be in primary context with many exposed by the excavation of the canal system in the area. As such they are of greater research value;
- After 200 000 years ago and extending up until some 40 000 to 20 000 years ago is the Middle Stone Age (MSA). Hart (1984, 1987) records the occurrence of MSA artefacts in similar contexts to ESA ones throughout his study area. No other reports of MSA artefacts are known in the vicinity;



- The Later Stone Age (LSA) extends from the end of the MSA until the arrival of European colonists some 350 years ago. By far the majority of archaeological sites found in South Africa pertain to the last 5000 years. The two small rock shelter excavations conducted by Smith et al. (1991) yielded material demonstrating that the area was certainly used by the San and the Khoekhoen. The latter only appeared in South Africa within the last 2000 years, although the exact time of arrival is still very much under debate. The Voëlvlei rock shelter had three radiocarbon dates conducted with the upper two being in the 15th and 16th centuries and the oldest one, from the base of the site, falling within the 2nd century AD. This last is claimed by the authors to be from a level predating the introduction of pottery to the site. The Driebos deposits were never dated but the finds suggest material of a similar age (Smith et al. 1991);
- The rock shelter excavations were conducted as part of Smith's wider interest in the origins of the herding economy in the Western Cape. He proposed that the Khoekhoen moved between winter pastures at the coast (specifically the Vredenburg Peninsula) to summer pastures inland (Smith 1983, 1984). The latter would have been on the Malmesbury shales where the nutritious Renosterveld vegetation grew. His cycle of transhumance passed through the Gouda area, following the course of the Great Berg River; and
- Rock art is present in the area with both the shelters documented by Smith et al. (1991) containing art. Furthermore, although this is subject to confirmation in the field, there is a rocky outcrop labelled on

maps as "Boesmanrots1" just east of the town and which may contain rock art. Mossop (1927) describes the rock but mentions no art. Several rock art sites are reported to occur in the region around Porterville (SA-Venues 2012) with the famous European galleon being a notable inclusion (Parkington 2003). It is reported that Thomas Bain discovered rock art sites in the vicinity of Nuwekloof when he was building the pass (Storror & Komnick 1984). The precise age of rock paintings is unknown but those with European content, such as the galleon, clearly indicate that the tradition of painting on the walls of rock shelters and boulders continued into the colonial period.

In terms of Colonial History, Gouda is most significant in heritage terms due to transport. Ross (2002) describes several early passes that existed between the Swartland and the Tulbagh Valley, which was originally known as "Roodezand". The first of these stemmed from the need to find the Khoekhoe people and their herds of domestic stock for trading purposes. An expedition in 1658 was sent out by Van Riebeeck. On this expedition a surveyor named Pieter Potter became the first European to see the Tulbagh Valley when he climbed a ridge some miles north of the Little Berg River and gained a view into the valley. He had previously tried to walk through the kloof but found the going too difficult along the river (Mossop 1927).

In 1699 Willem Adriaan van der Stel, then governor at the Cape, opened the Roodezand valley to farming, naming it "Land van Waveren" after a place in the Netherlands. In order to provide access to the valley a new pass some 4 km to the north of the kloof was made (Ross 2002). Mossop (1927) suggests this new pass to have been somewhere near the spot where Potter had ascended. Despite W.A. van der Stel's new name, the name "Roodezand" was still in common use for the Tulbagh valley and the pass became known as "Roodezand Pass". A rather poor pass, it had a very steep slope on its



eastern side, was narrow and in places thickly wooded. Ross (2002) notes Kolbe's statement in 1731 that for these reasons wagons were frequently taken apart and carried over the pass before being reassembled on the other side. The base of this pass lies near Gouda.

As a result of the difficulties associated with the Roodezand Pass, the local farmers tried to improve its quality but no satisfactory solution was forthcoming. They then turned their attention to the river valley and succeeded in creating a road along the northern side of the river that was not too steep. Since it afforded access to the Roodezand, it took on the name of Roodezand Kloof. To avoid confusion the old pass became known as Oude Roodezand Kloof and the new one Nieuwe Roodezand Kloof. The abbreviations Oudekloof and Nieuwekloof soon followed. By the 1760s Nieuwekloof had become the primary means of access to the Tulbagh valley (Ross 2002). A toll was levied as a contribution towards maintenance of the road and this resulted in some farmers still driving their cattle over the old pass to avoid the toll fee (Burchell 1822).

The remains of this pass were found to be still in existence by Burman (1963), although it was in a very poor state with low-lying sections washed away and others blocked by tumbled rocks. He also notes the scars of "remskoene"⁵ to be present in places on this pass.

With the renaming of Tulbagh, the pass changed names again, becoming "Tulbagh Kloof". The drifts that had to be crossed were problematic and in 1855 Thomas Bain examined the kloof recommending an alternative route on the south-western side of the river. This road was built between 1859 and 1860 and carried road traffic for more than a century thereafter. Bain was also asked to plan a railway through the kloof which he did in 1873 and 1874 (Ross 2002). The newly appointed railway engineer for the Cape Colony, William Brounger, oversaw the construction of this railway and its extension into the Karoo (Hart 1998). The section designed by Bain and Brounger was part of the Cape Town to Kimberley railway that was constructed in sections up until 1885. Although originally

intended to serve the Western Cape farming community, the railway was rapidly extended to Kimberley as a result of the diamond rush. The Nuwekloof section followed a very similar line to the road and was opened on 1st September 1875, while the final leg to Kimberley was opened prior to final completion on 28 November 1885 (Walker 2001). The modern road through the kloof was constructed in the 1960s and opened in 1968. The name "Nuwekloof Pass" was chosen for the new road (Ross 2002).

In addition, a multitude of canals and lei water furrows surround Gouda. The Voëlvlei Dam to the south of the town was built in 1952 and some of the canals and furrows post-date its construction. Others, however, are related to the earlier agricultural activities and many were present already on aerial photographs dating from 1938 (Orton 2008a). Although not structures in the usual sense, they are man-made, greater than 60 years of age and should be considered as protected heritage.

DLM has also started the De Poort Heritage Project in 2013 to preserve the common industrial worker heritage. The project aims to act as a catalyst to draw more visitors to the municipality, stimulating an economic multiplier effect and encourage preservation and transfer of heritage skills by training.

2.12 Current Institutional Arrangement

2.12.1 Official Institutional Structure

DWS is the official custodian and owner of the Voëlvlei Dam and based on Deeds of ownership, the land within the purchase boundary is owned by the Government. However, the specific department of the Government is not provided.

However, part of the State Land around the Dam (specifically to the south and east) is managed by Cape Nature as part of the Voëlvlei Nature Reserve. The exact conditions of the management of the State Land are not known.



In addition, both WCDM and CCTMM have infrastructure at the Dam which they manage. This is however only in relation to their mandate in terms of providing domestic water in the area and not in terms of recreational use.

According to the National Water Infrastructure Branch: Southern Operations (NWRI:SO), lease agreements are also in place with the Angling Clubs and Yacht Club.

VYC has a clubhouse and number of caravan sites and accommodation for members only. There are also some facilities at the WPALAS at the Dam.

2.12.2 Informal Institutional Structure

In the past, an informal structure known as the Voëlvlei Dam Management Committee was responsible for managing recreational use at the Dam. Historically this committee was chaired by the VYC and included members of all the recreational clubs and Government Departments at the Dam. However, the committee has not met in recent times.

2.12.3 Management of the Water Surface

Management of the surface water is done by DWS. However, the main access to the Dam is managed by VYC and the Angling Club.

Initial payment for the AtoN and demarcation markers (for general navigation) will be undertaken by DWS. However, the provision and maintenance of the demarcation markers at VYC and other organisations will be for the cost of the latter.

2.12.4 Access

Public access at the Dam is mainly informal as currently there is no formalised access area. Members of the public who wish to access the Dam, request access from the Water Control Officer who then opens the security gates near the Dam Wall. Most community members from Gouda where however unaware of this practice and thus there are many cases where the public illegally accesses the Dam by climbing fences.

Silwerfontein Guest House and Hiking Trail is adjacent to the Dam and privately owned. The owners of the property have a key to the Security Gate and thus have access to the Dam. There does not appear to be any access agreements in place managing this access.

2.12.5 Permits

A Freshwater Angling License is required from Cape Nature for freshwater angling in the Western Cape. No specific angling licenses are required for fishing at the Dam.

2.12.6 Safety

There is no overall safety system in place at the Dam. VYC has a rescue boat in place however the club is mostly empty during the week and thus there is no dedicated rescue point for recreational users. The VYC is also mainly focused on the safety of their members although they would help other recreational users if needed.

There are some demarcation markers at the VYC club however there is no standardized AtoN and Demarcation markers system in place.

There are also numerous obstacles at the Dam which are not demarcated. At the public meeting it was also noted that most recreational users did not know that the Dam was a security no-go zone.

The Dam has very strong winds which pick up very quickly and thus can be very unsafe especially for users that are not familiar with the Dam.

2.12.7 Overnight facilities

Overnight facilities at the Dam are located at VYC, WPALAS, and DWS.

Although on private land adjacent to the Dam, overnight facilities are also available at the Silwerfontein Guest House.



2.12.8 Event Management

Events are organized by the recreational clubs at the Dam however all events need approval from NWRI: SO.

2.13 Users and Uses of Voëlvlei Dam

2.13.1 Domestic Use

The primary purpose of Voëlvlei Dam is to provide domestic water to WCDM and CCT. There is a planned augmentation scheme to increase the capacity of the Dam. This would be done as two phases. The second phase would involve the raising of the Dam wall.

2.13.2 Irrigation

The Dam also provides some water for irrigation to farmers in the Lower Berg River. Water is released for irrigation up to the Estuary.

2.13.3 Recreational Use

The main recreational clubs that make use of the Dam are the VYC, WPALAS, WPFAA, TAC; WAC and the CPS.

The following recreational activities commonly take place at the Voëlvlei Dam:

- Bird-watching;
- Fishing from Shore;
- Boardsailing/windsurfing;
- Fishing from Boats;
- Swimming;
- Yachting; and
- Picnicking and sunbathing.

A number of events are held at the Dam including various angling competitions (for Bass and Carp) as well as a number of Regattas. VYC has also organised a triathlon at the Dam in recent years. The Stanford Bird Club has also visited the dam for their bird fairs in the past.

The Dam is located in close proximity to Du Toits Kloof Mountain Range. There are a number of cycling and hiking trails which are run in the area as well as adventure races such Western Cape Adventure (WCAD) cycling race.

2.13.4 Conservation

There are various protected areas around the Voëlvlei dam. These include the Voëlvlei Nature Reserve and Waterval Nature Reserve. Both these areas are of great conservation importance due to the presence of Geometric Tortoise in the area. The species is one the 25 most endangered tortoises and turtles at the Dam. These reserves are also home to a number of sensitive plant species including King Proteas.

2.14 Catchment Interactions

Based on the status quo of Voëlvlei Dam, it is clear that there are a number of factors that influence the ecological status, the use and management of the Dam.

- Land use in the catchment, especially agricultural use has impact on the water quality of the Dam. This is further impacted by WWTWs in the catchment which are sources of pollution;
- Conservation practices in the nearby Nature Reserves impact the accessibility of the Dam as well as fire management;
- The fish stocks at the Dam allow for varied competitive and recreational angling; and
- Strong winds provide excellent sailing conditions although also provide potential for safety issues due to the strong winds causing water from the Dam to be sprayed across the R44. The winds are also potential hazards for uninformed recreational users who are not prepared for these dangerous winds.

It is important to understand how the Dam is influenced by these factors so that management of the Dam through the RMP are taken into account.





3 WHERE DO WE WANT TO BE?

3.1 Vision

A visioning exercise was carried out with a combination of stakeholder input from public meetings, authorities meetings, one on one stakeholder meetings and community focus group meetings.

The vision for Voëlvlei Dam is a long-term, 20-year goal that is achieved through a series of objectives. While the vision is constant for a 20 year period, RMPs are updated every five years. This allows the objectives to be re-visited taking into account progress towards achieving the vision.

This vision for Voëlvlei dam is highlighted through the unpacking of the needs, interests, requirements and uses of the dam.

Stakeholders were keen on maintaining the sense of place, the pristine environment and important biodiversity and heritage resources of the area. The need for improved access and safe community use of the Dam was also noted. Clear roles and responsibilities and institutional arrangements are also key as all other objectives require a management system in place. Nature sensitive activities and eco-tourism were also highlighted especially in terms of skills development and improving employment levels in the area.

The vision statement that encompasses this is:

"To ensure sustainable use of our pristine resource by all without altering the tranquil and serene surroundings and sense of place"





3.2 Objectives

The vision was distilled into a number of key objectives which are listed below. Key actions required to ensure that these objectives are met are also provided. More detail on these actions is provided in Section 4.5. (The Strategic Plan).

Improved and Equitable Access for the Surrounding Community

- Public day visitors and fishing area to be created;
- Feasibility of a community access card to be assessed; and
- Information brochures to be developed to inform communities about the potential uses of the Dam and how to join recreational clubs and societies.

Swift Resolution of Land Matters and Unauthorised Activities

- Land matters to be resolved and new agreements with adjacent landowners to be drawn up

Improved Management and Safety

- Formalised institutional structure to be implemented. Detailed discussions with all relevant local municipalities, district municipalities and provincial departments to be undertaken to ensure adequate capacity is in place;
- Updated agreements taking into account RMP;
- Institutional Structure detailed in the RMP to be implemented;
- Zonal plan to take into account different recreational activities;
- Unique Positioning Number (UPN) System to be implemented including a formalised Rescue Operation Point;
- Standardised AtoN and demarcation system to be implemented; and
- Lifeguard skills training and first aid training to ensure safe public use of the Dam.

Development of Increased Eco-tourism and Recreational Opportunities

- The potential for nature sensitive overnight facilities to be assessed. Dark sky principles should be incorporated into all development planning;
- Potential of creating an overall “Back to Basics” hiking trail which includes astronomy, Rock Art, plant and animal biodiversity. This could be linked to skills development and job creation initiatives in the area. . Dark sky principles should be incorporated into all development planning; and
- Potential cycling trails to be assessed.

Improved Resource Management

- Water Quality Monitoring Programme to be undertaken together with an assessment of the main pollution sources;
- Landuse management study to assess land use practices in the catchment and their impact on water quality and availability at the Dam. This should include aspects related to invasive plant and farming practices etc.;
- Shoreline Management Plan to be compiled and implemented;
- Education Programmes regarding the impacts of alien invasive species;
- Fish Management Plan for carp and catfish to be compiled and implemented. The aim of this plan would be to sustainably reduce the numbers of these species so to improve angling of other species at the Dam;
- Discussions with BVLM to ensure that adequate capacity occurs in the
- Potential for commercial fishing or small scale fisheries programme to be assessed;
- Heritage assessment/study of the state of the Rock Art site and to determine methods of preservation;
- Siltation prevention measures to be assessed and put in place;



- Expansion of the Working for Water Programme to remove alien plant species in the area; and
- Wash bay system to be implemented to prevent alien invasive species infestations.

Education and Skills Development

- Coordination between clubs, local schools and SAS to introduce youth sailing programme at the Dam.;
- The potential for School science education programmes including elements of botany, zoology, geology, meteorology, astronomy to be assessed; and
- Skills training programmes including life guard training, first aid training, astronomy, rock art, and biodiversity to be developed as part of eco-tourism development and community skills training.



4 HOW DO WE GET THERE?

4.1 How does the RMP Work?

The overarching framework for the Voëlvlei Dam RMP is presented in Figure 13 below. It highlights the consultative nature of the RMP process where stakeholder meetings, public meetings and authority meetings were used to identify the Vision and Objectives for the Dam. The Vision and Objective forms the central tenet around which the RMP is based. The RMP is further broken down into 4 main Plans namely, the Institutional Plan, Financial Plan, Strategic Plan and Zonal Plan.

Each of the major areas of the RMP will be presented in detail further in this chapter. Briefly: The **Institutional Plan** provides a framework for the institutional arrangements at the Dam. In this case a three-tiered management system is proposed. This three-tiered approach includes a RMP Steering Committee (RSC), Operations Management Committee (OMC) and Dam Management Committee (DMC). Further, it should be noted that DWS reserves the right to appoint an Implementing Agent (IA) at the Dam. This IA would then form part of the institutional structure.

The RSC includes representatives of National Government Departments and fulfils a monitoring and high level guidance function to ensure that all functions of the DMC and OMC are being undertaken.

The OMC will be formed at an Operations or Cluster Level and is a current reporting line within DWS. The DMC will include authorised access point representatives and those who have

an official mandate at the Dam. All three committees are chaired by a DWS official.

The Institutional Plan discusses requirements for agreements, development targets (in relation to community development of water sports) and information on the affiliations required. The detailed Institutional Plan is provided in the **Chapter 4.2**.

The **Financial Plan** provides information on how money generated through recreational use should be used, by whom and for what. It also provides guidelines on the financial reporting required. Further, the information from the Financial Plan is used to inform the Business Plan. The detailed Financial Plan is provided in **Chapter 4.3**.

The **Zonal Plan** has three main components:

- Shoreline Management Zones;
- Water Surface Management Zones; and
- Activities allowed in each zone.

The activities are presented in Table 5 and provide information on activities that are not allowed within a zone together with preferred or potential activities. The detailed Zonal Plan is provided in **Chapter 4.4**.

In terms of the **Strategic Plan**, the vision for the Dam was distilled into a number of objectives. These objectives are further distilled into actions required in order to achieve the Vision. This information was used to inform the BP for each objective. The detailed Strategic Plan is provided in **Chapter 4.5**.

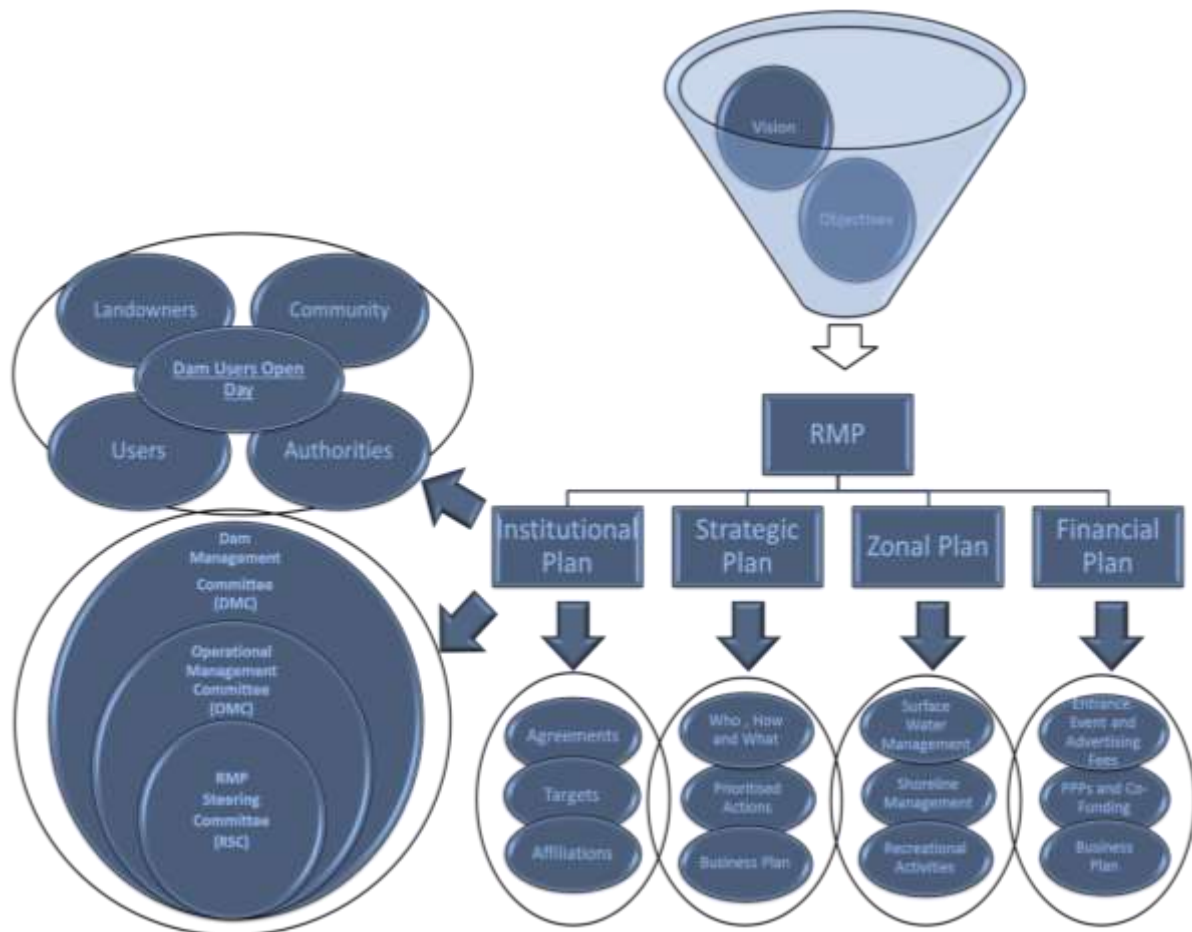


Figure 13: RMP Framework



4.2 Institutional Plan

The Institutional Plan is the backbone of the RMP as it identifies the management system which is required to ensure the objectives of the RMP are met. The Institutional Plan consists of three sets of tools which will be used to manage the Dam so that the Vision can be met.

The first toolset involves three separate but interlined committees all Chaired by the DWS because DWS is the custodian of all surface water in South Africa. The membership of each committee and their roles and responsibilities is provided in Section 4.2.1., 4.2.2. and 4.2.3. below.

The second toolset involves an open communication forum which allows all stakeholders to be involved in the management of the Dam. The purpose of this forum is to share

information and allow stakeholders to raise concerns and ideas regarding the management of the Dam. It also provides a platform for dealing with issues and challenges faced by users.

The third toolset includes a number of management tools including agreements, affiliations and targets.

Figure 14 below provides a visual representation of how these toolsets function together.

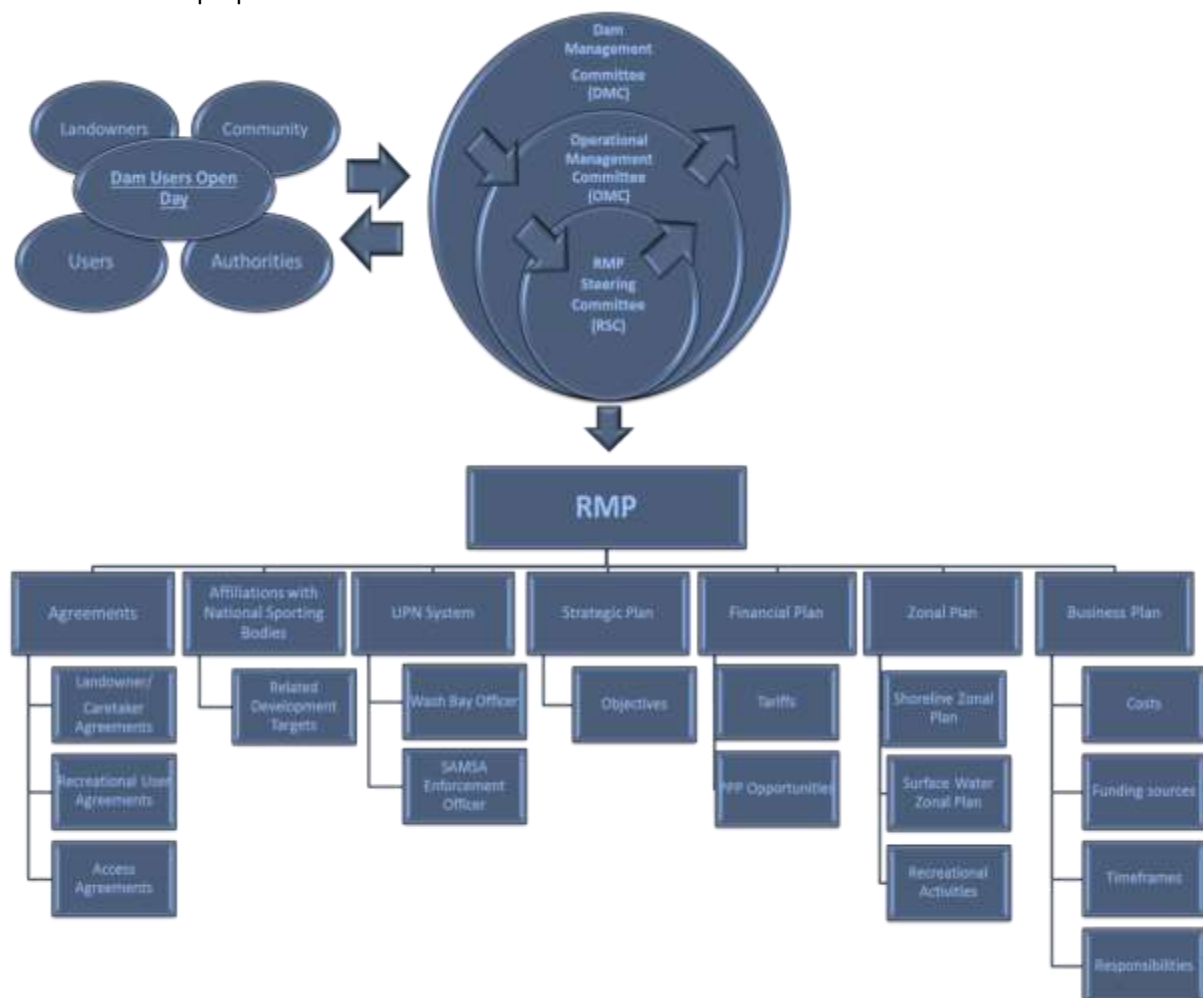




Figure 14: Institutional Framework

4.2.1 RMP Steering Committee (RSC)

The RSC is made up of representatives from National Government/Agencies. The main focus of this meeting is to ensure both the DMC and OMC are performing all necessary functions. The committee will also provide high level guidance. The RSC allows for a formal reporting structure between the Chief Director: Operations and the National Water Infrastructure Branch: Integrated Environmental Engineering (NWRIB:IEE). Relevant departments from DWS including

Operations, Water Quality Management and Catchment Management will be included in the RSC. The committee will meet every six months. Figure 15 below provides details of the membership of the RSC.

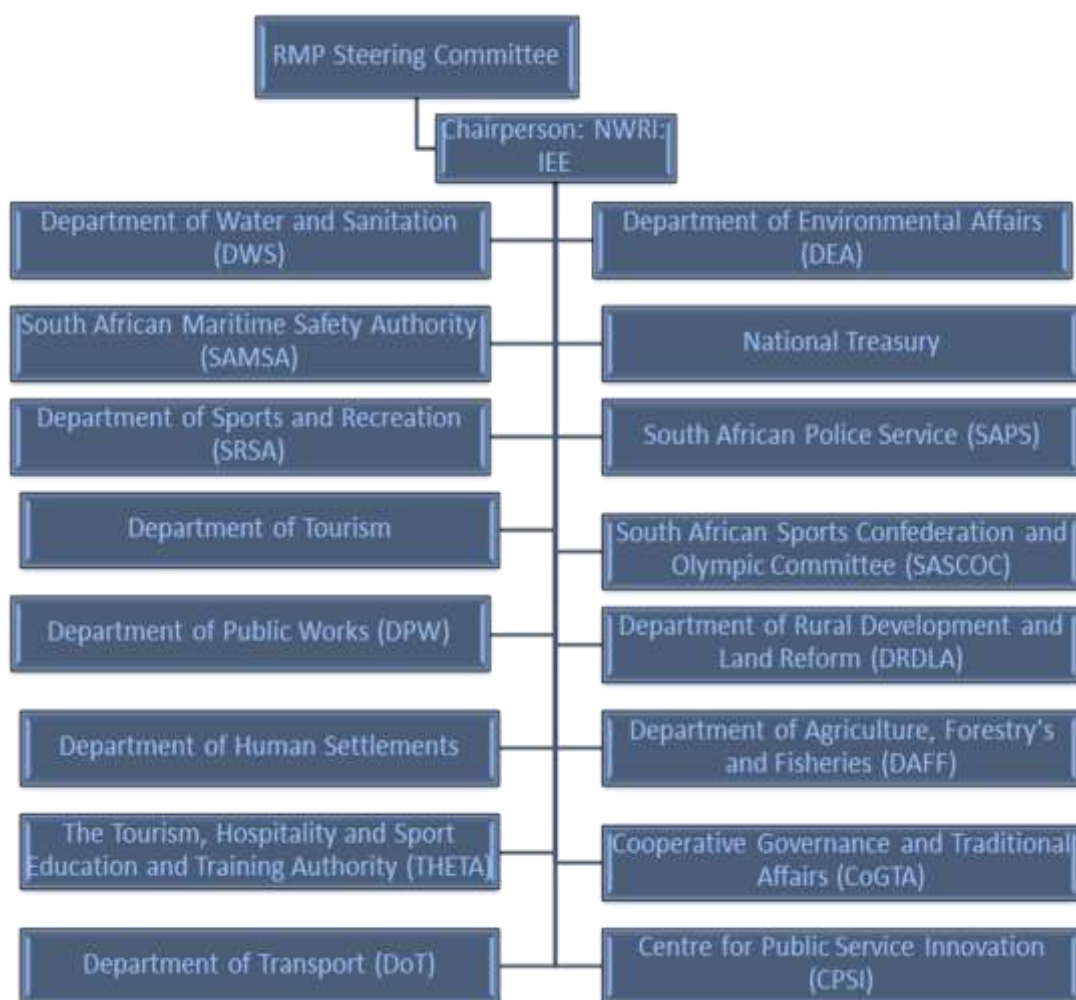


Figure 15: RSC Membership



4.2.2 Operations Management Committee (OMC)

The OMC will function at a catchment level and will provide high level guidance for all Dams occurring within one catchment. This is an existing reporting line between Area Managers for various schemes, the Regional Manager and

the Director: Operations. The implementation of the RMP will be added as an agenda item, hence providing an opportunity to discuss the RMP. The Regional Manager will be fully aware of all commercial and/or recreational activities/opportunities at all Dams within the cluster.

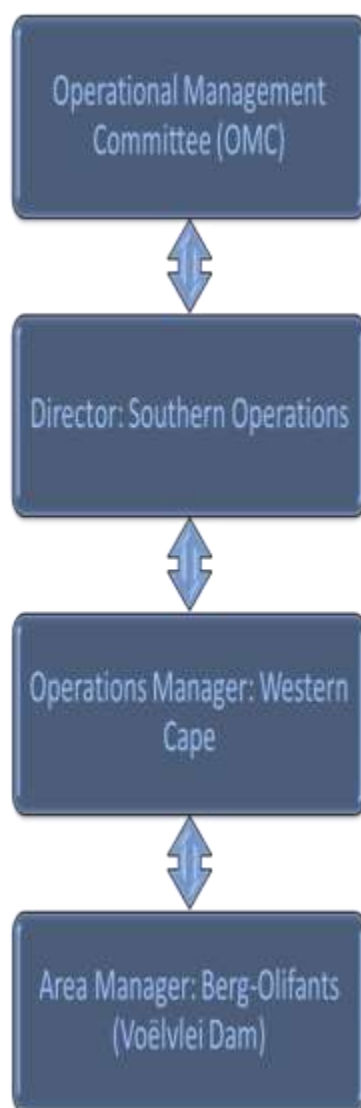


Figure 16: OMC Membership



4.2.3 Dam Management Committee (DMC)

The DMC is responsible for the operationalisation of the RMP and includes a larger pool of representatives. This committee is

chaired by the delegated DWS Official. The DMC is involved in the management of the UPN System as part of the CIWSP and includes the following representatives:

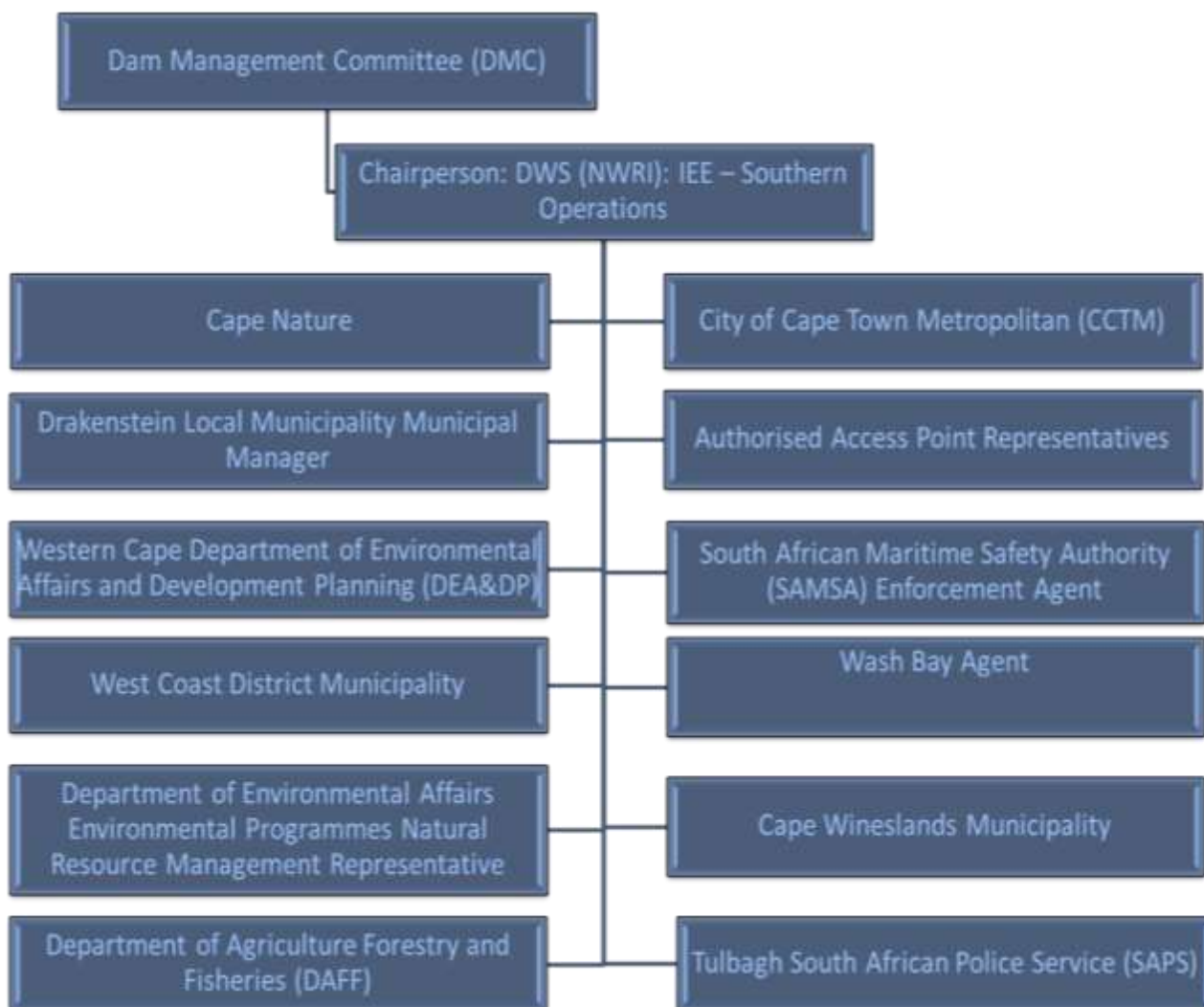


Figure 17: DMC Membership

One of the main functions of the DMC is to assess commercial opportunities at the Dam. As such, an agenda item related to the Strategic Plan for Commercialisation (SPC) is required. In addition, changes in water quality, developments in the area, status of Aquatic Invasive Species and education and information

programmes should be discussed. The DMC should meet every three months (i.e. quarterly).

Another important function of the DMC is to organise and facilitate the quarterly Dam User Open Day. All stakeholders should be invited to this meeting so that issues regarding use of the Dam can be discussed. If necessary, serious



issues can be escalated from the Public Open Day to the OMC and then RSC so to ensure swift conflict resolution. The Open Day also provides an opportunity for the DMC to inform users of the Dam of all rules and regulations governing the access and use of the Dam.

Operational management of recreational activities such as ensuring the AtoN and demarcation markers system is in place and setting times for use of the Dam (within the current framework of GN 654 of 1964) will also be managed by the DMC.

The final structure of the DMC may change once agreements with Authorised Access Points Representatives are concluded. The updated DMC membership list will be added as an addendum of the Gazetted RMP. Authorised access point representatives include clubs, private entities, landowners etc. that have authorised access to the Dam through an updated agreement with DWS.

Lastly, the DMC is also responsible for ensuring the BP is implemented.

4.2.4 Management tools

The RSC, OMC and DMC will have a number of management tools which will enable proper management of the Dam in line with Legislative requirements.

4.2.4.1 Terms of Reference

The RSC, and DMC will be guided by Terms of Reference regarding roles and responsibilities. The Terms of Reference will provide guidance on the following management aspects:

- Meeting frequency;
- Roles and Responsibility of Chairperson;
- Roles and Responsibilities of Members;
- Minutes and attendance requirements;
- Reporting requirements;
- Management of agreements;
- Management of access objectives;
- Management of development targets;

- Strategic Plan for Commercialisation (SPC);
- Management of Water quality monitoring;
- Management of the Control of Aquatic Invasive Species;
- Management of Development Pressure; and
- Management of UPN system and wash bays.

Terms of Reference are not required for the OMC as this is an existing reporting structure.

4.2.4.2 Agreements

1.) Agreements between DWS and Implementing Agent

One of the main management tools available is the use of agreements to ensure proper use of the Dam in line with the RMP vision and objectives.

Although specific agreements with some recreational clubs exist, there is no overarching agreement to manage recreational use currently in place at the Dam. It is thus suggested that an IA be appointed to manage recreational use at the Dam. This would include the following:

- Management of Recreational Clubs;
- Management of Public Access Area;
- Management of Wash Bay and UPN System;
- Management of Community Skills and Training Programmes; and
- Management of commercial activities (in line with Treasury Requirements).

It is suggested that Cape Nature be approached regarding this role as this could potentially tie in to tourism activities as part of Voëlvlei Nature Reserve.



Another potential IA is DLM as their current IDP and Marketing Strategy for the Municipality includes a strong emphasis on eco-tourism, skills development programmes and management of the public access area also has the potential create jobs which is another strong focus of the municipality.

The final option would be a PPP process where one Private Entity would manage recreational use at the Dam. This would include the potential nature sensitive overnight, potential “Back to Basics” hiking trail which includes astronomy, Rock Art, plant and animal biodiversity and potential cycling trails as well as the public access area.

Regardless, all agreements should be in line with the RMP requirements which as a minimum must achieve the following:

- Conditions on IA’s mandate to enter into agreements with other parties on the use of the surface water for recreational use;
- Terms and conditions regarding equitable access must be included in ALL agreements;
- Guidance on the use of the State Resource for Public-Private Partnerships (PPP) in line with Treasury’s requirements;
- Safety management to be in line with SAMSA requirements;
- Targets and objectives for the management of the Dam;
- Roles and responsibilities regarding the following:
 - Maintenance of AtoN and Demarcation Markers;
 - Maintenance of Wash Bays;
 - Maintenance of Recreational Infrastructure;
 - Maintenance of Fencing;
 - Maintenance of the UPN System including signage;
 - Management of agreements with other recreational users;

- Responsibilities on monitoring development and access targets (as part of agreements with other recreational users).
- Conditions on the use of the Dam for small scale fisheries or for commercial fisheries projects; and
- Conditions for the negotiations of agreements with recreational clubs. As a minimum, it is suggested that all agreements between the IA and any recreational clubs, should be reviewed and accepted in writing by DWS. They should also be presented to the DMC prior to signature to ensure the vision and objectives of the RMP are met.

Irrespective of the nature of the agreement the following must be incorporated:

- Clear start and end dates and terms of renewal/extension;
- Rights and obligations of both parties;
- Access points to be used must be stipulated. The RMP makes provision for three potential access points (The current access at VYC and Angling Club and the potential public access point). Access agreements with DWS will be necessary within the next year. Failure to do so will result in unauthorized access points being closed (see section on Access agreements for more details);
- IA’s (and therefore DWS’s) exclusion of liability;
- Terms and conditions of improvements made to the property should be stipulated. All improvements require consent from DWS and the DMC. Furthermore, the financial consequences should this requirement not be met should also be stipulated in the agreement. No permanent structures shall be built within the 1:100 year floodline without additional approval as required by Section 21 (c) and (i) of the



- National Water Act, 1998 (Act no 36 of 1998);
- The extent of the rights to use the resource should be stipulated;
 - Safety management to be in line with SAMSA requirements;
 - Targets and objectives for the management of the Dam;
 - Clear instructions on the financial requirements of both parties, and where and when money must be paid should also be stipulated. All recreational clubs and societies on State Land must be managed in line with National Treasury requirements. Lease agreements for use of State Land should include fair remuneration at the current market value;
 - All agreements should include a cancellation clause if requirements cannot be met;
 - All clubs or associations must be affiliated to a national sporting body recognised by the South African Sports Confederation and Olympic Committee (SASCOC)
 - All agreements must include a cancellation clause if clubs or associations fail to obtain affiliation within one year from date of signature of the agreement;
 - Limitations of the number of people allowed to access the water surface of the Dam based on carrying capacity of Dam as well as the carrying capacity of the CIWSP wash-bays must be adhered to;
 - A list of current and potential recreational activities allowed at the Dam;
 - Requirements for safety, disaster management and emergency response plans;
 - Duties and responsibilities of either party regarding maintenance, management and infrastructure;
 - A list of prohibited activities;
 - Prohibition of subletting portions of the leased area;
 - Conditions on the use of the Dam for small-scale fisheries projects; and
 - A mandate for programmes to assist in equitable access and redressing past imbalances at the Dam, such as sponsored gate-fees for members of previously disadvantaged communities. This should be in line with the RMP. The DMC will then be required to report against all targets at the OMC.
 - All agreements must include a cancellation clause should community access targets not be met.
 - All recreational activities must be in line with the RMP, which once gazetted, becomes the mechanism to control and manage recreational use. Although no Section 21k Water Use License Application (WULA) is required, all activities must comply with all other relevant legislation requirements including the following:
 - The Merchant Shipping (National Small Vessel Safety) Regulations, 2007, - Control of Boating;
 - Section 21 (a) of the National Water Act, 1998 – abstraction;
 - Section 21 (c) and (i) of the National Water Act, 1998 – construction of slipways/infrastructure;
 - Safety at Sports and Recreational Events Act, 2010 – Events; and
 - Provincial Ordinances – Fishing.
- These agreements should be updated within the next year.
- All agreements should also take into account the planned augmentation scheme which would result in increased capacity at the Dam and would move the current shoreline.
- 2.) Recreational Use Agreements



Recreational Clubs must enter into an agreement with the IA who will be responsible for the surface water management of the Dam. All recreational use at the Dam must be through an appropriate legal framework. However all agreements must be approved in writing by DWS and the DMC.

Recreational Use Agreements must be developed inline with the conditions stipulated in the agreement between DWS and the IA.

All agreements must be finalised within one year of the RMP being gazetted.

3.) Land Management Agreements

The DMC should actively consider land management strategies that improve the efficiency of current practices. This could include co-management agreements with surrounding or adjacent landowners which may result in environmentally sustainable and more efficient land management.

Agreements must be developed with appropriate legal advice and consultation.

In the case of Voëlvlei Dam, the majority of the State Land is managed by Cape Nature as part of Voëlvlei Nature Reserve. It is suggested that this agreement be updated in line with RMP.

All agreements should be put in place within one year of the RMP being gazetted.

4.) Access Agreements

All surface water access must be formalised. The conditions for such access must be written into the agreement. All illegal practices must be addressed. Appropriate action must be taken to ensure that all Parties comply with the requirements of the RMP.

All adjacent landowners and clubs must be made aware that access to the surface water should only be through authorised access points. Accessing the surface water through unauthorised access points is an illegal activity unless they enter into a formal agreement with DWS.

Further, a formal agreement with DWS will be required by all adjacent landowners and recreational clubs that have direct access to the water surface of the dam through 1.) constructed slipways; 2.) natural slipways; or 3.) jetties for angling and/or launching of boats. Additional agreements with the IA may also be necessary.

The wash bay must be built on State Property as part of the CIWSP. A formal agreement is necessary between the IA and DEA on the management and maintenance of the facility. The agreement will be overseen by the DMC.

All agreements should be put in place within one year of the RMP being gazetted.

Further, the use of the road over the Dam wall is prohibited. The access road below the Dam wall should be used.

5.) Safety of Navigation Agreements

Agreements between SAMSA and DWS/other relevant Parties/Bodies are to be concluded to allow them to:

- Exhibit the relevant AtoN; and
- Establish or deploy the relevant fixed and/or floating AtoN.

6.) Event Applications

Voëlvlei Dam is used for a number of competitive angling events as well as sailing.

All events must be managed through an event application process. While the application may be made to the IA, DWS and the DMC must approve the application. These applications must follow a specific template and will include the following:

- Number of participants;
- Emergency Response Plan;
- Advertising and branding (will need to be in line with DWS communication requirements);
- Access points to be used;



- Costs; and
- Films/photographs that will be generated to be in line with DWS communication requirements.

Further, all Events must meet the requirements of the Safety at Sports and Recreation Act, 2010 (Act No 2 of 2010).

4.2.4.3 National Affiliations and Development Targets

All recreational clubs should be affiliated to a SASCOC affiliated organisation. The development targets set by the National Organisations must be met. The Clubs must be affiliated within two years of the RMP coming into effect.

4.2.4.4 Community Participation and Beneficiation

The RMP has suggested a number of different objectives, actions, interventions, agreements and institutional arrangements to ensure that community participation and beneficiation of the resource takes place. These are captured throughout the different plans and in the vision and objectives. However, in order to ensure a strong focus on this aspect by the DMC, OMC and RSC going forward, the different elements of community participation and beneficiation are consolidated below.

1.) Socio-Economic Development

Socio-economic development is a key aspect of the RMP. A specific objective (and related actions) is specifically related to socio- economic development.

Development of Increased Eco-tourism and Recreational Opportunities

- The potential for nature sensitive overnight facilities to be considered;
- Potential of creating an overall “Back to Basics” hiking trail which includes astronomy, Rock Art, plant and animal biodiversity. This could be linked to skills development and job creation initiatives in the area; and

- Potential cycling trails to be assessed.

Further, as discussed in the Financial Plan below, Voëlvlei Dam can become a key economic lever for the region, thereby creating job opportunities for the local community.

One of the key mechanisms for this is the use PPPs. However in regards to potential PPPs, the following should be noted:

- A balance between high and small cap opportunities is required to ensure that revenue generation occurs together with the promotion of equitable access and job creation at the Dam; and
- While the tariff structure can be used for revenue generation, it should not be used to deny people access to the dam.

The BP has a specific intervention regarding determining the feasibility of a PPP for the management of Nature Sensitive Accommodation, Back to Basic Hikes and Development of Cycling events and trails.

In addition, the BP has a specific intervention regarding the potential for Small-Scale Fisheries at the Dam.

2.) Equitable Access

One of the main triggers for the RMP was the issue of inequitable access. In order to rectify this, one of the objectives (and related actions) has aspects which are specifically related to equitable access:

Improved and Equitable Access for the Surrounding Community

- Public day visitors and fishing area to be created;
- Feasibility of a community access card to be assessed; and
- Information brochures to be developed to inform communities about the potential uses of the Dam and how to join recreational clubs and societies.



In addition, a specific intervention in the BP is focused entirely on the creation of a public access area at the Dam to allow community participation and use. It is suggested that DWS undertake the initial planning and construction while the management and maintenance of the area be included in the agreement with the IA.

Section 4.2.4.1. provides guidance on the aspects which should be included in the ToR for the DMC and RSC. Specific mention is made of Management of access objectives and Management of development targets. While, Section 4.2.4.2. provides the guidance on the aspects which should be included in all agreements. This includes the following:

- A mandate for programmes to assist in equitable access and redressing past imbalances at the Dam, such as sponsored gate-fees for members of previously disadvantaged communities. This should be in line with the RMP. The DMC will then be required to report against all targets at the OMC; and
- All agreements must include a cancellation clause should community access targets not be met.

3.) Skills Development and Training

The RMP also focuses on skills development and training through one of the objectives (and related actions items – listed below).

Education and Skills Development

- Coordination between clubs, local schools and SAS to introduce youth sailing programme at the Dam; and
- The potential for School science education programmes including elements of botany, zoology, geology, meteorology, astronomy to be assessed; and
- Skills training programmes including life guard training, first aid training, astronomy, rock art, and biodiversity to be developed as part of eco-tourism development and community skills training.

The BP has a specific intervention relating to development and implementation of a skills training programme as there is an opportunity for local community members to obtain skills (such as first aid) to be employed at the public access area as 'lifeguards'. This would have the added benefit of improving community safety at the Dam.

4.3 Financial Plan

Voëlvlei Dam is an economic lever and can become central to development in the Region. The RMP provides guidance on cost recovery mechanisms to ensure the sustained and improved management of the Dam.

There are opportunities for PPPs which could further unlock the economic potential of the Dam.

With PPPs, the private party assumes the financial, technical and operational risks but receives a benefit for this. PPPs allow for DWS to make State Assets such as Dams available to private parties who wish to engage in tourism related commercial operations (DWAF, 2009). This risk sharing mechanism aims to unlock socio-economic potential of State Dams. In addition, development of PPPs in remote areas often require related infrastructure upgrades and thus there is the opportunity for new infrastructure investment and development and related services which would benefit local communities.

Although high cap PPPs result mostly in revenue generation, small cap opportunities (less than R10 million (2007 figures) are more likely to fulfil socio-economic objectives such as job creation, promotion of Broad-Based Black Economic Empowerment, LED and Small, Medium and Micro Enterprises. A balance between high and small cap opportunities is required to ensure that revenue generation occurs together with the promotion of equitable access and job creation at the Dam.

Further, Voëlvlei Dam is a State Resource and as such all profits made from the recreational use



of the Dam should be used for further development of the Dam.

While the fees for use of the Dam can be used for revenue generation, it should not be used to deny people access to the Dam. Thus it should take into account the socio-economic status of recreational users. For example, a sliding scale, cross subsidy fee structure and/or contractual obligations which ensure equitable access must be considered when setting a fee.

The BP provides a financial framework to undertake certain interventions.

4.4 Zonal Plan

The Zonal Plan for Voëlvlei Dam has three main sections. The first involves the current recreational activities together with an identification of potential recreational and/or commercial opportunities. This section also includes the determination of carrying capacity. The second involves the shoreline management zones (together with preferred activities and prohibited activities within each zone) and the third involves surface management zones (together with preferred activities and prohibited activities within each zone).

4.4.1 Current Recreational Uses

The main recreational clubs that make use of the Dam are the VYC, the WPALAS, WPFAA, the TAC; WAC and the CPS.

The following recreational activities commonly take place at the Voëlvlei Dam:

- Bird-watching;
- Fishing from Shore;
- Boardsailing/windsurfing;
- Fishing from Boats;
- Swimming;
- Sailing; and
- Camping and caravanning.

A number of events are held at the Dam including various angling competitions (for Bass and Carp) as well as a number of Regattas. VYC has also organised a triathlon at the Dam in recent years. The Stanford Bird Club have also visited the dam for their bird fairs in the past.

There are various protected areas around the Voëlvlei dam. These include the Voëlvlei Nature Conservancy and Waterval Nature Reserve. These reserves are home to the Geometric Tortoise which is critically endangered as well as a number of sensitive plant species including King Protea. The Dam also occurs in close proximity to Du Toits Kloof Mountain Range. There are a number of cycling and hiking trails which are run in the area as well as adventure races such Western Cape Adventure (WCAD) cycling race.

4.4.2 Potential Recreational and/or Commercial Opportunities and Uses

A matrix model was used to determine the feasibility of possible recreational and eco-tourism activities in line with the operational requirements of the Dam, the biophysical environmental conditions and safety requirements.

The scores utilised to determine viability are as follows:



Table 7: Scores for Recreational Use

Score	Meaning	Comment
0	Not feasible	High Negative Impact to Dam Environment + High Negative Impact to Recreational Users Text provided in red highlights the specific factors which make the activity not feasible at the Dam.
1	Likely to be feasible however feasibility study is required.	Feasibility Study is required
2	Likely to be feasible	Benefits appear to outweigh impacts. Allowed should there be an interest. Adequate agreements and safety measures would be required as per RMP. No feasibility study is required.
3	Current use	Benefits outweigh impacts. No feasibility study is required.

The main potential activities include:

- Day Hiking trails around the Dam;
- Back to Basics Trail;
- Junior Sailing School for the Boland Area;
- Public Access Area;
- Potential commercial fishery;
- House boats;
- Science school education programme; and
- Rustic Accommodation

It should be noted that recreational activities at the Dam must be assessed and managed to ensure that it does not negatively impact on water quality (which is directly related to the primary purpose of the Dam).



Table 8: Potential and Current Recreational Activities

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
No Contact	Day Hiking/ Walking Trail	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	Potential disturbances but can be mitigated through well chosen routes that do not impact bird nesting	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	No conflicts	N/A	Not required for Day hikes	Ablution facilities would be required at Public access area. These could be used by hikers.	Not required	Land in the purchase boundary is available	Hiking is a popular activity in the area however the day hike would be relatively short and may not be very popular	Part of IA's mandate	2
	Guided Back to Basic Hikes including heritage, dark skies, biodiversity etc.	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	Potential disturbances but can be mitigated through well chosen routes that do not impact bird nesting	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	No conflicts	N/A	Rustic cabins would be required (similar in concept to hikes such as the Otter Trail)	Ablution facilities would be required at the overnight points	Not required	While it is suggested that the hike starts at Voëlvlei Dam, it would extend into the Nature Reserves and mountains around the Dam. Agreements with Cape Nature would be required.	Hiking is a popular activity in the area. In addition, the area has numerous attractions which would be marketed.	PPP	1
	Picnicking and sunbathing	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	No conflicts	N/A	Public access area required	Ablution facilities at public access area required	Not required	Land in purchase boundary available	Day visitor activities	Public access facilities to be funded by DWS	1
	Cycling	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	Potential disturbances but can be mitigated through well chosen routes that do not impact bird nesting	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	No conflicts	N/A	N/A	Ablution facilities would be required at public access areas	Not required	While it is suggested that the hike starts at Voëlvlei Dam, it would extend into the Nature Reserves and mountains around the Dam. Agreements with Cape Nature would be required.	Cycling is a popular activity in the area. In addition, the area has numerous attractions which would be marketed.	PPP	1
	Public Access Area	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	Potential disturbances can be mitigated through site selection	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	May conflict with current users as the Dam is very quiet and a public access area may increase noise disturbance	No winds would be required however safety is a concern as strong winds can occur at the Dam	Picnic spots and braai facilities would be required	Ablution facilities would be required.	Access agreement with DWS would be required	Available area within purchase boundary	During public consultation, community members from Gouda were interested in a public access area	PPP/Co-management agreement with DLM	1
	School science education programme	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	Potential disturbances can be mitigated through site selection	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	N/A	N/A	Outdoor classroom facilities required	Ablution facilities would be required.	Access agreement with DWS would be required	Available area within purchase boundary	Due to the high level of biodiversity, dark skies and heritage there is likely to be interest	BP	1

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Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Camping at Current recreational clubs	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of agreements with Recreational clubs	No conflicts at this point	N/A	Facilities available	At VYC and Angling Club	Agreement with DWS required	Land available within purchase boundary – agreement with DWS required	Currently takes place	Not required	3
	Nature Sensitive Accommodation	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	Potential disturbances can be mitigated through site selection	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	May be disturbed by noise from recreational users	N/A	Limited land available for development	All facilities for the high end accommodation would be required	Not required however access to water may be the main drawcard and thus an agreement with DWS would be required	Available area within purchase boundary	Potential for tourism in the area	PPPs	1
	Birding	Water levels should not impact no contact activities	No impact	N/A	N/A	N/A	N/A	Potential disturbances can be mitigated through site selection	N/A	N/A	N/A	N/A	Cell-phone reception available	Emergency response as part of IA's mandate	May be disturbed by noise from recreational users	N/A	No accommodation specifically required however a bird hide would be necessary	Ablution facilities would be required at Public access area. These could be used by birders.	Not required	Available area within purchase boundary	Already occurs at Voëlvlei Dam and the Dam has a large number of bird species	Through creation of Bird Watching Club and related membership fees or through potential agreements with Cape Nature	3
Primary Contact	Open Water Swimming - Recreational	N/A	N/A	Water quality impacts	Algal blooms can cause potential health impacts	No known species at this point	N/A	N/A	N/A	Would be required	Acceptable for swimming	Acceptable	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate swimmers	No winds would be required however safety is a concern as strong winds can occur at the Dam which make swimming unsafe	Not required	Ablution facilities required at Public Access Area	Agreement with DWS required	Land available within purchase boundary.	Swimming events as part of Triathlons have been held at the Dam.	As part of public access area and current clubs	0
	Open Water Swimming – Development Programme	N/A	N/A	Water quality impacts	Algal blooms can cause potential health impacts	No known species at this point	N/A	N/A	N/A	Would be required	Acceptable for swimming	Acceptable	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate swimmers	No winds would be required however safety is a concern as strong winds can occur at the Dam which make swimming unsafe	Not required	Specific ablution facilities would be required	Agreement with DWS would be required	Land available within purchase boundary.	No specific interest	SwimSA, Telkom Splash or similar foundations. Coordination with schools may also be possible.	0
	Snorkelling	N/A	N/A	Water quality impacts	Algal blooms can cause potential health impacts	No known species at this point	N/A	N/A	N/A	Would be required	Acceptable for swimming	Water is too turbid for snorkelling or diving	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate snorkelers	N/A	Not required	Ablution facilities required at Public Access Area	Agreement with DWS required	Land available within purchase boundary.	None at present	N/A	0

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Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Diving	N/A	N/A	Water quality impacts	Algal blooms can cause potential health impacts	No known species at this point	N/A	N/A	N/A	Would be required	Acceptable for swimming	Water is too turbid for snorkelling or diving	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate divers	N/A	Not required	Ablution facilities required at Public Access Area	Agreement with DWS required	Land available within purchase boundary.	None at present	N/A	0
Secondary Contact	Commercial/ Small Scale Fishery for Catfish and Carp	N/A	N/A	Acceptable	Algal blooms can cause some concerns regarding bioaccumulation	No known species at this point	Fishing of invasive species may assist indigenous population	May disturb bird nesting	Maintenance of boats and equipment required to prevent contamination	Required for aquaculture	N/A	N/A	Cell-phone reception available	None. Would require UPN System	Positive impact – will likely improve recreational angling	N/A	Facilities and infrastructure required.	Facilities and infrastructure required.	Agreement with DWS required	Land available within purchase boundary.	DWS CapeNature and DAFF are currently involved in establishing the rules for a pilot commercial fishery on Voelvlei Dam.	PPPs	1
	Shore Fishing	N/A	N/A	Water quality is acceptable	Algal blooms can cause some concerns regarding bioaccumulation	No known species at this point	The Zonal map should prevent impacts	None	None	Required	N/A	N/A	Cell-phone reception available	None. Would require UPN System	Shore fishing takes place currently.	No required	Not required	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Fishing is very popular at the Dam	Would be funded by clubs themselves or as part of public access area	3
	Tube Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No winds would be required however safety is a concern as strong winds can occur at the Dam.	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Potential interest due to large fish stock	N/A	2
	Pontoon Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	No current conflict	No winds would be required however safety is a concern as strong winds can occur at the Dam.	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Current activity	Would be funded by clubs themselves or as part of public access area	3
	Bass Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Used to be common but no bass occurs at the Dam anymore	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Current activity	Would be funded by clubs themselves or as part of public access area	0

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Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
																				boundary			
	Motorised Boats	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	The Dam is a no motor boat Dam. Motor boats are only allowed as safety vessels during regattas	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not allowed at the Dam	N/A	0
	Jet Powered Boats	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	The Dam is a no motor boat Dam. Motor boats are only allowed as safety vessels during regattas	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not allowed at the Dam	N/A	0
	Rigid hulled Inflatable Boat (RHIB)	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	The Dam is a no motor boat Dam. Motor boats are only allowed as safety vessels during regattas	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not allowed at the Dam	N/A	0
	Water-skiing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	The Dam is a no motor boat Dam.	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not allowed at the Dam	N/A	0
	Jet Ski	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	The Dam is a no motor boat Dam.	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Likely to be interest	N/A	0



Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Dragon Boats	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No winds would be required however safety is a concern as strong winds can occur at the Dam.	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	No interest at this point	N/A	2
	Slalom Canoe	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No winds would be required however safety is a concern as strong winds can occur at the Dam.	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	No interest at this point	N/A	2
	Fishing Canoe	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Canoeing occurs at the Dam	No winds would be required however safety is a concern as strong winds can occur at the Dam.	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Fishing occurs from boats	N/A	3
	Jet Ski Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to conflict this activity is currently not allowed at the Dam.	No winds would be required however safety is a concern as strong winds can occur at the Dam.	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Likely to be interest	N/A	0
	Wind Surfing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	Yes, winds available at the Dam. They can be very strong so all wind related activities must be undertaken by informed individuals and safety system/potential notification system for strong winds may be required	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Current activity	N/A	3



Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Kite Surfing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users, zoning to prevent major conflict	Yes, winds available at the Dam. They can be very strong so all wind related activities must be undertaken by informed individuals and safety system/potential notification system for strong winds may be required	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Current activity	N/A	3
	Ski Jumping	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	No motorised boats allowed at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Similar to water skiing – events may be popular	N/A	0
	Slalom Skiing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	No motorised boats allowed at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Current activity	N/A	0
	Ski and Wakeboard Boat	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	No motorised boats allowed at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Current activity	N/A	0
	Kayaking Sprints	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds canoeing is not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not known	N/A	0



Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Kayaking Marathons	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds canoeing is not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not known	N/A	0
	Kayaking Water Polo	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds canoeing is not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not known	N/A	0
	Kayaking Touring	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds canoeing is not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not known	N/A	0
	Kayaking Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds canoeing is not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not known	N/A	0
	Paddle Ski	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds paddle skiing is not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of	Not known	N/A	0



Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
																				purchase boundary			
	Surf Ski	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds surf ski is not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not known	N/A	0
	Pedal Boat	N/A	N/A	N/A	N/A	No known species at this point	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers require	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Due to strong winds pedal boats are not encouraged at the Dam	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Potential activity	N/A	0
	Hovercraft	N/A	N/A	N/A	N/A	No known species at this point	Disturbance to local fauna	Disturbance to local fauna	Disturbance to local environment	N/A	Depth is suitable	Not required	Cell-phone reception available	None. Would require UPN System	Conflicts with sense of place	N/A	Not required	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	None at present	N/A	0
	Stand Up Paddling	N/A	N/A	N/A	N/A	No known species at this point	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers require	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	None foreseen at present	Due to strong winds stand up paddling is not encouraged at the Dam	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Not known	N/A	0
	Parasailing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	No motor boats allowed at the Dam so parasailing can take place	The Dam is known for strong winds	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Similar to current activities	N/A	0

VOËLVLEI DAM
FINAL RESOURCE MANAGEMENT PLAN



Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Sailing	N/A	N/A	Water quality is acceptable	No specific health risks associated	No known species at this point	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users, zoning to prevent major conflict	The Dam is known for strong winds	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Current activities	N/A	3
	Water Toys	N/A	N/A	N/A	N/A	No known species at this point	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers required	N/A	Safety concern as not visible to bigger craft, flags and other safety measures required	Cell-phone reception available	None. Would require UPN System	None foreseen at present	No	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	Occasional use at Voëlvlei Dam	N/A	3
	Flying Boats/Water Planes	N/A	Possible Damage to infrastructure	N/A	N/A	No known species at this point	Disturbance to local fauna	Disturbance to local fauna	Disturbance to local environment	Specific aviation requirement would need to be met	Some sections of the Dam are very deep	N/A	Cell-phone reception available	None. Would require UPN System	Conflict with sense of place	N/A	Not required	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	None at present	N/A	0
	House Boats	Water levels fluctuates seasonally	Possible Damage to infrastructure	N/A	N/A	No known species at this point	N/A	N/A	Possible pollution from litter	Zoning AtoN and Demarcation Markers required	Required depth to be determined in feasibility study. However dam is relatively shallow.	Zoning would be required to prevent danger to smaller crafts such as tube-fishermen	Cell-phone reception available	None. Would require UPN System	Conflicts with current recreational operating hours	N/A	N/A	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of purchase boundary	None at this time	PPP	1
	Junior Sailing School	N/A	N/A	N/A	N/A	No known species at this point	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	No	The Dam is known for strong winds	Depends on the scope of the School. No accommodation facilities will be required for a local	Ablution facilities required at Public Access Area	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required)	Through Public Access area (should it be put in place); VYC and Angling Clubs (agreements required) – as part of	VYC is in discussions with SAS regarding a sailing school at the Dam for the Boland region	SAS	1



Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
																	schools programme			purchase boundary			



4.4.3 Carrying Capacity

In order to determine the degree of recreational use possible on the water surface, the Methodology for Carrying Capacity Assessment: Recreational Water Use (DWS) was used as a guideline to determine the level of activity that would be sustainable at Voëlvlei Dam.

Calculating carrying capacity for recreation is a vital step to ensure that recreation at the dam is safe and that users do not feel crowded and enjoy their use of the dam as a venue for recreation. There are three kinds of carrying capacity:

1. Physical Carrying Capacity (PCC). This is the maximum number of users that can physically fit onto the water surface at any given time.
2. Real Carrying Capacity (RCC). This is the maximum number of users that can use the resource once corrective factors (such as wildlife or weather conditions) that are unique to the dam are taken into account.
3. Effective (permissible) Carrying capacity (ECC). This is the number of visitors that can use the resource, given the management capacity available at the dam.

4.4.3.1. Physical Carrying Capacity (PCC)

PCC is calculated as $PCC = A \div U/a \times R_f$

- Where A = area available for public use;
- U/a = area required for each user; and
- R_f = Rotation Factor (the number of visits per day)

A is calculated as the area of the water surface: 15.63 km², or 1563.6 hectares (ha)

U/A = There is a range of literature regarding the area required for different recreational users. The U/A used for that assessment are as follows:

Craft	Water Depth (m)	U/A (ha/craft)
Canoes	>0.6	0.5
Windsurfers	>0.6	0.5
Rowing	>1.0	0.5
Dinghies	>1.0	1.0
Yachts	>1.8	2.0
Fishing	>1.0	4.0
Average		1.6

Craft	Water Depth (m)	U/A (ha/craft)
Canoes	>0.6	0.5
Windsurfers	>0.6	0.5
Rowing	>1.0	0.5
Dinghies	>1.0	1.0
Yachts	>1.8	2.0
Fishing	>1.0	4.0
Average		1.6

Based on the fact that most activities do not require much space, and that the average hectares per user is 1.6 ha (16 000 m²), the value of 4 ha (40 000 m²) is an acceptable area per user. This conservative number has been chosen in order to ensure the sense of place and quiet atmosphere is not impacted by overcrowding.

As Voëlvlei is quite remote it is unlikely that people would use the Dam more than once per visit. It is far more likely that visitors to the Dam would spend the majority of the day on the water surface. In this case R_f = 1.

The PCC for Voëlvlei Dam can therefore be calculated as:

$$PCC = 1563.6 \div 4 \times 1$$

$$PCC = 390 \text{ boats on the Dam.}$$

However, this is based on the full length of the Dam at 100% capacity. It also doesn't take into account the zoning of the Dam.

4.4.3.2. Real Carrying Capacity (RCC)

Real capacity is the PCC, taking into account factors that limit recreation. In this case limiting factors include:

- Safety No Go Zones; and
- Swimming Areas.

The above factors result in a 2.7% decrease in water area available for recreation at the Dam (Area available for use decreases from 1 563.6 ha (15.63 km²) to 1 521.4 ha (15.21 km²). Therefore, 97.3% of the surface area of the Dam is still available for recreation.

The RCC for Voëlvlei Dam is therefore:



- $RCC = PCC \times (100 - Cf1) \% \times (100 - Cf2) \% \times \dots (100 - Cfn)\%$
- Where Cf = a corrective factor expressed as a percentage.
- $RCC = 390 \times (100 - 97.3)\%$

RCC = 379 boats on the Dam at any given time
Based on water surface.

4.4.3.3. Effective (permissible) Carrying Capacity (ECC)

Effective Carrying Capacity is the maximum number of visitors that a site can sustain, given the management capacity available. Given that Voëlvlei Dam has no formal public access area and that neither VYC and WPALAS have extensive facilities, the infrastructure capacity is estimated to be approximately 0. The management capacity is also estimated to be low as there is no overarching management system in place and thus the ECC is currently 0. Once a management system and details for infrastructure capacity is in place, the ECC can be recalculated.

- $ECC = [Infrastructure\ Capacity \times MC] / RCC$
- Where: ECC = Effective Carrying Capacity;
- MC = Management capacity based on staff and budget;
- RCC = Real Carrying Capacity

4.4.4 Water Surface Zonal Plan

The Zonal plan for the water surface at Voëlvlei Dam is divided into four distinct areas or zones. These zones are based on a number of factors including:

- Operational requirements of the Dam;
- Safety requirements of each activity;
- Types of activities (in terms of contact); and
- Environmental requirements.

The overall zonal map is provided in the figure below.

The zones are as follows:

- Zone A: Secondary Contact: Combination Zone. Both Sailing and Fishing Activities are allowed in this zone however due to shallow nature along the shoreline and to prevent conflict between users, no sailboats are allowed at speed in this zone;
- Zone B: Primary Contact – Swimming and Water Toys. This blue zone is a zone available for recreational swimming and the use of water toys. Launching of sailboats of the shoreline at VYC is permitted however all boats must maintain a dead slow speed;
- Zone C: No Go Zone – Safety. This is the area around the Dam Walls and intake towers and is denoted in orange. No access to the public is allowed;
- Zone D: Secondary Contact – Sailing and Associated Activities. This zone is designated for the use of Sailboats at high speed; and
- Zone E: Secondary Contact – Shoreline Fishing and Casting.

Detailed information of the current and potential activities together with activities that are not allowed in each zone is provided in the table below. Information on requirements for each zone is also provided.



Table 9: Surface Water Management Zones

Zone Name	Contact Type	Permissible Activities - Current	Permissible Activities - Potential	Access Point	Safety Requirements for Users	Safety Requirements for DMC
Zone A – Combination Activities	Secondary Contact	Motorised Boats – for safety purposes during regattas Fishing Canoe Shore Fishing Tube Fishing Pontoon Fishing Bass Fishing Fishing from Boats Sailcraft allowed at dead slow speeds	Smallscale/commercial fisheries House Boats Slalom Canoes Dragon boats Open Water Swimming – Recreational during events such as Triathlons	VYC and WPALAS if agreements are put in place Public Access point	Registered Safe for Water Vessel Valid Skipper's License First Aid Kit UPN date stamp UPN tag Access road over the Dam wall cannot be used.	AtoN and Demarcation Markers UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer VYC and WPALAS will require system of checking UPN tag and date stamp as Wash Bay will likely be located at Public Access Area Findings of point source pollution study to be taken into account when assessing event application for triathlons.
Zone B – Sailboats and Associated Activities	Secondary Contact	Motorised Boats – during regattas for safety purposes Wind Surfing Kite Surfing Sailing		VYC and WPALAS if agreements are put in place Public Access point	Registered Safe for Water Vessel Valid Skipper's License First Aid Kit UPN date stamp UPN tag Access road over the Dam wall cannot be used.	AtoN and Demarcation Markers UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer VYC and WPALAS will require system of checking UPN tag and date stamp as Wash Bay will likely be located at Public Access Area
Zone C – No Go Zone - Safety	N/A	DWS maintenance and management activities	None	DWS (for management purposes only)	N/A	AtoN and Demarcation Markers

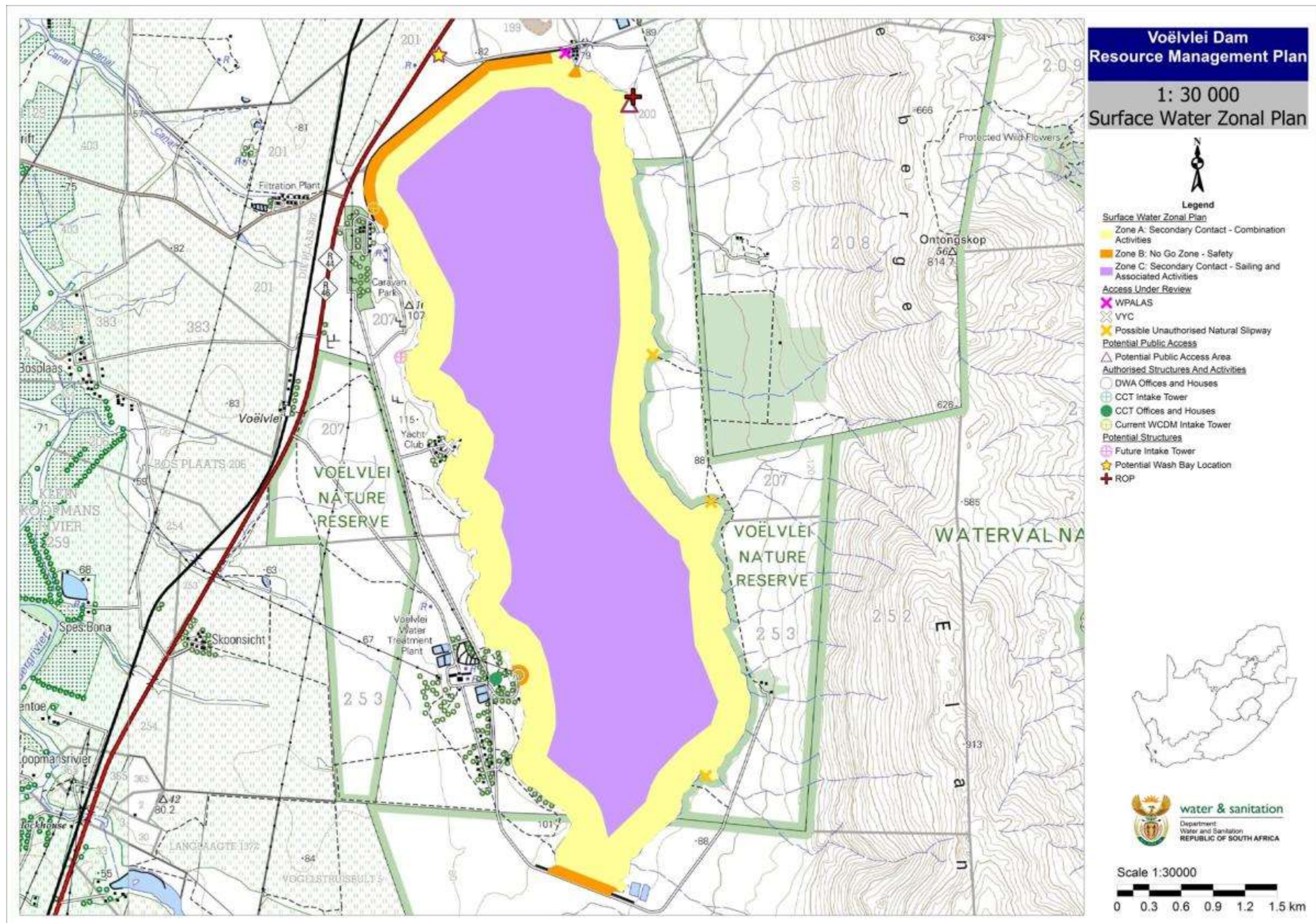


Figure 18: Map of the Water Surface Zonal Plan

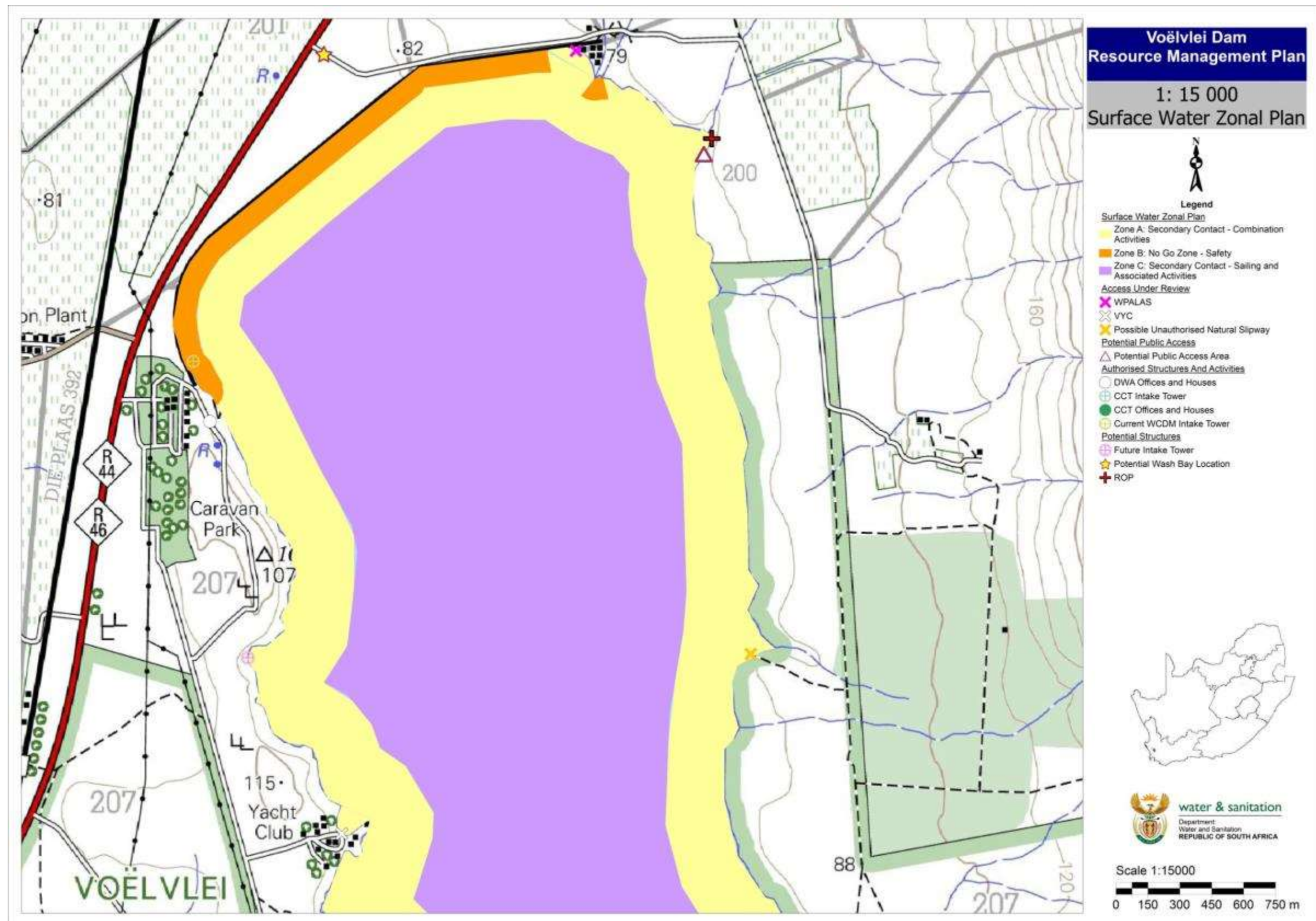


Figure 19: Map of the Water Surface Zonal Plan – Section 1

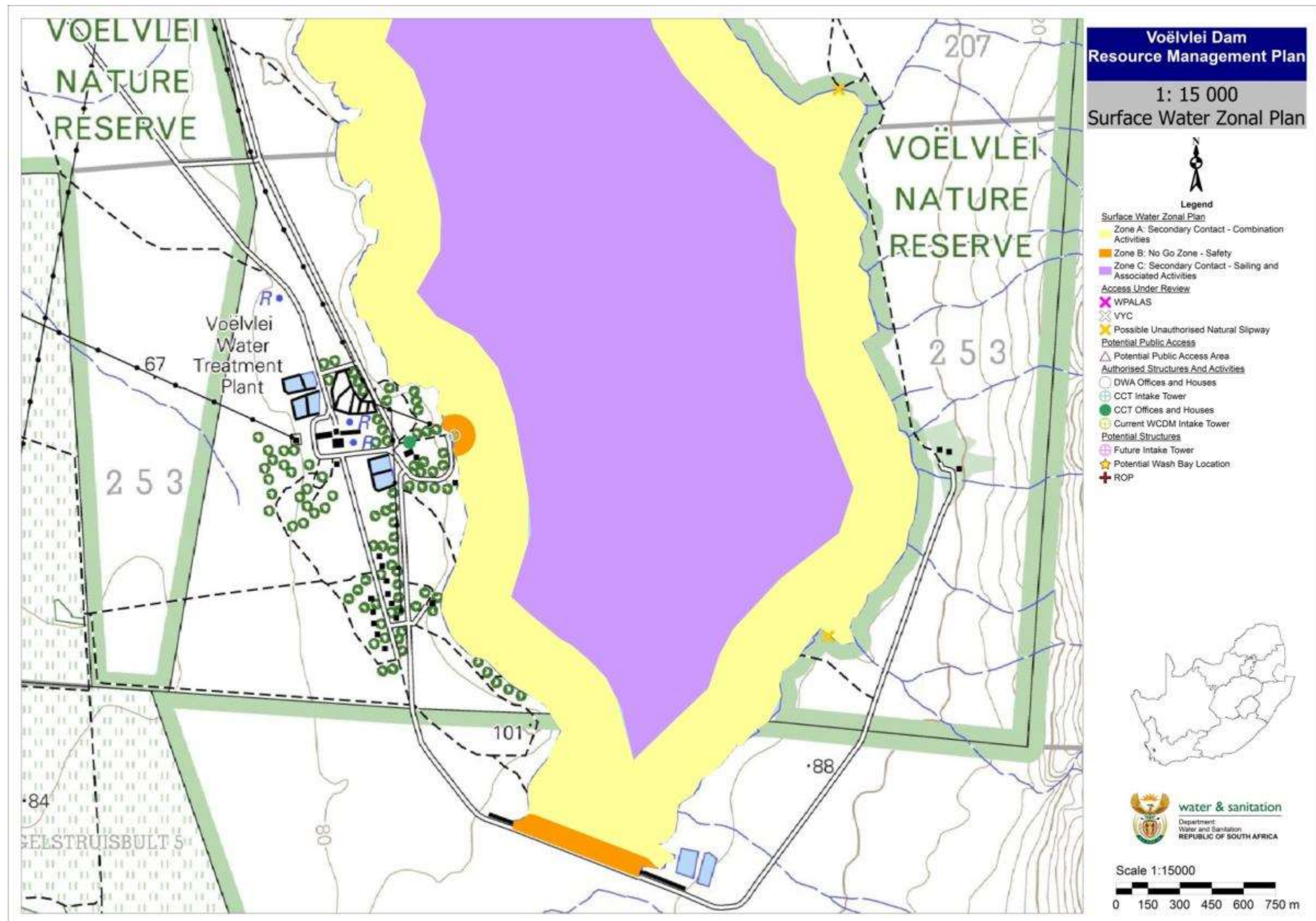


Figure 20: Map of the Water Surface Zonal Plan – Section 2



4.4.5 Shoreline Zonal Plan

In addition to the surface water Zonal Plan above, an integral part of the RMP is shoreline zoning. This provides guidance on what activities (if any) are allowed in the land adjacent to the Dam.

The Shoreline Zonal Plan can only manage state owned land around the Dam. Much of the State Land is managed through an agreement with Cape Nature and is thus for conservation and some low impact recreational activities only.

It should be noted that due to the gradient of the land around the Dam, it is possible for boats to be launched without a slipway. Adjacent landowners may not access the Dam via informal launches without agreements with DWS being in place.

The management zones include:

- Zone A: Conservation and low impact recreation;
- Zone B: Development and Recreation; and
- Zone C- No Public Access – Management Only.

Permissible and non-permissible activities are detailed in the table below.



Table 10: Shoreline Management Zones

Zone Name	Zone Type	Permissible Activities	Requirements for Users	Requirements for DMC
Zone A	Zone A: Conservation and low impact recreation	Conservation initiatives Management of firebreaks Management of litter Management of Invasive Plant Species Hiking Cycling Bird watching Star gazing Picnicking School science programmes	Angling clubs require updated agreements with DWS Eco-tourism activities would require approval from Cape Nature Camping, birding, hiking, picnicking, shoreline fishing and access to the water must be done in accordance to access agreements Camping allowed only in designated areas Noise levels to be kept at a minimum. No littering at Picnic spots All users bringing boats to go through Wash Bay All activities to be formalised and agreements drafted before the expansion of existing facilities No private slipways to be built without approval from DWS. In addition Section 21 (c). and (i) Water Use License Application (WULAs) would be required	Enforcement Officer to check all designated picnic spots Feasibility of employing local community members as part of “Working For Dams” programme to be assessed. Potential jobs include management of picnic sites/picking up of any litter DMC must ensure that all developments have been approved by DWS and DMC. Requirements of National Water Act and National Environmental Management Act must be taken into account All developments should have an approved Environmental Management Plan (EMP) to ensure construction does not impact on Dam UPN system to be put in place DMC to take seasonal water level changes into account
Zone B	Recreation and Development	Expansion of facilities/infrastructure for recreation Development of facilities/infrastructure for development/training Development of facilities/infrastructure for tourism (Nature sensitive accommodation) Shoreline fishing Shoreline fishing competitions Fishing Camping/Accommodation Birding Picnicking Access to surface water for recreational purposes and potential commercial/smallscale fisheries	Camping, birding, hiking, picnicking, shoreline fishing and access to the water must be done in accordance to access agreements Camping allowed only in designated areas Noise levels to be kept at a minimum. No littering at Picnic spots All users bringing boats to go through Wash Bay All activities to be formalised and agreements drafted before the expansion of existing facilities No private slipways to be built without approval from DWS. In addition Section 21 (c). and (i) Water Use License Application (WULAs) would be required	Enforcement Officer to check all designated picnic spots Feasibility of employing local community members as part of “Working For Dams” programme to be assessed. Potential jobs include management of picnic sites/picking up of any litter DMC must ensure that all developments have been approved by DWS and DMC. Requirements of National Water Act and National Environmental Management Act must be taken into account All developments should have an approved Environmental Management Plan (EMP) to ensure construction does not impact on Dam Wash Bay system to be put in place UPN system to be put in place DMC to take seasonal water level changes into account Dark sky guidelines to be taken into account when assessing development plans
Zone C	Management – No Public Access	Fire management Invasive alien species clearing Management of Dam Infrastructure Access to surface water for management purposes	N/A	N/A

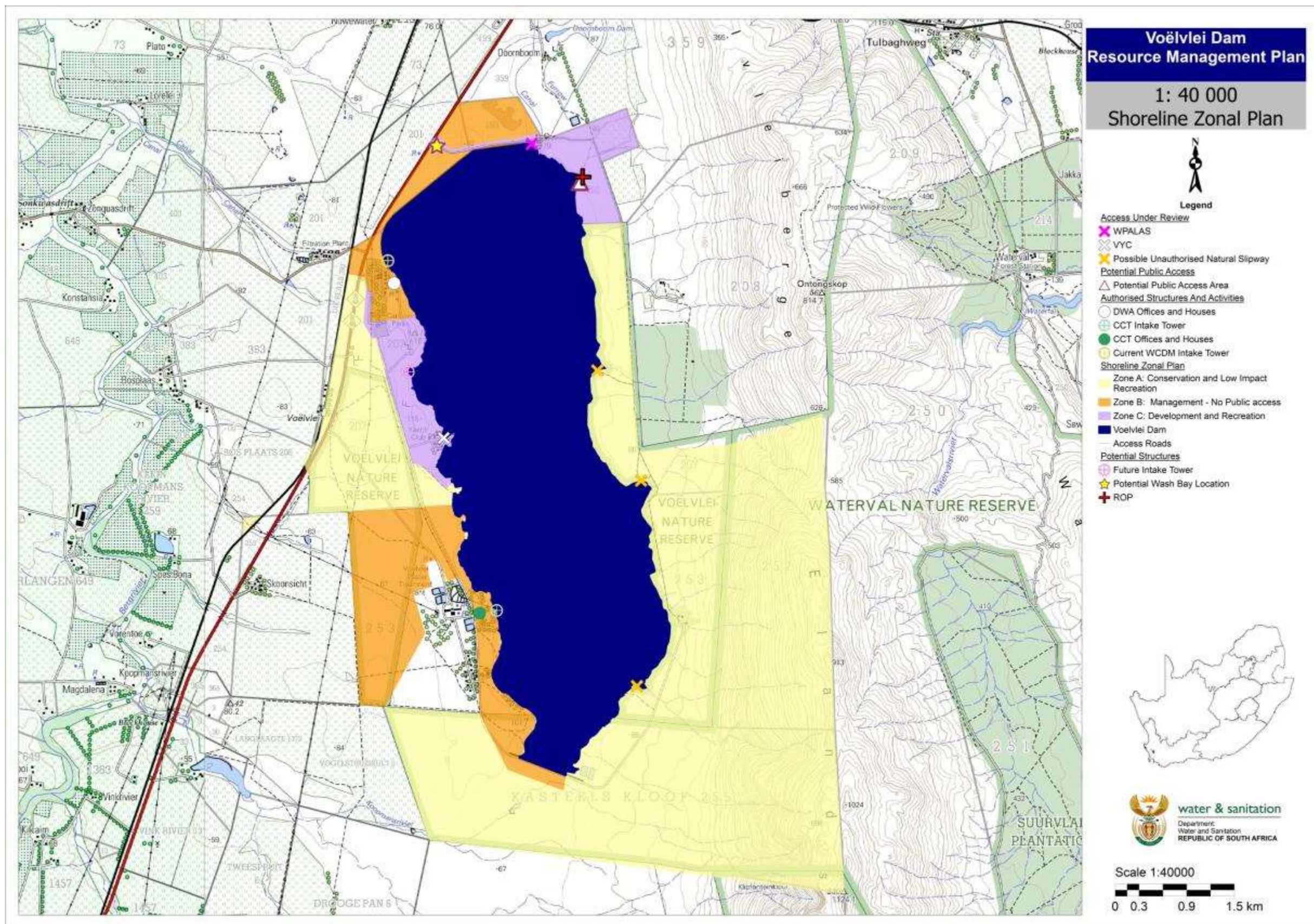




Figure 21: Map of the Shoreline Zonal Plan

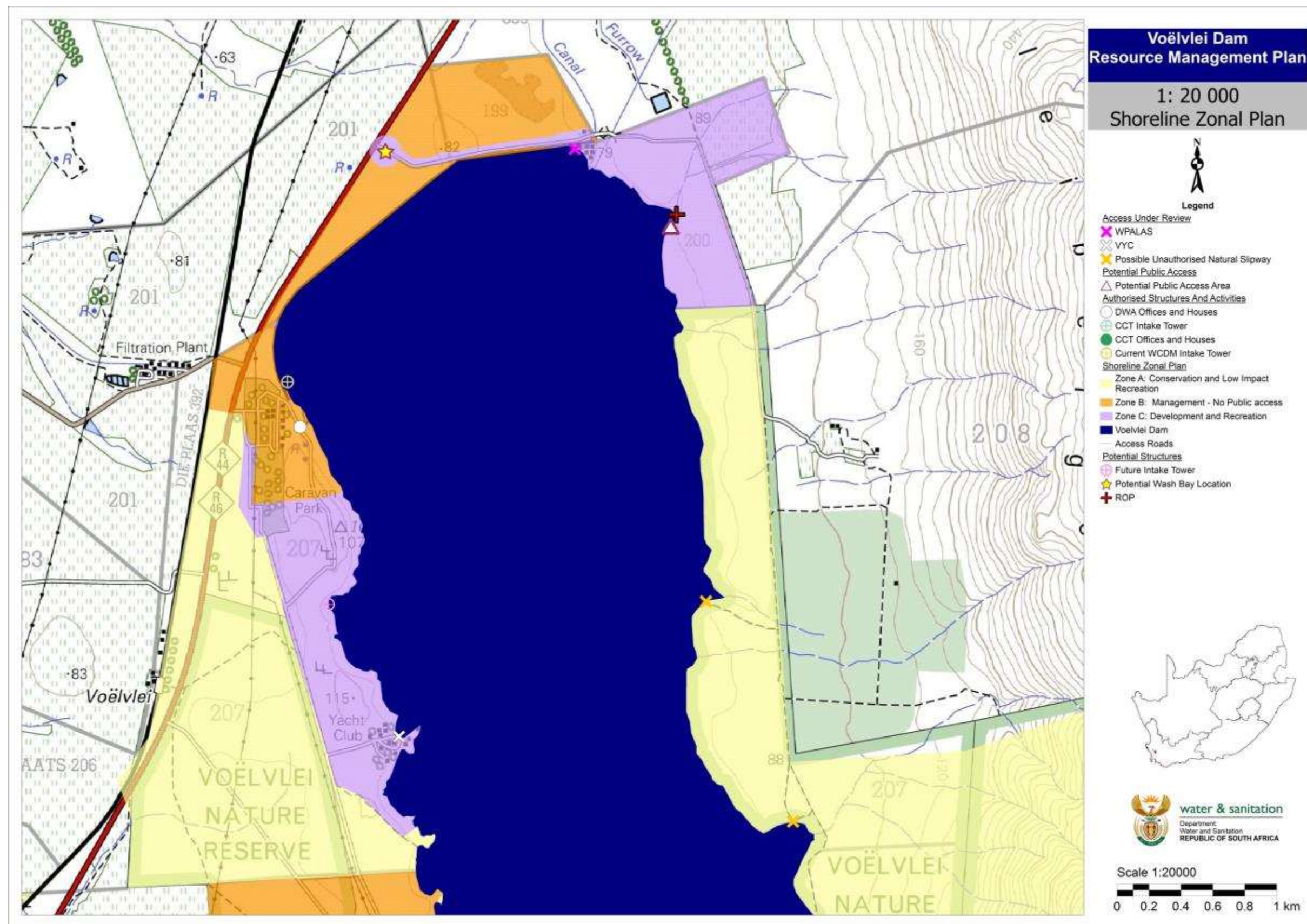




Figure 22: Map of the Shoreline Zonal Plan – Section 1

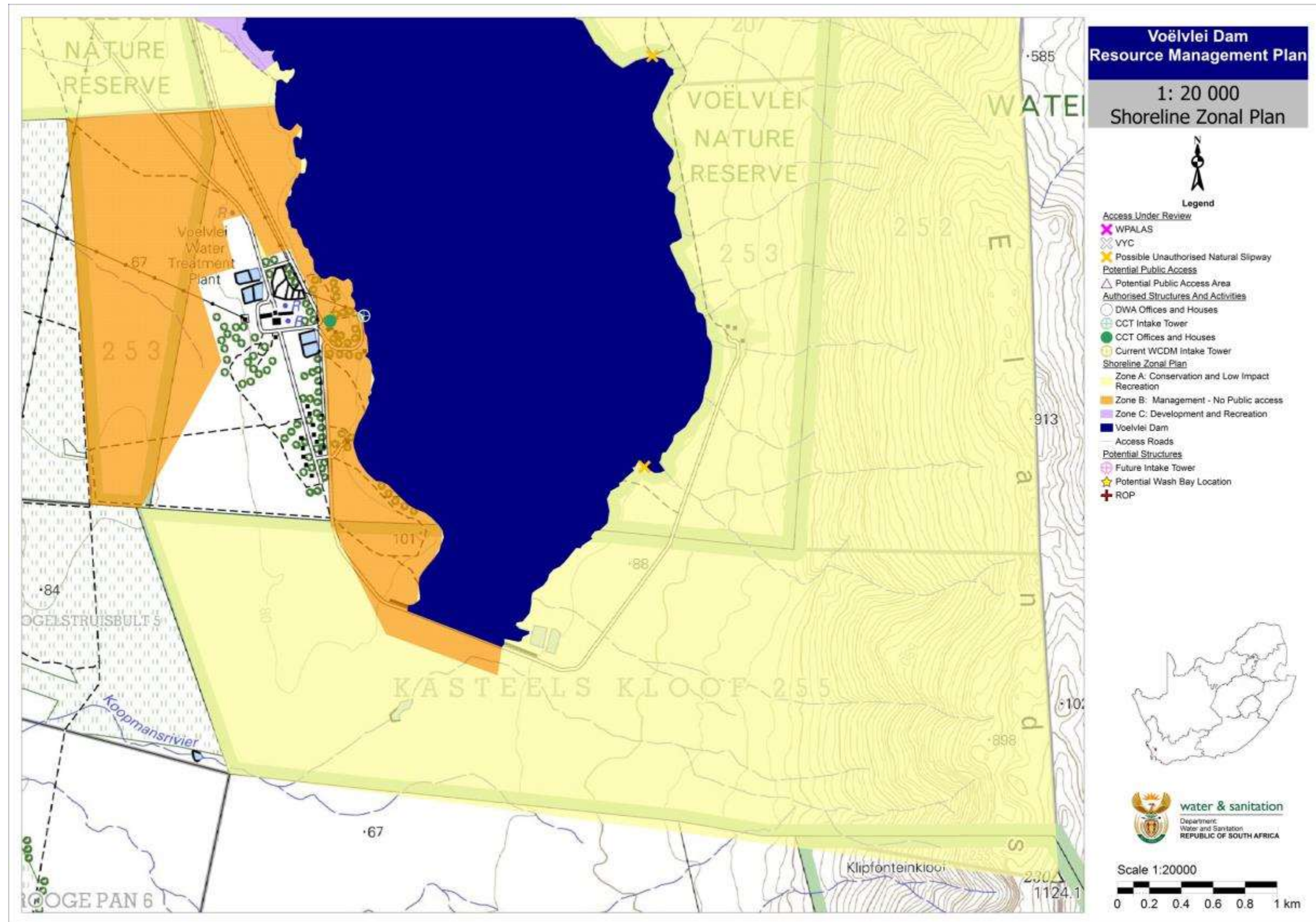


Figure 23: Map of the Shoreline Zonal Plan – Section 2



4.5 Strategic Plan

The Strategic Plan is informed by the objectives determined during the Visioning exercise and through research on feasible opportunities for the Dam.

Objective category/major objective	What	Why	How	Who
Improved and Equitable Access for the Surrounding Community	Public day visitors and fishing area to be created	<p>At this point there is no public access point at the Dam and thus the local community do not make use of the Dam</p> <p>In addition, to the public access area, a fire management plan should be compiled as part of the management and operation of the area to ensure that recreational use does not increase potential fires.</p>	<p>Discussions with Cape Nature Regarding the potential for signing an additional agreement with them which would include recreational use</p> <p>Should this not be feasible, it is suggested that DLM be approached as their IDP places a strong emphasis on eco-tourism and job creation</p> <p>This would be dependent on DLM's capacity. It may be necessary for a PPP process to be undertaken for the management of recreational use, eco-tourism activities and the public access area</p> <p>Once agreements/PPPs are in place, a fire management plan should be compiled and should specifically deal with the use of braais at the public access area and clubs. Based on this plan, the DMC should make a decision on whether braai facilities should be put in place.</p>	DWS Cape Nature/DLM/IA
	Information brochures to be developed to inform communities about the potential uses of the Dam and how to join recreational clubs and societies. Information on water quality issues should also be included.	<p>The local community is unaware of the potential recreational uses at the Dam</p> <p>There is also no information on the process to be followed when joining recreational clubs</p>	<p>The DMC together with recreational clubs should develop information brochures regarding the Dam</p> <p>It is also suggested that informative workshops/presentations be given to the Ward Councillors/Schools/Churches etc. so that partnerships can be developed</p> <p>Brochures should be given out at public open days</p>	DMC Recreational Clubs
	Potential for community access card to be assessed	Currently the local community does not make use of the Dam. It is suggested that a public visitors area be created however the entrance fees should not be prohibitive	Agreement with IA to include community access card/sliding scale for local community members	DWS Cape Nature/DLM/IA

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Objective category/major objective	What	Why	How	Who
Swift Resolution of Land Matters and Unauthorised Activity	Land matters to be resolved and new agreements with adjacent landowners to be drawn up	Adjacent commercial activity does appear to take place on State Land. Although the extent of this is unknown There is also a land claim which needs to be resolved	Agreements with Silberfontein Guest House should be put in place. Disputes (such as land claims) to be resolved	DWS
Improved Management and Safety	Formalised institutional structure to be implemented. Detailed discussions with all relevant local municipalities, district municipalities and provincial departments to be undertaken to ensure adequate capacity is in place	There is currently no formal institutional structure at the Dam	DWS to meet with specific stakeholders to ensure adequate capacity occurs in all departments for effective management of the RMP. Based on these discussions, additional interventions regarding capacity creation and training may be required DWS to appoint members of the DMC, OMC and RSC as per the RMP	DWS
	Updated agreements taking into account RMP	The RMP has made a number of recommendations which need to be taken into account in all agreements	All agreements to be updated in light of the RMP requirements	DWS
	Unique Positioning Number (UPN) System to be implemented including a formalised Rescue Operation Point	There is no overarching safety system at the Dam There is also no mechanism for reporting environmental and recreational emergencies	UPN system to be instituted at the Dam Formal ROP to be selected	DWS
	Standardised AtoN and demarcation system to be implemented	There is currently no formalised and standardised AtoN and demarcation markers at the Dam	SAMSA and DWS to undertake survey of the Dam to identify obstacles and areas which require demarcation markers AtoN and Demarcation Markers to be put in place Agreements between SAMSA and DWS and other recreational clubs regarding AtoN and Demarcation markers to be put in place	DWS SAMSA Recreational Clubs CIWSP
	Lifeguard skills training and first aid training to ensure safe public use of the Dam.	The Dam has very strong and unpredictable winds which increase safety risks. However by initiating lifeguard skills training and first aid training as part of a potential "Working for Dams" Project, there is an opportunity to provide skills training to local community members while	Feasibility of a "Working for Dams" Project including funding for skills training and job creation to be determined Local community members to be trained	DWS



Objective category/major objective	What	Why	How	Who
		at the same time ensuring safe public use		
Development of Increased Eco-tourism and Recreational Opportunities	The potential for nature sensitive overnight facilities (electricity free “rustic” facilities).	<p>During consultation, there was a strong focus on maintaining the sense of place and natural element of the Dam. There is therefore an opportunity to increase tourism to the Dam through nature sensitive rustic accommodation, hiking trails and cycling trails. Discussions with similar rustic lodges to be undertaken (such as Kosi Forest Lodge which is high income accommodation but is electricity free and environmentally sensitive) would provide some guidance of this type of accommodation.</p> <p>In addition, the area around the Dam has high levels of floral and faunal biodiversity, heritage sites (in the form of Rock Art) and extreme dark skies which enable star gazing. This offers an opportunity for creating a unique tourism experience through a Back to Basics Hike. This hike could also be used for skills development and job creation as oral history regarding the area (and potential linkages to Drakenstein Prison and Nelson Mandela) could be used to include the local community</p> <p>Dark sky guidelines should be taken into account when designing the accommodation as well as alternative energy sources such as solar or wind energy. It is therefore suggested that Cape Nature be approached regarding these additional elements. Should this not be feasible, it is suggested that DLM be approached as their IDP places a strong emphasis on eco-tourism and job creation</p> <p>This would be dependent on DLM’s capacity. It may be necessary for a PPP process to be undertaken for the management of recreational use, eco-tourism activities</p>	<p>Discussions with similar rustic lodges to be undertaken (such as Kosi Forest Lodge which is high income accommodation but is electricity free and environmentally sensitive)</p> <p>Potential for PPP for accommodation to be investigated</p> <p>Dark sky principles should be incorporated into the design of this to ensure that the dark sky environment is conserved</p>	DWS Cape Nature/DL M/IA



Objective category/major objective	What	Why	How	Who
		and the public access area.		
	Potential of creating an overall “Back to Basics” hiking trail which includes astronomy, Rock Art, plant and animal biodiversity. This could be linked to skills development and job creation initiatives in the area; and	The area around the Dam has high levels of floral and faunal biodiversity, heritage sites (in the form of Rock Art) and extreme dark skies which enable star gazing. This offers an opportunity for creating a unique tourism experience This hike could also be used for skills development and job creation as oral history regarding the area (and potential linkages to Drakenstein Prison and Nelson Mandela) could be used to include the local community	Discussions with Cape Nature Regarding the potential for signing an additional agreement with them which would include recreational use Should this not be feasible, it is suggested that DLM be approached as their IDP places a strong emphasis on eco-tourism and job creation This would be dependent on DLM’s capacity. It may be necessary for a PPP process to be undertaken for the management of recreational use, eco-tourism activities and the public access area Dark sky principles should be incorporated into the design of this to ensure that the dark sky environment is conserved	DWS Cape Nature/DLM/IA
	Potential hiking/cycling trails to be assessed.	The area around the Dam is mountainous and has been used for WBAC adventure races. There is a potential to set up additional cycling trails at the Dam	Discussions with Cape Nature Regarding the potential for signing an additional agreement with them which would include recreational use Should this not be feasible, it is suggested that DLM be approached as their IDP places a strong emphasis on eco-tourism and job creation This would be dependent on DLM’s capacity. It may be necessary for a PPP process to be undertaken for the management of recreational use, eco-tourism activities and the public access area	DWS Cape Nature/DLM/IA
Improved Resource Management	Water quality monitoring to be undertaken together with an assessment of the main pollution sources	Water quality in the area is a concern and there have been algal blooms at the Dam in the past	An assessment of the main pollution sources to the Dam should be undertaken. This should include the adjacent chicken farms as well as the Tulbagh catchment DMC to take into account the results of the study when assessing event applications that require swimming	DWS WCDM CCT
	Shoreline management plan	There is no comprehensive shoreline management plan.	A consultant should be appointed to compile the shoreline	DWS

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Objective category/major objective	What	Why	How	Who
	to be compiled and implemented	This is especially important in regards to management of alien invasive species, fire breaks, erosion control etc.	management plan in line with best practices. This should be included as part of the agreement with Cape Nature/DLM/IA.	Cape Nature/DLM/IA
	Landuse management study to assess land use practices in the catchment and their impact on water quality and availability at the Dam. This should include aspects related to invasive plant and farming practices etc	Land use practices in the catchment can have a negative impact on water quality and availability at the Dam. During consultation concern regarding poor water quality as well as the impact of poor agricultural practices and unsustainable township development was raised. A land use management study will identify poor land use practices and identify mechanisms in which these can be improved.	Investigation into land use and land use management in the area and assessment of land use practices that will improve water quality and ecosystem services Discussions between Cape Nature, WCDM, CWDM CCT, DAFF, DLM and DWS and farmers to facilitate instituting the findings of the study	DWS Cape Nature WCDM CWDM DLM DAFF DLM
	Education programmes regarding the impacts of alien invasive species	There are numerous potential aquatic invasive species, invasive fish species and terrestrial invasive species in and around the Dam that have numerous negative impacts. Ensuring that recreational users are aware of the issues caused by these species is necessary	DMC together with Cape Nature, DEA and DEA&DP to compile an invasive species education programme	DMC Cape Nature DEA&DP
	Fish Management Plan for carp and catfish to be compiled and implemented. The aim of this plan would be to sustainably reduce the numbers of these species so to improve angling of other species at the Dam	A fish management plan should be compiled to sustainably control the numbers of carp and catfish at the Dam which have grown exponentially over recent years and have already had an impact on recreational use (as bass has been effectively removed from the Dam and bass fishing can no longer occur).	An environmental consultant should be appointed to compile a Fish management plan for carp and catfish The consultant should meet with DEA and Cape Nature to ensure best practices are put in place Consultation with angling clubs should also be undertaken	DWS Cape Nature DEA Angling clubs
	Expansion of the Working for Water Programme to remove alien plant species in the area	There are a large number of terrestrial invasive species in the QDS around the Dam. This has potential negative implications for the management of the Dam as terrestrial invasive plant species are known to result: Loss of indigenous species as a result of competition for space and resources with alien species; Disruption of aquatic and riparian ecosystems;	Discussions with Working for Water regarding the need to expand the programme in the area	DWS DMC Cape Nature Working for Water

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Objective category/major objective	What	Why	How	Who
		Erosion of river banks and riparian areas; Alterations in environmental flows as a result of water use by invasive alien plants; and An increased fire risk, which destroys indigenous habitats.		
	Potential for commercial fishing or small scale fisheries programme to be assessed	DWS, CapeNature and DAFF are currently involved in establishing the rules for a pilot commercial fishery on Voelvlei and Theewaterskloof Dams. Substantially increased harvesting of catfish and carp from Voelvlei will likely benefit recreational angling in the dam as well as improve water quality.	A feasibility assessment (including potential impacts on water quality) should be undertaken and if possible the PPP process should be followed	DWS Cape Nature/DL M/IA DAFF
	Heritage assessment/study of the state of the Rock Art site and to determine methods of preservation	The exact state of the Rock Art site is unknown. It may be necessary to implement preservation measures. It may also be possible to include the site as part of guided back to basics hikes	A Heritage Consultant should be appointed to determine the exact state of the rock art, the potential preservation measures and feasibility of including the site in guided hikes. The findings should be presented to the DMC and be included as part of the feasibility of the Back to Basics Hike	DWS SAHRA Cape Nature/DL M/IA DMC
	Siltation prevention measures to be assessed and put in place	Some concerns regarding increased siltation was raised.	Siltation measures should be assessed as part of the shoreline management plan	DWS Cape Nature/DL M/IA DMC
	Wash bay system to be implemented to prevent alien invasive species infestations	The Dam is currently not known to be infested with aquatic invasive species however the three aquatic invasive species are known to occur in the 3319AC QDS and thus it is imperative that prevention measures are put in place to prevent future infestation	DWS to undertake site visit to determine best location for Wash Bay (it is suggested that the Wash Bay be located at the Public Access Area or VYC) Wash Bay to be designed Wash Bay to be constructed Wash Bay agent and SAMSA Enforcement Agent to be appointed	DWS Cape Nature/DL M/IA DMC

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Objective category/major objective	What	Why	How	Who
Education and Skills Development	Coordination between Yacht Club, local schools and SAS to introduce youth sailing programme at the Dam	Due to the strong wind, the Dam offers ideal conditions for Sailing training. In addition there is no youth sailing programme in the Boland area. VYC has expressed interest in starting a youth sailing programme. This could be extended into the local community and could increase equitable access and use	Discussions with VYC and SAS regarding the feasibility of a Youth Sailing Programme to be undertaken Feasibility assessment to be undertaken Funding mechanisms to be determined Sailing programme to be implemented	DWS VYC SAS
	The feasibility of a practical school science programs in biology, zoology, geology, meteorology, astronomy to be assessed	The dam and its environs provide excellent opportunities for practical science observations in a number of the natural sciences and can thus serve as an outdoor classroom/laboratory	Discussions between local educators, Cape Nature, Clubs, SA Astronomical Observatory, Astronomical Society of S.A., National Botanic Institute, Botanical Society of S.A., Geology Society of S.A. to take place to identify funding sources and determine feasibility of school science programmes. If feasible, development of practical science programs to utilize opportunities offered by Voelvllei and environs	Local educators, Cape Nature, Clubs, SA Astronomical Observatory, Astronomical Society of S.A., National Botanic Institute, Botanical Society of S.A., Geology Society of S.A.
	Skills training programmes including life guard training, first aid training, astronomy, rock art, and biodiversity to	The Dam has very strong and unpredictable winds which increase safety risks. However by initiating lifeguard skills training and first aid training as part of a potential "Working for Dams" Project, there is an opportunity to	Feasibility of a "Working for Dams" Project including funding for skills training and job creation to be determined Local community members to be trained Feasibility of Back to Basics Hike including community	DWS Cape Nature/DLM/IA

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Objective category/major objective	What	Why	How	Who
	be developed as part of eco-tourism development and community skills training	provide skills training to local community members while at the same time ensuring safe public use. In addition, there are also potential eco-tourism training programmes that could be implemented including astronomy for star gazing and rock art and biodiversity for guiding of hikes	training to be assessed	



5 WAY FORWARD

5.1 Compilation of Business Plans

Based on the strategic objectives identified for Voëlvlei Dam, a suite of BPs were developed. The BP describes the financial management and operational requirements to implement the Objectives of the RMP. The Financial Plan will facilitate the implementation of listed and recommended activities in the RMP.

The Business Plans are approached in the following manner:

- Identify Strategic Objective – informed by RMP;
- Determine Interventions – Each objective was divided into practical interventions;
- List Detailed Activities – Interventions were further divided into activities, in order to establish timeframes and provide guidance to the entity who implements the business plan;
- Establish Key Performance Indicators per intervention – Key Performance Indicators allow for monitoring and evaluation;
- Establish timeframes per activity;
- Establish a budget per activity; and
- Determine Funding sources – Innovative mechanisms to obtain funding were identified.

5.2 Review of RMPs and Business Plans

The RMP presents a twenty-year vision for the Dam. This vision will be implemented through the RMP which will be revised and updated every five years, according to changing priorities, constraints and achievements. Within a five-year cycle of the RMP, the BPs will identify key objectives in line with a changing status quo and potential change in circumstances. After five years the RMP will be reviewed and updated so to identify new objectives in line with the vision for the Dam.

The BPs are updated annually.



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