FINAL RESOURCE MANAGEMENT PLAN

VYGEBOOM DAM







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- Members of the community who took part in informal interviews around the Dam;
- The Ward Councillor of Ward 23; and
- The Embuleni Traditional Council.



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Annual Review of Business Plans	August	2014	2015	2016	2017	2018
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Amendments Page

Date	Nature of Amendment	Amendment No.
6 November 2013	First Draft for DWS Review	1
20 May 2014	Draft RMP for PSC Review	2
08 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
16 March 2015	Final RMP	6



Executive Summary

According to the Guidelines for the Compilation of Resource Management Plans (2006), the main aim of and 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 Resource Management Plan is thus a planning tool aimed at working within the requirements of existing policies levels, 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. This focus on institutional arrangements is accompanied by a Zonal Plan together with a detailed Strategic Plan. In addition, a Financial Plan provides guidance on what funds can be collected and how these should be used. Together these components provide a comprehensive guide on the "what?"; "why?"; "how?" "who?" and of the management of prioritised Government Waterworks.

Vygeboom Dam was completed in 1971 and is situated about 53 km downstream of Nooitgedacht Dam and about 85 km upstream of the international border between South Africa and Swaziland (AfriDev, 2005). The Dam was constructed primarily to supply water to Eskom's coal-fired power stations on the Highveld (DWAF 1986) through transfer to the Olifants Water Management Area. There is also a canal transferring water from the Gladdespruit and Poponyane Rivers into Vygeboom dam (DWA, 2010).

Vygeboom Dam forms part of the Inkomati Water Management Area which falls wholly within South Africa, however it is important to note that the Inkomati Water Management Area forms a part of the Inkomati International River Basin which is shared between the Republic of Mozambique, the Kingdom of Swaziland and the Republic of South Africa. All the rivers in the Inkomati WMA flow through Mozambique to the Indian Ocean. Thus, the Inkomati Water Management Area has certain international obligations, in terms of the quality and quantity of water that flows across its borders (Inkomati CMS, 2010).

The Dam is not used officially for domestic use and according to the Chief Albert Luthuli Local Municipality Water Sector Development Plan (2011), the area in the municipality are mainly supplied from run-off from rivers and groundwater abstraction. A number of communities around the Dam however do not have access to potable water and thus the Dam is an important source of water for washing, domestic use and for cattle watering.

The Dam is used extensively for recreational use by a number of separate recreational clubs. Recreational use through these clubs includes a number of motor boat activities, bass fishing and shore fishing. This recreational use was in the past governed through lease agreements with specific clubs. All agreements however are currently under review and will be aligned with the RMP requirements.

There are also a number of current and proposed commercial activities taking place on the Dam including Private Resorts, Private Estates and House Boats. These activities are currently not in line with National Treasury requirements for commercial use on a State Resource.

Recreational use and management of the Dam has also been managed through the current Vygeboom Dam Sustainable Utilisation Plan which was compiled by the Department of



Water and Sanitation in 2004. The aim of the SUP was to ensure sustainable utilisation and equitable access of the State Resource. However, there have been a number of changes since 2004 and the current Sustainable Utilisation Plan is outdated. It also does not take into account the requirements of the Guidelines for the Compilation of Resource Management Plans (DWA, 2006). The RMP for Vygeboom Dam relies on the SUP as a starting point.

Extensive research and public consultation was then used to update the SUP into an RMP.

The general process followed to compile the RMP is detailed in the figure below. It is followed by a summary diagram to explain the Sustainable Utilisation Plan update process.



Figure 1: RMP Process (DWA, 2006)

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Figure 2: SUP Update Process

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 RMP through the establishment of a Vision for the Dam with a number of Key Objectives.

The key recommendations of the Vygeboom Dam RMP are as follows:

 As a cornerstone of the Resource Management Plan, the formation of a three-tiered management system including a Dam Management Committee, Operations Management Committee and Resource Management Plan Steering committee should take place;

- A Memorandum of Agreement with the Embhuleni Traditional Council regarding the management of the public access area and surface water should be investigated. It is envisioned that the Traditional Council would manage access and infrastructure at the public access area and monitor compliance to the Safety Management System;
- A Safety Management System should be developed and should include a Wash Bay at the Public Access Area and the Unique Positioning Number System.



Agreements between Department of Water and Sanitation and the recreational clubs should include the provision of safety officer to ensure that all members have gone through the Wash Bay System;

- Implementation of standardised and harmonised Aids to Navigation and Demarcation Markers;
- An Event management system should be implemented and rates for events and advertising should be determined;
- All private clubs/association's on state land will need to be managed through Lease Agreements. Further all commercial activities should meet National Treasury Requirements;
- Effluent Disposal Management Plan should be developed;
- A Water Quality Management Plan should be developed to address the impact of mining pollution;
- A rehabilitation plan should be developed to rehabilitate the large eroded area adjacent to the Public Access Area;
- An alien invasive species management plan should be developed. This plan should include aquatic and terrestrial plant species as well as fish species;
- A veld burning plan should be developed to manage bush encroachment. This should be done in consultation with necessary stakeholders such Mpumalanga Tourism and Parks Authority and Department of Agriculture Forestry and Fisheries;
- A Waste Management Plan, which will address solid waste will be developed;
- The Public Access Area picnic area to be formalized;
- A Marketing plan including road signs and a website should be compiled and implemented;
- The feasibility of creating additional sports fields/courts at the public access

area to be determined. This would create a 'recreational hub' at the Dam where the youth of the surrounding communities could benefit from a number of water and land based sports;

- The feasibility of creating a stock watering hole in the community area around the Dam to be investigated;
- The feasibility of small scale water purification plant and potable water service infrastructure to the local community to be determined;
- The feasibility of the implementation of a local community access card/subsidy programme to subsidize access for community members should be determined;
- Information programmes to be implemented by the Dam Management Committee to educate local community about the benefits of the Dam should be implemented;
- Trained Safety officer with authority should be put in place;
- Potential for Inland Water Life savers to man public access areas/swimming areas to be investigated;
- Clubs to be affiliated to National Clubs such as under South African Sports Confederation and Olympic Committee and thus incorporate training and development requirements;
- Feasibility of opening a Swimming School to be determined (co funding mechanisms should be also be researched);
- The use of the Dam for Science education and learning by local schools to be investigated; and
- The Dam Management Committee should play an active role in Environmental Impact Assessments and Basic Assessments and to act as a custodian for the Dam.



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Figure 24: Shoreline Zonal Map – Section 2

Acronyms and Abbreviations

AGIS	Agriculture Geographic Information System
AtoN	Aids to Navigation
BP	Business Plan
CALLM	Chief Albert Luthuli Local Municipality
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CCA	Carrying Capacity Assessment
CITES	Convention on the International Trade in Endangered Species
CIWSP	Cooperative Inland Waterways Safety Programme
СМА	Catchment Management Agency
CMS	Catchment Management Strategy
COGTA	Department of Cooperative Governance and Traditional Affairs
CPSI	Centre for Public Service Innovation
DAFF	Department of Agriculture, Forestry and Fisheries
DEDT	Mpumalanga Department of Economic Development and Tourism
DEA	Department of Environmental Affairs
DMC	Dam Management Committee
DMR	Department of Minerals Resources
DoT	Department of Transport
DRDLA	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EC	Electrical Conductivity
ECC	Effective Carrying Capacity
ETC	Embhuleni Traditional Council
GDP	Gross Domestic Product
GGP	Gross Geographic Product
GIS	Geographical Information System
GN	Government Notice
GVA	Gross Value Added
GVA	Gross Value Added
На	Hectares
I&APs	Interested and Affected Parties

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IA	Implementing Agent
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IBA	Important Bird Area
IDP	Integrated Development Plan
IIRB	Inkomati International River Basin
IUCMA	Inkomati-Usuthu Catchment Management Agency
IWRM	Integrated Water Resource Management
LAAP	Local Accountable AtoN Parties
MAP	Mean Annual Precipitation
MOA	Memorandum of Agreement
МТРА	Mpumalanga Tourism and Parks Agency
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
NWRI	National Water Resource Infrastructure
NWRI: IEE	National Water Resource Infrastructure: Integrated Environmental Engineering
ОМС	Operational Management Committee
PCC	Physical Carrying Capacity
PFMA	Public Finance Management Ac (Act 29 of 1999)
PPP	Public Private Partnership
PSDES	Provincial Spatial Economic Development Strategy
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
SAPS	South African Police Service
SASCOC	South African Sports Confederation and Olympic Committee
SMME	Small, Medium and Micro Enterprises
SPC	Strategic Plan for Commercialization
SRSA	Department of Sports and Recreation
SUP	Sustainable Utilization Plan
THETA	Tourism, Hospitality and Sports Education Training Authority
ToR	Terms of Reference
UPN	Unique Positioning Number (used in the CIWSP)



WDSP	Water Development Sector Plan
WMA	Water Management Area
WUA	Water User Association
WULA	Water Use Licence Application
WWTWs	Waste water Treatment Works



1 WHAT IS A RMP AND WHY IS IT NECESSARY?

A Resource Management Plan (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 of the Dam without compromising 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 benefits with minimal and economic disturbances and environmental impacts.

RMPs are managed by the National Water Resource Infrastructure Branch (NWRI) of the Department of Water and Sanitation (DWS). This branch is tasked with constructing, operating and maintaining strategic water resource infrastructure in an efficient way so to ensure 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 involved with the Dam

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	Responsible for biodiversity management within the dam including alien
Affairs (DEA)	invasive species.
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 its use of the Dam and its mandate regarding the 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. Therefore the RMP is a planning tool aimed at meeting the expectations of users without sacrificing the environment.



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2 WHERE ARE WE NOW?

2.1 Overview of the Water Management Area (WMA)

Vygeboom Dam occurs in the Komati West Catchment in the Upper Komati Sub Area of the Imkomati Water Management Area (IWMA). All rivers in the IWMA are shared with Mozambique while the Komati and its tributary, the Lomati, are also shared with Swaziland. Due to the fact that the Dam falls within an area of international strategic importance, information is provided at the WMA level and not the catchment level.

In terms of location, the IWMA is situated in the north-eastern part of South Africa and falls entirely within Mpumalanga Province. It borders on Mozambique in the east and Swaziland in the south-east. The WMA comprises several parallel sub-catchments, the Sabie, Crocodile, Komati West and Komati North, which drain eastwards towards Mozambigue to form the InKomati River which discharges into the Indian Ocean just north of Maputo (DWA, 2010). The elevation of the area varies from 2000m above sea level in the west to as low as 140m above sea level in the east. The climate also varies from temperate on the Highveld to sub-tropical in the eastern Lowveld. The WMA is in a summer rainfall area, with the mean annual precipitation (MAP) ranging from over 1200 mm in the central parts to a low of 400 mm in the eastern parts and 600 mm in the western parts (DWA, 2010). The geology is complex and generally of a low waterbearing capacity.

It is important to note that currently, the area has a Catchment Management Agency (CMA) in place called the Inkomati Catchment Management Agency (ICMA) however in July 2013, the Minister of Water and Environmental Affairs proposed that the ICMA be extended to include the Usuthu Catchment and become known as the Inkomati-Usuthu Catchment Management Agency. This is still in a draft stage and thus information provided in this report deals specifically with ICMA.

2.1.1 Surface Water and River Systems

Surface water provides for 92% of the available water in the IWMA (Inkomati CMS, 2011). The Komati, Crocodile, and the Sabie catchments all encompass areas of high rainfall and steep topography, and most of the surface runoff originates from these areas. The Sand River, Nwaswitsontso and Nwanedzi river catchments have less favourable natural characteristics, resulting in intermittent and seasonal flows only.

The Runoff in the Catchment follows a similar distribution to the Rainfall Pattern. It is clear that downstream users are extremely dependant on river flow and thus the proper management and operation of upstream runoff and upstream users is vital, especially considering that most of the demands are downstream.

The rivers in the WMA all flow eastwards into Mozambique where they discharge into the sea.

The Komati River flows from just above the Nooitgedacht Dam near Carolina through Swaziland and back into South Africa before flowing into Mozambique. The Lomati River is a tributary of the Komati River and rises in the mountainous northern parts of Swaziland and southern Mpumalanga. The confluence of the Komati and Lomati Rivers is in the south-eastern part of Mpumalanga.

The main rivers in the Crocodile Catchment are the Crocodile, Elands and Kaap Rivers. The Crocodile River originates near Dullstroom and flows eastwards. The Elands River rises near Belfast and joins the Crocodile River near Nelspruit. The confluence of the Kaap and Crocodile Rivers is near Kaapmuiden in eastern Mpumalanga. The Crocodile and Komati Rivers join just upstream of the Mozambique border near Komatipoort, from where it is called the Inkomati River (DWA, 2010).

The main rivers in the Sabie Catchment are the Sabie and Sand Rivers. The Sabie River originates in northern Mpumalanga and the Sand River in



Bushbuckridge. The rivers join near Skukuza in eastern Mpumalanga. From there the Sabie River flows southeast into Mozambique where it meets the Inkomati River. The Upper Rio Uanteze comprises the Uanetse and Massintonto Rivers which both flow eastwards through the central Kruger Park to the Mozambique border and eventually join the Rio Inkomati River in Mozambique (DWA, 2010).

The main dams in the Upper Komati Sub Area are Nooitgedacht and Vygeboom Dams. These dams make up the majority of the available yield in this sub-area. In terms of water availability, there is limited yield due to the large afforested area that occurs in the Upper Komati Sub Area (DWAF, 2004).

The key issue in this sub-area is the transfer of water out of the WMA to the Olifants WMA. A number of important canal systems that distribute water to irrigators in the Crocodile, Sabie and Sand River catchments (DWA, 2010). Transfers from Vygeboom Dam and Nooitgedacht Dam to the Olifants WMA constitute the main water use of the water resources of this sub-area (DWAF, 2004). The other significant water use is irrigation, while domestic water use is very limited.

Currently, the yield out of the Vygeboom and Nooitgedacht dams is about 97 million m³/annum (DWAF, 2004). However, the National Water Resource Strategy (NWRS) reserves this transfer (i.e. requires national authorisation) up to 132 million m³/annum which suggests that the transfer out of the sub-area could increase in the future (although new infrastructure would be required).

However, an important factor to note is the position of Swaziland downstream of the subarea. There is a Treaty between South Africa and Swaziland, as well as the more recent Interim IncoMaputo Water Use Agreement, both of which influence the management of the water resources of this sub-area.

2.1.2 Land Use

The Inkomati WMA is important for conservation and contains a number of protected areas,

natural heritage sites, including a number of cultural and historical sites, and other conservation areas. The main protected area in the WMA is the Kruger National Park (DWA, 2010). In addition, there are a number of provincial reserves in the WMA managed by the Mpumalanga Tourism and Parks Agency (MTPA), including Songimvelo Nature Reserve that is part of the Songimvelo-Malolotja Transfrontier Conservation Areas with Swaziland. There are also a number of private game reserves adjacent to the Kruger National Park and also in other parts of the WMA. Some 35% of the area of the WMA is game reserve.

Economic development in the WMA has been stimulated by a combination of favourable conditions, mineral deposits, the scenic beauty, abundant wildlife and the availability of water (DWAF 2003). Gold and other minerals were mined in the vicinity of Barberton, but this mining has now reduced to small scale operations. Extensive coal mining takes place in the south-west of the WMA. This coal is used mainly for thermal power stations at the boundary of this WMA and the neighbouring Olifants WMA. Irrigation of fodder, grain, tobacco, citrus, tropical fruit and sugar takes place, while large areas of land in the escarpment have been developed under commercial forestry. Tourism is an important activity, centred around the popular Kruger National Park (DWAF 2003, DWA, 2010).

In terms of agriculture, the Lowveld area has a warm sub-tropical climate suitable for growing many frost-sensitive crops and tropical fruit such as bananas, avocados, pawpaws and mangoes. Sugar cane is grown as an irrigated crop in mostly the eastern parts of the lower Crocodile and Komati valleys and there are sugar mills in this area at Malelane and Komatipoort. The higher mountainous areas are suitable for forestry and large plantations of pine and eucalyptus supply the wood, pulp and paper industries with one of the largest paper mills in the country located at Ngodwana. Much of the manufacturing is related to agriculture and forestry, with Nelspruit a developing commercial and industrial centre (DWA, 2010).



There are significant areas of the WMA which are communal land. These are in the south-west between the Swaziland border and the boundary between the Inkomati and the Usutu to Mhlatuze WMAs; in the south-east in the area that borders both Swaziland and Mozambique and in the centre of the WMA running from south to north with much of this area bordering on the Kruger National Park (DWA, 2010).

2.1.3 Water Quality

According to the Inkomati CMS (2011), Water Quality in the ICMA as a whole can be said to be generally good. However, there have been trends identified that are worrisome. Electrical Conductivity (EC) is rising steadily in all the catchments, most likely due to the increasing concentration of various dissolved substances.

Further, faecal coliform pollution in the IWMA is a common feature and it is affecting the use of the water resource. Pollution of the rivers by untreated or semi-treated sewage often caused by a lack of funds and capacity is a major problem (Inkomati CMS, 2011).

The major impacts on the water quality in the catchment are associated with diffuse sources including agricultural fertilisers, agricultural insecticides, pesticides and fungicides, sewage run-off and atmospheric deposition; and with point sources which include mining effluent, domestic sewage effluent and industrial effluent and organic pollutants (AfriDev, 2006).

In the Upper Komati region (Nooitgedacht Dam to Vygeboom Dam catchment) water quality appears to be in a good condition as the land use activity is minimal. The main impacts are related to dry land farming and forestry. The catchments are characterised by few agricultural practices and Carolina being the only major settlement. Commerical forestry is the dominant farming activity in this region. The slight increases in electrical conductivity, pH, alkalinity and sulphate readings in this region could be due to atmospheric depositions and coal mining in the area. It must be noted that although the current water quality is currently good, there is a significant threat from proposed coal mining activities in the Region.

Coal mining activities could also increase the sulphate levels in the water, which would have major implications for Eskom, and by implication to all electricity users. The continued supply of good quality water to Eskom is of strategic national importance and strategies need to be developed to secure the quality of this water (DWAF, 2004).

In the middle Komati River, in the reach between Vygeboom Dam and Swaziland, the water quality appears to be fairly good. There is minimal land use activity and hence the water quality is fairly unimpacted. This region also experiences higher rainfall which is a contributing factor to the quality observed in the river. The land use is characterised mainly by extensive grazing, limited cultivated land and a few settlements. The surrounding area of the Gladdespruit confluence with the Komati River is characterised by citrus and maize farming activities. The main water quality issues observed are elevated concentrations of the nutrients (phosphate, ammonia, nitrates) and slightly elevated salt concentrations at Hoogenoeg. As the middle Komati is more populated with a higher number of urban settlements, the water quality observed could be attributed to sewage effluent discharges and increased organic pollution. A further impact in the catchments are the water quality problems related to the changes in the river flows due to the transfers from the Vygeboom and Nooitgedacht Dams for Eskom (Inkomati CMS, 2011).

The water quality in the lower Komati River appears to be significantly impacted with increased concentrations being observed for most water quality variables at the last three monitoring stations, namely X1H003, X1H042 and X2H036. As the Komati River flows through Swaziland it is bordered by intensive agricultural activity (within very close proximity of the river) and this continues into South Africa. This part of the catchment is characterised by intensive agricultural activity and intensive irrigation. This has resulted in the deterioration of the water



quality. The available data shows that the main water quality issues appear to be related to

nutrients and salinization.

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Variable	Units	Present Value	Percentile	Ref_value	RWQO	Comment
Alkalinity (CaCO3)	mg/l	102.9	95	103.8	200	Better than Ideal
Ammonia (NH3-N)	mg/l	0.01	95		0.015	Ideal
Calcium (Ca)	mg/l	16.6	95	20.3	40	Better than Acceptable
Chloride (Cl)	mg/l	11.7	95	6.2	25	Better than Ideal
EC	mS/m	25	95	22.1	50	Better than Ideal
Fluoride (F)	mg/l	0.3	95	0.4	0.7	Ideal
Magnesium (Mg)	mg/l	14.6	95	12.8	30	Better than Ideal
NO2 and NO3	mg/l	0.4	95	0.2	1	Better than Ideal
		8	95	7.9	8.4	Acceptable
рН		7.1	5	6	6.5	Ideal
Potassium (K)	mg/l	3.3	95	1.6	7	Better than Ideal
PO4-P	mg/l	0.023	50	0.022	0.025	Tolerable
	mmol					
SAR	/I	0.6	95	0.8	2	Better than Ideal
Sodium (Na)	mg/l	12.6	95	15	30	Better than Ideal
SO4	mg/l	27	95	15.8	60	Better Than Ideal
TDS	mg/l	178.2	95	174.6	260	Ideal
Si	mg/l	10.6	95	17.3	20	Ideal

Table 2: Water quality data for the Upper Komati (Inkomati CMS, 2011)

2.1.4 The Social Environment

Economic growth in Mpumalanga as a province is broadly in line with that of the rest of the country, averaging 2.5% growth rate between 1996 and 2001, which shows a great increase in relation to the 1.2% achieved between 1990 and 1996, which was below the National average. The GGP growth rate between 1996 and 2002 exceeded the average population growth rate of 1.8% over that period (Inkomati CMS, 2011).

Unlike the rest of South Africa where the services sector is the dominant component of the GDP, mining, energy and manufacturing dominate Mpumalanga's economy. All three of these sectors are highly capital intensive and generate relatively few jobs. Mining, manufacturing, and electricity comprise almost 60% of total value added and yet contribute only 20% of the jobs in the Province.

However, In the Inkomati water management area the picture is somewhat different with agriculture playing a far more important role in the economy. Agriculture also forms the catalyst for many manufacturing and industrial activities indirectly related to agriculture. The gross geographic product (GGP) of the Inkomati WMA was R6,7 billion in 1997. The most important magisterial districts in terms of contribution to GGP are shown below:

- Nelspruit 41,1 %
- Barberton 17,1 %
- White River 9,2 %
- Nsikazi 7,9 %
- Pilgrims Rest 7,6 %
- Other 17,1 %

Mining is the dominant contributor to the (water based) GDP of the basin, followed by industry, irrigation and forestry. The industries analyzed are irrigation and forestry based, with the result that the two sectors contribute more than 50% to the total GDP of the basin.

Irrigation is the dominant contribution to the water generated employment of the basin, followed by industry, mining and forestry (Inkomati CMS, 2011).

It is also important to note that the Inkomati WMA has among the most numerous and largest Land Claims in the Country. Land reform, under the control of the Department of Land Affairs,



will significantly impact the transformation of water users and the social environment in the WMA.

Distinction is made between Land Restitution (returning land to the people who have a valid claim) and land distribution (redistributing stateowned land). It has been cautioned that not all land claims will result in transformation as in certain cases negotiation is underway for monetary compensation in lieu of returning to the land. The impact on the transformation profile is difficult to project. However, 2007 information indicates that there are approximately 125,000 beneficiaries of Land claims in the Nkomazi alone as of June 2007.

The total number of hectares under claim, which are gazetted are at present approximately 83 783 ha (837.83 km²). There are still a substantial number of land claims that have not been Gazetted

To date it has been the most expensive land reform area (with reference to the amount paid out for land claims) with the highest percentage of successfully awarded claims in the country. Currently this amount is close to R1,2 Billion. This amount includes only the cost of land and excludes any amounts paid out as grants. It is therefore inevitable that the success of land reform is highly prioritised by both the private sector and Government.

2.1.5 Tourism Potential

The tourism potential of the ICMA is largely linked to the land use in the area. As mentioned above, almost 35% of the land is currently protected. Tourism is thus an integral part of the social and economic environment of the area. The following provides a list of the main protected areas and game reserves in the ICMA:

- Kruger National Park;
- Nelspruit Botanical Gardens;
- Lomshiyo Cattle/Game Project;
- Mawewe Cattle/Game Project provincial reserve);
- Ligwalagwala Conservancy;
- Londolozi Game Reserve;

- Mahushe Shongwe Game Reserve;
- Mala Mala Game Reserve;
- Manyeleti Game Reserve;
- Mthethomusha Game Reserve;
- Sabi Sabi Game Reserve;
- Sabi Sand Game Reserve;
- Songimvelo Game Reserve;
- Badplaas Nature Reserve;
- Barberton Nature Reserve;
- Bosbokrand Nature Reserve;
- Inkomati Nature Reserve;
- Jericho Dam Nature Reserve;
- Komatipoort Nature Reserve;
- Masibekela Nature Reserve;
- Mkombo Nature Reserve;
- Nelspruit Nature Reserve;
- Nooitgedacht Dam Nature Reserve;
- Samango Forest Private Nature Reserve;
- Verloren Valei Nature Reserve;
- Long Tom Pass Private Nature Reserve; and
- Wakkerstroom Conservancy.

The biodiversity of the area and the occurrence of sensitive flora and fauna are also key in terms of tourism potential. There are a number of sensitive habitat in the ICMA which bring in tourists including:

- The Barberton Mountains are important . due to the diversity of biota. The area supports a wide variety of vegetation types ranging from Afromontane forest to grassland, woodland and riverine forests and thicket. A total of 23 fish species have been recorded in the streams, while many bird species, including important species such as Bald Ibis, Blackrumped buttonquail, Blue Crane, Striped flufftail, Stanley's Bustard, Blackbellied Korhaan, Black•]winged Plover, Grass Owl, Blue Swallow, Broadtailed Warbler and Halfcollared Kingfisher. The oldest fossils in the world are also found in these mountains.
- The gorge between Nooitgedacht and Vygeboom Dams contains a Red Book Data fish species.

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- Areas of riparian woodland in the middle and lower reaches of the Komati and Lomati Rivers provide habitat for important riparian species and is an important area for the migration of eels, fish and freshwater prawn. Tiger Fish also occur here.
- The Crocodile River Catchment has more fish species than any other river in South Africa, with 49 indigenous species occurring and a further five species have been introduced. Areas of importance in this catchment include Verloren Valei and its associated wetlands which is a RAMSAR site and a breeding site for wattled crane. The site is also in the only reserve in the world where Rudd's Lark can be found. It also supports a wide variety of forbs, ferns, lilies, orchids and irises. Lower Nels River is an important refuge for aquatic biota. The plateau at Kaapsehoop is an important area for the conservation of plants and has the third largest breeding site of Blue Swallows in South Africa.

According to the Annual Mpumalanga Tourism Statistics Report (MTPA, 2011), Mpumalanga had an increase in Tourism related annual spend of R0.3 million (from R4.4 million to R4.7 million) and had approximately 1,316,869 visitors in 2011.

2.1.6 Catchment Management Agency

The National Water Act, Act 36 of (1998) (NWA), mandates the Minister of Water and Environmental Affairs to establish Catchment Management Agencies (CMAs) for the management of water resources at the catchment level. The Breede-Overberg CMA in the Western Cape and the Inkomati CMA in Mpumalanga Province are the two operational CMAs in the country.

CMAs are state owned entities established in terms of Chapter 7 of the NWA. The purpose of a CMA is to delegate water resource management to the regional or catchment level and to involve local communities in the decision-making processes. The intention is for water resource management to:-

- meet the basic human needs of present and future generations,
- promote equitable access to water,
- redress the results of past racial and gender discrimination, and
- Facilitate social and economic development.

Initially, the Minister established eight out of a proposed 19 CMAs. However, since the establishment of these CMAs, the Department has reviewed the appropriateness of having 19 CMAs across the country, and has proposed a reduction in the number of water management areas, and by implication the number of CMAs, to nine. In this reduction, new boundaries for the nine water management areas are being demarcated through the National Water Resources Strategy (NWRS) as is required under the National Water Act.

The Mhlatuze-Usuthu CMA, which adjoins the Inkomati water management area to the south, has been established on paper, but does not exist as a functional organisation. Thus, the former Inkomati water management area, and the Usuthu catchment from the Mhlatuze-Usuthu water management area have been combined into one WMA called the Inkomati-Usuthu WMA. The intention is that one CMA, will manage the water resources in this water management area.

To achieve this, the non-functional Mhlatuze-Usuthu CMA was disestablished and the boundaries of the Inkomati CMA were extended to include the Usuthu catchment. The name of was changed to the Inkomati-Usuthu CMA (IUCMA).

The current vision for the IUCMA is:

Water for all in Inkomati

The IUCMA's mission is to be a pioneering catchment management system that empowers stakeholders to engage in consensual and adaptive decision making, to achieve reform,



and to promote persistent social, economic and environmental justice across the Inkomati catchment.

- The IUCMA supports the <u>co-operative</u> <u>management</u> of the Inkomati basin as an internationally shared water course
- The decision-making environment of the IUCMA, including delegated functions, enables collaborative action towards <u>equity, sustainability and</u> <u>efficiency</u> in a continually evolving socio-economic system
- The IUCMA manages the resources adaptively, co-operatively and progressively to <u>achieve social</u>, <u>economic and environmental justice</u>, and promote healthy living

Many of these guiding principles are important in terms of management of Vygeboom Dam as an important resource within the catchment. In addition, the CMA (current or proposed) is an important stakeholder in the management of the Dam.

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 No 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 floating Aids to Navigation1 (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.

In order to demarcate specific zones/areas, standardised demarcation markers are to be used in conjunction with the relevant AtoN.

There is currently no adequate, standardised and harmonised fixed and floating AtoN and Demarcation Markers in place at the Dam.

2.2 Purpose of Vygeboom Dam

The Komati River Government Water Scheme originally comprised of Nooitgedacht dam which was built in 1960 to supply Komati Power Station with water. The scheme consisted then of Nooitgedacht Pump Station with two pipelines to Komati. The scheme was later extended during 1972 when Vygeboom Dam was built to supply Arnot and Hendrina Power Stations with water. Three major pump stations namely Vygeboom, Bosloop and Wintershoek were built. When Duvha Power Station was built in 1980 the intention was to use the water from Witbank dam via the Naauwpoort pump station however it was soon realised that the quality of Witbank dam water was not acceptable to be used by Duvha and a pipeline was built from Hendrina to Duvha instead.

Vygeboom Dam forms part of the Inkomati Transfer System which transfers water from the Komati west Catchment to the Upper Olifants Catchment with a design capacity of 5.76 m³/s. (Jeleni and Mare, 2007). The Dam also forms part of the Komati-Olifants Transfer Scheme which transfers water at a rate of up to 4.62 m³/s. The maximum possible volume for the transfer is supplied from Vygeboom Dam with the remainder being supplied from Nooitgedacht Dam.

Further, the Dam does provide some water for irrigation. For the most part, the irrigation requirement in the Upper Komati catchment is based on an irrigated area of 6 310 ha (63.1 km²). Some of this (9.7 million m³/annum) is abstracted from the Komati River between the Nooitgedacht and Vygeboom Dams. However,

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".



the remainder (14.5 million m³/annum) is released from Vygeboom Dam for irrigators downstream of this dam (DWA, 2004).

The Dam is not used officially for domestic use and according to the Chief Albert Luthuli Local Municipality Water Sector Development Plan (WSDP) (2011), the area in the municipality are mainly supplied from run-off from rivers and groundwater abstraction. A number of communities around the Dam however do not have access to potable water and thus the Dam is an important source of water for washing, domestic use and for cattle watering.

The Dam is also used extensively for recreational use by a number of separate recreational clubs. Recreational use through these clubs includes a number of motor boat activities, bass fishing and shore fishing.

An important factor in regards to the Dam is downstream uses by neighbouring countries and ensuring that release of water meets international treaty requirements.

2.3 Overview of Vygeboom Dam

Vygeboom Dam falls within the Chief Albert Luthuli Local Municipality and the Gert Sibande District Municipality of Mpumalanga Province. As discussed above, the Dam falls within the Komati West Catchment of the Inkomati Water Management Area.



Figure 3: Location of Vygeboom Dam

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Below is an overview of the catchment and the Dam.

Table 3: Overview of Vygeboom Dam (DWA, 1989)

Catchment Details	
Mean Annual Runoff (MAR)	265.9 Mm ³
Dam Characteristics	
Category	Major Dam
Year Completed	1971
Length of wall (m)	1 220m
Height	48m
Outlet Capacity	20 m ³ /s
Total Capacity	79 million m ³
Surface Area of Dam	66 km² (660ha)
Purpose	Provision of Water for Use by Power Stations (Industry)
River	Komati River

2.4 Legislative Framework

The RMP forms the overarching framework for the management of Vygeboom 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 Vygeboom 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);
- 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);

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- 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);
- Merchant Shipping (National Small Vessel Safety) Regulations, 2007
- National Environmental Management Act EIA Regulations (2010);
- The Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998);
- The Mpumalanga Tourism and Parks Agency Act, 2005 (Act 5 of 2005);
- South African National Biodiversity Institute (SANBI) Biodiversity GIS information; and
- Sport and Recreation SA Strategic Plan -2011-2015.

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

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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 and thus it is necessary for the RMP to provide guidance this regard. DWS has also published the General Strategic Plan for Commercialization (approved in April 2009) which also provides information on RWU.

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:

- <u>Critically endangered species</u>: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- <u>Endangered species</u>: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- <u>Vulnerable</u> species: any indigenous species facing an extremely high risk of extinction in the wild in the mediumterm 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		
Large-	a. 2 in National Parks, Provincial Reserves,		
mouth	Mountain Catchment Areas and Forestry		
bass	Reserves declared in terms of the		
	Protected Areas Act.		
	b. 3 in all rivers, wetlands, natural lakes		
	and estuaries in which it occurs.		
	c. 2 for conveying, moving or otherwise		
	translocating a live specimen.		
	d. Large-mouth bass is not listed for dams		
	within discrete catchment systems in		
	which it occurs (excluding (a) above).		
Common	e. 1b in National Parks, Provincial		
carp	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.		

Largemouth Bass and Carp occur at the Dam however the Dam does not occur within a protected area. Further, Common carp and Bass are exempted listed as category 2 for a period of two years from the date upon which this notice takes effect, from requiring a Permit for any restricted activity in terms of the Act or Alien and Invasive Species Regulations, 2014, provided a person is in possession of a valid Provincial Permit issued in terms of Provincial legislation where required for the species.

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.

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)

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 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. 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 at sports, recreational, religious, cultural or similar events held at stadiums, venues or along a route. It also provides for the accountability of event roleplayers. 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 highrisk 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 Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998)

This Act sets out how wild species are to be managed in terms of human use, such as collecting, fishing, hunting, capture, transport and trade. It deals with rare and endangered species and the powers needed to protect them, and the protection of sensitive natural sites from damage and exploitation.

2.4.17 The Mpumalanga Tourism and Parks Agency Act, 2005 (Act 5 of 2005)

This Act was responsible for creating the Mpumalanga Tourism and Parks Agency (MTPA) in 2006, with a specific mandate for the following:

- To promote and sustainably manage tourism and nature conservation and provide; and
- To provide for the sustainable use of natural resources.

In pursuing its objectives, the MTPA is required to:

- Conserve and manage biodiversity and ecosystems;
- Develop and manage protected areas;
- Promote, develop and market tourism; and
- Create growth and transformation within the industry, and thereby economic and employment opportunities for disadvantaged people

MTPA does not manage the State Land around Vygeboom Dam however it does undertake annual bird counts.

2.4.18 Agreement in Regard to Rivers of Mutual Interest of 1964

The "Agreement between the Governments of South Africa and Portugal in regard to Rivers of Mutual Interest and the Cunene River Scheme" (October 13 1964) (also known as "Cunene Agreement") started off as a bilateral agreement between South Africa and Portugal, to which Mozambique succeeded at independence.

Swaziland then acceded to Part I (Rivers of Mutual Interest) of this agreement in 1967.

The agreement acknowledges the importance of rivers as water resources for the development of the respective territories of the parties as well as the advantages of collaborating in the development of such water resources.

The operative paragraphs of Part I record agreement on three so-called "principles":

- The application of the principle of "best joint utilization" in the development of Water resources of "common interest rivers";
- The manner in which cooperation should take place is by way of exchange of hydrological and other data, consultations regarding the execution of major hydraulic works affecting the interests of the states concerned, and joint studies regarding "general plans for the development of water resources of each basin"; and

Copyright 2015 © Department of Water and Sanitation 2015 PG 32 Negotiations at the diplomatic level and the conclusion of agreements in respect of particular basins are recommended.

2.4.19 Agreement Relative to the Establishment of a Tripartite Permanent Technical Committee

A Tripartite Permanent Technical Committee (TPTC) was established in February 1983, consisting of three representatives from each of the three governments concerned. The TPTC is convened on an ad hoc basis, as and when circumstances require. All decisions are to be taken by consensus. The functions and duties of the TPTC are mainly of an advisory nature with regard to:

- Measures to alleviate short-term problems regarding water shortages on rivers of common interest during drought periods;
- The division of flows in rivers of common interest, arrangements for the investigation of common watersheds, and joint water schemes on rivers of common interest;
- Mechanisms to coordinate and integrate the findings and plans of each country; and
- Report on the optimum joint scheme or schemes catering for the needs of all three countries.

2.4.20 Agreement reached at the Tripartite Ministerial Meeting of February 15 1991

At this meeting the recommendations of the TPTC were accepted and agreed upon by the three ministers responsible for water in the three states concerned. Agreement was recorded on the following matters:

 To conduct a joint study of the water resources, demands, and development potential of the whole Inkomati river basin;

- To proceed with implementing the first phase of the Komati River Development Plan (that is, the construction of the Driekoppies and Maguga Nkomati Basin dams); and
- Pending the results of the Joint Study, to implement the following interim measures:
 - Cross-border release of 2 m³/s averaged over a cycle of three days in order to satisfy demands in the reach from Ressano Garcia to the confluence of the Sabie River.
 - South Africa would refrain from constructing any new waterworks with a storage capacity in excess of 250,000 cubic meters or with an abstraction rate exceeding 110 liters per second in the Sabie river catchment, without prior consultation at TPTC level in accordance with the Helsinki rules and the 1964 Rivers Agreement.

2.4.21 Joint Inkomati Basin Study (JIBS)

Following the tripartite agreement of 1991, the Joint Inkomati Basin Study (JIBS) was launched in 1992. However, because of the impossibility of obtaining the required information from Mozambique, the study was concluded in curtailed form in 1995. The study was re-initiated in 2000 (JIBS Phase 2) and concluded towards the end of 2001.

2.4.22 Treaty on the Development and Utilization of the Water Resources of the Komati River Basin and Treaty on the Establishment and Functioning of the Joint Water Commission

Both treaties were signed by South Africa and Swaziland in March 1992, and explicitly deal with the Komati River, a sub-basin of the Inkomati basin. The preamble to the first treaty records the commitment of both countries to pursue their common water interest on the basis of the





provisions of the Helsinki Rules, and to develop the water resources of the Komati river basin by means of a comprehensive development plan.

The Joint Water Commission (JWC) and the Komati Basin Water Authority (KOBWA) are the two main institutions entrusted with the different aspects of the implementation of the Project and the development plan. Both countries expressly declared that they:

- Recognize the right of the Republic of Mozambique to a reasonable and equitable share in the use of the waters of the Inkomati River Basin of which the Komati River Basin is an integral part. The Parties agree to enter into negotiations with each other when such share is claimed by the Government of the Republic of Mozambique; and
- In the terms of the second treaty, a Joint Water Commission (JWC) is established and its duties and functions determined. The JWC consists of the two delegations representing both countries and all decisions are taken on the basis of consensus. In the main, the JWC acts in an advisory capacity with regard to the various aspects of the joint development of water resources of common interest to the parties. The JWC is charged in particular with the duty of having regard for the interests of Mozambigue.

2.4.23 Bilateral Agreement Between Mozambique and South Africa

A formal agreement was signed between Mozambique and South Africa in July 1996 to create a Joint Water Commission. The structure and content of this agreement are quite similar to the one between the South Africa and Swaziland for the Komati river basin. The main functions and powers of the JWC are to give advice on all technical matters. The JWC must have due consideration for the interests of Swaziland, Zimbabwe, and Botswana in any water resources of common interest between the parties and one or more of those countries.

2.4.24 Bilateral Agreement Between Swaziland and Mozambique

In July 1999, Mozambique and Swaziland signed an agreement to establish a Joint Water Commission, in similar terms to the one established between Mozambique and South Africa in 1996.

2.4.25 Relevant Transboundary Legal Conventions

For the sharing of the water resources of the Inkomati basin, three conventions are of relevance. They are, in chronological order, the Helsinki Rules of 1966, the UN Convention on the Law of the Non-Navigational Uses of International Watercourses (1997), and the SADC Protocol on Shared Watercourse Systems (in force since 1998, and revised as the Protocol on Shared Watercourses in 2000).

The Helsinki Rules have been used by Mozambique, South Africa, and Swaziland as a basis for negotiating on issues of common river basins, even if not accepted in a formal way. The UN Convention is presently the more advanced legal document on the issue of international watercourses and, although it has lapsed, it contains the fundamental principles of water management, conflict resolution, and environmental safety that have been developed during the last three decades.

The UN Convention inspired the revision of the SADC Protocol on Shared Watercourse Systems and many of its clauses were incorporated in the revised Protocol.15

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 Chief Albert Luthuli Local Municipality;


- The Water Services Development Plan (WSDPs) of Chief Albert Luthuli Local Municipality;
- The Strategic Framework of Water Services, 2003;
- The Provincial Spatial Economic Development Strategy (PSEDS), 2003;
- National Spatial Development Perspective (NSDP), 2006

- The New Growth Path, 2012 (NGP); and
- The Cooperative Inland Waterways Safety Programme (CIWSP)

The figure below highlights the relationship between the RMP lifecycle and other planning initiatives.



Figure 4: Relationship between RMP and Planning Initiatives

2.5.1 Vygeboom Dam Sustainable Utilisation Plan (SUP)

In an effort to ensure that the water of the Vygeboom Dam is protected, used, developed, conserved, managed and controlled in a sustainable and appropriate manner, and to ensure that access to and use of the dam is equitable, the Department of Water Affairs and Forestry (DWAF) (now DWS) commissioned the compilation of a Sustainable Utilisation Plan

(SUP) for the Vygeboom Dam. The SUP was completed in 2004 and aimed to ensure that the objectives of the National Water Act, 1997 (Act No 36 of 1998) were obtained including the following:

- Access to water is equitable;
- Past gender and racial discrimination is redressed;
- The utilisation of the water is efficient, sustainable and beneficial;

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- Social and economic development is facilitated;
- Provision is made for the growing demand for water use, in particular the use of water for recreational purposes;
- Both the aquatic and associated ecosystems, inclusive of their biodiversity is protected;
- Pollution and degradation of the water resource is reduced and prevented;
- International obligations can be met; and
- Dam safety is promoted.

2.5.1.1 Institutional Arrangements

The SUP suggested the establishment of a Water User Association (WUA), facilitated by DWS. The membership of the WUA was suggested to include:

- Access providers including adjacent land owners;
- Development and Access concessionaires;
- Local Government;
- Service Contractors;
- Development Foundation; and
- Resource Managers.

This WUA, was planned to become the delegated authority responsible for the development of, and the control over, public recreation, as well as for conservation of fauna and flora, and have the right of control and supervision over the dam surface and the surface of the surrounding state land within the dam basin.

The responsibility of control and supervision will include overseeing and facilitating:

- Resource Management;
- Private Sector involvement through service contracts and concessions compliant to the NWA and Treasury Regulations;
- Community development and benefit flow;

- Controlling all access to the dam, both its surface and surrounding land;
- Ensuring that access is equitable;
- Managing the utilisation of the water surface through the demarcation of zones, appropriate signage and documentation;
- Ensuring that the utilisation is environmentally, socially and economically acceptable and viable;
- Managing the utilisation of the state land adjacent to the dam through management agreements with adjacent landowners or concessionaires;
- Ensuring that the management agreements are compliant with the objectives of the Vygeboom Dam SUP, and any other relevant legislation;
- monitoring the performance of the land management agreements against set objectives;
- Evaluating proposed concessions against ecological, social, economic and operational guidelines;
- Monitoring compliance with the conditions of the allocated concessions;
- The establishment of a Vygeboom Dam Development Trust/Foundation, with representation from the surrounding communities, government authorities and select individuals;
- Monitor community benefit flow on a regular basis;
- Measure the ripple effect of the Vygeboom Dam on the surrounding environment; and
- Report on the successes and failures of the Vygeboom Dam as catalyst for community beneficiation.

In terms of this institutional structure, the Vygeboom Dam Development Trust or Foundation was proposed to be responsible for all external projects, within the surrounding community. Individual projects or initiatives within these communities can approach the Development Trust or Foundation for support, based on specific criteria and within clear



budgets. The Development Trust or Foundation then had the right to source additional donor or grant funding for these projects, and therefore need not rely solely on the percentage accruing to it from the concessions.

2.5.1.2 Key Performance Areas and Objectives

The structure of the plan of the SUP was based on key performance areas, namely:

- Resource management natural, cultural, and land expansion and incorporation;
- Tourism experience management;
- Private sector involvement;
- Recreation and tourism infrastructure;
- Marketing;
- Community participation and beneficiation;
- Research projects; and
- Monitoring.

Within each of these key performance areas the following aspects are addressed:

- Vision;
- Objectives primary, secondary, tertiary;
- Policy;
- Strategy;
- Operational Guidelines; and
- Monitoring.

2.5.1.3 Zonal Plan

The zonation of the Vygeboom Dam was undertaken to ensure organized development, equitable visitor access, sound resource management and optimal community beneficiation. The approach aimed to minimises the potential conflict that could arise between the various user groups.

Various categories of zones were identified based on current utilisation; knowledge; climatic

conditions; visitor needs and expectations; economic and social criteria, guided by accepted recreational and conservation principles (See Figure below).

A zone in the Vygeboom Dam is set aside for access to the general public, to satisfy their desire and right to enter and utilise a government waterworks. Facilities and activities for using water for recreational purposes may be provided in this zone to optimise the carrying capacity of the Vygeboom Dam. Infrastructural developments will be provided in this zone to minimise impact and optimise utilisation. A restricted speed zone with a width of 50 m along the shoreline reduces environmental impacts and increases public safety.

Five limited use zones were identified for use by concessionaires only. The Vygeboom Dam management team retains access and all management rights in these zones at all time.

Operators retain any agreed access, use and development rights subject to relevant development, EIA and DWAF policies and authorisations, and carry any costs associated with renegotiations.

Areas have been set aside for the conservation of natural ecosystems with limited outside interference. Access is restricted, and is limited to slow speed, preferably high quality guided activities that can highlight the importance of the management guidelines and zonation. No permanent developments will be allowed. Caretaker agreements for the land management and utilisation component will guide the conservation of the land.

A zone close to both the DWAF offices and public access zone has been identified for community development. Ideally within this zone, aspects such as a community hall, school, sport field and related infrastructure will be developed.

The land adjacent to the dam has been zoned in compliance to the surrounding land use, and management agreements will guide the management of this land, either through



caretaker agreements or through service contracts.

Several sites have been identified where access is provided, as well as where developments such as slipways, jetties, moorings and related infrastructure may be provided.

All developments must be authorised in terms of relevant legislation.

Access to the Vygeboom Dam can only be obtained from these points. Management will have additional access at the DWAF offices.

Slipways, jetties and moorings for boat launching will be provided at the concession sites, as well

as public access area, according to approved and authorised plans.

No zone for aquaculture development has been identified yet if a proposal is received from the private sector it must be entertained in terms of access, level fluctuations, community benefits, services, etc. This development will be subject to authorisations in terms of relevant legislation.



Figure 5: SUP Zonal Plan

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2.5.2 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 Vygeboom 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

2.6.1 Population

The total population in Chief Albert Luthuli Municipality is 186 009. The population of 15 - 34 age groups and the 35-64 age group account for 36 % and 22% of the population respectively. This means that 58% of the population are of working age.

Youth in total account for 37% 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.





2.6.2 Education

76% of the population in LM have received some level of education. 44% of the population has received some form of higher education. This indicates that with a trend of a large section of the population being of working age, that there should be sufficient capacity within the local community to accommodate an increase in the tourism sector.





2.6.3 Employment

8 % of the people in the LM are unemployed. 16% of persons are employed while 29% of the population is not economically active.



Figure 8: Employment Status

2.6.4 Monthly Personal Income

Personal income is grouped into the following brackets:

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

The figure below shows monthly income per person for 2011. 40% of the population earn no income at all. 38% of the population are low income earners while. Only 2% of the population earn in the high income bracket.



Figure 9: Income

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; and
- Mining and Quarrying;

Secondary Sector:

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

Tertiary Sector:

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

In total, Chief Albert Luthuli LM contributed R 2979.4 million to GVA. General government contributed 21% to GVA of LM indicating a dependence on the municipality for job creation. Wholesale and retail trade contributed 19% to GVA while business services contributed 15% to GVA.





Figure 10: GVA

2.7 Development Potential

The development potential of Vygeboom Dam is high is especially in terms of increased recreational and tourism use.

The Dam is located along the R38 arterial route between Barberton and Carolina and is therefore reasonably accessible.

In addition, the Dam is approximately 6km from eManzana (Badplaas) found at the foothills of the Ndlumudlumu Mountains. The town is the home of well-known hot sulphur springs. According to TourismRSA (www.TourismRSA.com), the natural hot springs were first discovered by Swazi tribes in the area and named "Emanzana" (healing waters). The springs also have an interesting historical/cultural aspect as they were given as a gift in 1876 to Jacob De Klerg who set up a store near the springs and advertised their medicinal properties especially to passing prospectors who passed through the area in the 1880s due to the gold rush in the De Kaap Valley.

The town also has a freshwater diving site called "Badgat" which is well known. In addition, the Shonalanga Nature Trail traverses the nearby Forest and the Num-Num Trail provides scenic views of the Komati Gorge and both are well known.

In terms of Eco-tourism, the Nelshoogte Nature Reserve conserves an exceptional middleveld/grasslands environment with its indigenous plants and birds.

There are also some scenic routes from Badplaas to Waterval-Boven over the Skurweberg pass. The Pass's name refers to its ancient sandstone outcroppings; a rare example of an ancient seabed from the Godwana period and it offers perfect protection to the numerous aloes and stunted yellowwood trees that grow there.

2.7.1 Water Quality:

The water quality at Vygeboom Dam has been monitored by DWS since 1975. The average values during the period between 1975 and 2013 are provided in Table 4 for Monitoring Point X11_ 102951. For the most part, the values are good however, the time series analysis shows a worrying trend with levels of Phosphorus (P) reaching poor levels (Figure 7). There has been some concern by stakeholders that the nearby mining in the area has decreased water quality in rivers and the Dam. It is also important to note that Eskom requires good quality water and thus maintaining the water quality in the Dam is a priority in terms of its primary function.

Table 4:	Water Q	uality	at	Vygeboom	Dam
		(DWA	1)		

Variable	Average (1975- 2013)
Calcium (Ca)	8.37
Chloride (Cl)	4.16
Dimethyl sulphide (DMS)	87.95
Electrical Conductivity (EC)	12.65
Fluoride (F)	0.13
Potassium (K)	1.16
KJEL_N_Tot_Water	0.52
Magnesium (Mg)	6.17
Sodium (Na)	4.72
Amonia (NH4_N)	0.04
Nitrates (NO3_NO2)	0.09
Phosphorous (P)	0.05
рН	7.57
Phosphates (PO4_P)	0.02
Silicon (Si)	6.58
Sulphates (SO4)	7.33



Total Alkalinity (TAL)45.14The Maucha Diagram below shows that the TotalAlkalinity (TAL) is also high (Figure 6).



Figure 11: Maucha Diagram for Vygeboom Dam



Figure 12: Water quality at Vygeboom Dam from 1975 to 2013 (DWA)

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2.7.2 Aquatic Invasive Plant Species:

Historically, South Africa's waters have been invaded by a number of aquatic macrophytes that have detrimental economic and environmental effects. The worst of these include water hyacinth (*Eichhornia crassipes* Solms-Laub.), parrot's feather (*Myriophyllum aquaticum* (Vell.) Verdc.), salvinia (*Salvinia molesta* D.S. Mitchell), water lettuce (*Pistia stratiotes* L.), and red water fern (*Azolla filiculoides* Lamarck). The majority of these species however are under acceptable control.

Of concern is that recent studies have shown that South Africa however is home to a number of emerging invasive aquatic species. Submerged macrophytes in South Africa such as Brazilian/ dense waterweed, Egeria densa Planch. and watermilfoil, spiked/Eurasian Myriophyllum spicatum L. are seen to be a potential threat to water quality and biodiversity in aquatics systems. There is great potential for these species to spread further, and for others, such as cabomba, Cabomba caroliniana A.Gray (Cabombaceae), and Canadian water weed, Elodea canadensis Mitch. (Hydrocharitaceae), to invade waterways due to the nature of South Africa's aquatic systems.

For example, *Hydrilla verticillata* was first recorded in South Africa in 2006 and is only found at Pongolapoort Dam in KwaZulu-Natal. Based on surveys of Dam users and climate data, Coetzee *et al.*, (2009) found that most of South Africa had the potential to become infested.

There are no records of aquatic invasive species at Vygeboom Dam at this time however, no comprehensive surveys of aquatic invasive species in South Africa are available and thus the possibility of their occurrence is relatively high. In addition, there are aquatic invasive species along the Gladdespruit River system and thus the potential for infestation high (G. Mahlare, *pers comm*.)

2.7.3 Terrestrial Invasive Plant Species

Alien vegetation covers a reasonable amount of land in the WMA, but the water use figures are more worrying. It is estimated that they use 3300 million m3/a in the whole of South Africa, according to a study by Le Maitre *et al* (1999). For the Inkomati WMA, the water use by invasive alien plants as estimated by (DWAF, 2004) is as follows;

- Komati West: 7 million m3/annum
- Lower Komati: 0 million m3/annum
- Crocodile: 57 million m3/annum
- Sabie: 24 million m3/annum
- Sand: 3 million m3/annum

A total of 91 million m3/annum of water is used up by alien vegetation in the IWMA. Acacias, Pines, Eucalypti and *Prosopis* species and *Melia azedarachs* are among the top ten invading plants, accounting for about 80% of the alien vegetation water use. Alien vegetation usually affects the riparian zone, taking over the riparian vegetation in some cases affecting the biodiversity of the indigenous populations (Inkomati CMS, 2011).

A large number of alien species occur in the catchment which surrounds the Dam. These include the following (Kotze et al., 2010).

Species	Measure of Impact	Average for the Catchment
Acacia bailevana.	Density (% canopy cover)	2.04
dealbata &	Condensed area (km ²)	0.07
mearnsii	Uncondensed area (km ²)	10.63
	Density (% canopy cover)	0.01
Agave spp.	Condensed area (km ²)	0.0032
	Uncondensed area (km ²)	0.085
	Density (% canopy cover)	0.03
Arundo donax	Condensed area (km ²)	0.005
	Uncondensed area (km ²)	0.038
	Density (% canopy cover)	1.10
Eucalyptus spp.	Condensed area (km ²)	0.048
	Uncondensed area (km ²)	8.186

Table 5: Terrestrial Invasive Species



		A
Creation	Manager of langest	Average
species	Measure of Impact	for the
		Catchment
Jacaranda	Density (% canopy cover)	0.04
mimosifolia	Condensed area (km ⁻)	0.013
	Uncondensed area (km ²)	1.018
	Density (% canopy cover)	0.00
Lantana camara	Condensed area (km ²)	0.001
	Uncondensed area (km ²)	0.43
	Density (% canopy cover)	0.06
Melia azedarach	Condensed area (km ²)	0.021
	Uncondensed area (km ²)	1.623
	Density (% canopy cover)	0.00
Opuntia spp.	Condensed area (km ²)	0.012
	Uncondensed area (km ²)	0.518
	Density (% canopy cover)	0.13
Pinus spp.	Condensed area (km ²)	0.042
	Uncondensed area (km ²)	3.602
	Density (% canopy cover)	0.08
Populus spp.	Condensed area (km ²)	0.043
	Uncondensed area (km ²)	1.82
	Density (% canopy cover)	0.07
Salix babylonica	Condensed area (km ²)	0.031
	Uncondensed area (km ²)	3.260
<u>.</u>	Density (% canopy cover)	0.15
Solanum	Condensed area (km ²)	0.024
mauritianum	Uncondensed area (km ²)	0.4986

2.7.4 Fauna

2.7.4.1 Fresh Water Fish

Freshwater Ecosystem Priority Area maps provide guidance on how many rivers, wetlands and estuaries, and which ones, are needed for protecting representative aquatic biodiversity and ecological functioning of South Africa's freshwater ecosystems.

No threatened or near threatened fish species occur in the sub catchment around the Dam. However, Yellowfish (*Labeobarbus* spp) are known to occur in the Dam. A study by O'Brien for the Water Research Commission (2009) found that two particular species of Yellowfish occurred in the area. The existing communities of *L. polylepis* are isolated between these dams that act as barriers. *L. marequensis* occurs with and is more common than *L. polylepis* in this reach. In general, these fish are actively targeted and utilised by various angling and subsistence fishing communities throughout South Africa.

In addition, the Komati River Catchment has good fish habitat (Riffles, Overhanging Vegetation, Rapids and Pools) which support variety of fish species such as (Amphilius. Uranoscopus, Chiloglanis. Swierstrai, Labeobarbus Marequensis, Claries Gariepinus, Barbus penguereyi, Oncorhynchus Mykiss etc). Bio-monitoring by the River Health Programme in 2012 found the presence of intolerant, tolerant and moderate tolerant species in the river. Moreover the analysis of macroinvertebrates collected in May 2012 indicated that the river system status has deteriorated when compared to the one collected in February 2012 and this was also confirmed by the ASPT score which was low during the current survey. The low ASPT was due to the high abundance of tolerant to pollution macro-invertebrates which was indication of a change in water quality.

2.7.4.2 Amphibians

The South African Frog Atlas Project (<u>www.sarca.adu.org.za</u>) did not indicate any specific Amphibian species in the 2330DD quarter degree grid.

2.7.4.3 Reptiles

Detailed information of species which occur in the immediate vicinity of the Dam is not available however the following species have been recorded in the 2530DD Quarter Degree Square (South African Reptile Assessment – www.vmus.adu.org.za):

- Duberria lutrix lutrix (South African Slugeater (Colubridae); and
- Bitis arietans arietans (Puff Adder (Viperidae).

2.7.4.4 Mammals

The following mammal species occur within the 2530 Degree Square (2530) in which the Dam occurs:

- Sylvicapra grimmia Common Duiker (Bovidae)
- Cercopithecus aethiops pygerythrus -Vervet Monkey (Cercopithecidae)
- Galerella sanguinea Slender Mongoose (Herpestidae)



- Lepus saxatilis Scrub / Savannah Hare (Leporidae)
- Lutra maculicollis Spotted-necked Otter (Mustelidae)
- Pelea capreolus Grey Rhebok (Bovidae)
- Redunca fulvorufula Mountain Reedbuck (Bovidae)
- Ourebia ourebi Oribi (Bovidae)
- Pipistrellus hesperidus African
 Pipistrelle (Vespertilionidae)
- Hippopotamus amphibius -Hippopotamus (Hippopotamidae)
- Canis adustus Side-striped Jackal (Canidae)
- Caracal caracal Caracal (Felidae)

2.7.4.5 Avifauna

The Dam occurs in the vicinity of the Nkomazi Wilderness Area. The following birds are found in this area:

- White stork
- Yellow-billed Stork
- Bat hawk
- Martial Eagle
- Long crested eagle
- Osprey
- African finfoot
- Blue swallow
- Wattled crane
- Crowned Crane
- Southern bald ibis
- Striped flufftail
- White-winged flufftail
- Ground woodpecker
- Olive Woodpecker
- Rudd's lark
- Buff-streaked chat
- Gurney's sugarbird
- Malachite Sunbird
- Yellow-breasted pipit
- Kurrichane Button Quail

- Harlequin Quail
- Ground Hornbill
- Winchat
- Orangebreasted Waxbill
- Narina Trogan
- Trumpeteer Hornbill
- Knysna Touraca
- Livingstones Touraca
- Purpel crested Touraca
- Grass Owl

In addition, the Dam is within close proximity of two Important Birding Areas (the Blue Swallow Natural Heritage Site and the Songimvelo Game Reserve). In addition, MTPA does annual bird counts in the high conservation area around the Dam although the species list from these collections is not available at this time.

2.8 Heritage

The Komazi West Catchment has Cultural Heritage Resources which according to National Heritage Act, (Act No. 25 of 1999) require protection and management. In addition, these heritage resources can promote tourism to the area.

The following heritage resources are located in the area:

		-
Site Name	Location	Description
Old Stock Exchange	Barberton	Historic Building
Guard House		Historic Building
ETC Building		Historic Building
Blaaubosschkraal stone		Stone Walling
ruins		
Makonjwa Mountains		Geological Site
Samora Michel	Mbuzini	Monument
Monument		
	Carolina	Rock Art Site
Stopforth	Stopforth	Historic Building
Waterval Boven Town	Waterval	Historic Town
Bridge of five arches	Boven	Historic Bridge
Elands River Bridge		Historic Building
		and Monument
Komatipoort Town	Komatipoort	Historic Town
	Badplaas	Walling and Rock
		Art Paintings and
		Stone Age
Nzasm Railway bridge	Komatipoort	Historic Building

Table 6: Heritage Resources (Inkomati CMS, 2011)



Site Name	Location	Description
Lime Kilns	Ngondwana	Historic site
Batwa Site	Ermelo	Rock Art Site and
		Stone Age
Chrissiemeer		Rock Art Site and
		Stone Age

2.9 Current Institutional Arrangement

2.9.1 Official Institutional Structure

DWS is the official custodian of Vygeboom Dam. In 2004, a SUP for the Dam was compiled and included a proposal for a Water Users Association (WUA) as the institutional management tool for the Dam. However, the WUA was never formed and is not currently in place.

2.9.2 Informal Institutional Structure

As mentioned above, there are a number of separate recreational clubs on the State Land around the Dam. However, these clubs have not formed any overall formal management structure. Instead each club is responsible for management of their own members.

All lease agreements are currently under review . Lease agreements will be signed after the RMP has been finalized so to ensure that all measures included in this document are taken into account in the new agreements.

Further, DWS has noted a number of irregularities in regards to the use of the Dam by some of these clubs including:

- Encroachment on State Land without prior permission;
- Issues regarding fencing and access; and
- Issues regarding vessels and safety as not all vessels are in line with SAMSA requirements. In addition, some vessels have flush toilets which dispose of waste directly into the Dam. Some of the skippers also do not have valid Passenger Endorsement which is required. SAMSA is therefore not willing to issue a Local General Safety Certificate (LSGS).

2.9.3 Management of the Water Surface

Management of the water surface and infrastructure (including buoyage related to the Dam wall) is carried out by DWS.

However, in terms of AtoN and demarcation markers, there is no formal system in place at the Dam.

2.9.4 Access

The only authorised access point is through the DWS offices. This is for management use only. Although the previous SUP designated Public Use Zones, no specific slipways are available for public access.

However, all the recreational clubs around the Dam have slipways which are used for members only use. Using Google Earth, the location of the slipways was determined and has been included in the Zonal Maps. There are an estimated 25 slipways/moorings. The number and position of the slipways should be verified by ground trothing. As discussed above, there are currently no lease agreements in place governing these slipways.

The Vygeboom Country Estate is a residential development on private land adjacent to the Dam. The Estate currently accesses the Dam via a portion of State Land which was designated as Public Access by the 2004 SUP. The Public Access Area has also been fenced off.

There are two additional Public Access areas designated by the 2004 SUP. There are no slipways or infrastructure at any of these areas. They are primarily used for accessing the Dam for fishing and/or picnics. The main Public Access area is also used for stock watering by the surrounding community.

Currently, OppieDam is being developed as a public resort. There is one 18m x 9m pleasure boat which is used for Sunset cruises and two smaller house boats.OppieDam does not have a slipway in place but has recently applied to DWS to build one. Currently the agreement regarding OppieDam is under review.



2.9.5 Permits

A Freshwater Angling Permit is required for angling in Mpumalanga. No specific permits are required for fishing or use of Vygeboom Dam specifically.

2.9.6 Safety

There is no specific safety management system in place to ensure that all clubs and recreational users are meeting SAMSA's safety requirements. Recent checks by SAMSA have shown that there are a number of vessels that do not meet requirements.

A number of clubs have internal safety checks but these are not implemented on a wider scale.

In terms of fire management, the Dam falls within the Vygeboom Ward for fire protection with the Lowveld Ehlanzeni Fire Protection Agency (LEFPA).

2.9.7 Overnight facilities

Vygeboom Country Estate is a residential development which is used as holiday homes by some although there are some full time residents staying there. In addition, many of the clubs have overnight facilities which members as use while visiting the Dam on weekends /holidays.

2.9.8 Event Management

There is no specific event management system in place. Clubs are required to notify DWS of any events however this is not always done.

2.10 Users and Uses of Vygeboom Dam

2.10.1 Provision of Water for Industrial Use

The primary purpose of Vygeboom Dam is to provide water to Eskom Power Stations in the Olifants Catchment through the Komati River Government Water Scheme.

2.10.2 Provision of Water for Irrigation

Most water irrigation is abstracted from the Komati River between the Nooitgedacht and Vygeboom Dams. However, some water is from Vygeboom Dam for irrigators downstream (DWA, 2004).

2.10.3 Provision of Water for Domestic Use and Stock Watering

The Dam is not used officially for domestic use however a number of communities around the Dam do not have access to potable water and thus the Dam is an important source of water for washing, domestic use and for cattle watering.

2.10.4 Recreational Use

The Dam is also used extensively for recreational use by a number of separate recreational clubs. Recreational use through these clubs includes a number of motor boat activities, bass fishing and shore fishing. The following clubs have clubhouses around the Dam:

- Barberton Yacht Club;
- Ermelo Boat Club;
- Kijat Angling Club;
- Machadodorp Police Club;
- Vygeboom Onspanning;
- Vygeboom Power Boat Club;
- Lakeside Club;
- Barberton Police Club;
- Lions Club; and
- Barberton Boat and Sailing Club.

Further, commercial activities takes place at OppieDam. Currently House Boats are run from this area. There is also a planned resort.

Vygeboom Estate occurs on private land however access to Dam for recreational use does take place through public access area near the Estate.

All agreements are currently under review.



2.10.5 Recreational and Subsistence Fishing

Many of the recreational activities around the Dam centre on fishing. In addition, the surrounding community often make use of the Dam for subsistence fishing.

2.11 Catchment Interactions

Based on the status quo of Vygeboom 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 eco-tourism);
- International Treaties and downstream requirements of other countries and irrigation farmers;
- Management practices within Nature Reserves in the Catchment;
- Community Socio-Economic Status and access to services;
- The Political environment and potential conflict in regards to land claims etc. This can impact on the management of the Dam;
- Land Claims and Land Restitution can also significantly influence the Dam through change in ownership and related land use practices;
- Mining in the Catchment and its impact on water quality; and
- Recreational use.

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, one on one stakeholder meeting, a community focus group meetings and community interviews.

The vision for Vygeboom Dam is a long-term, 20year 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.

The vision for Vygeboom dam is informed by the needs, interests, requirements and uses of the dam. Current weaknesses at Dam relate to inequitable access, lack of facilities, the need for proper institutional management and the impacts of poorly managed development (both for recreational use and housing). Stakeholders highlighted the importance of maintaining the current good water quality, improved public access and management and the need to ensure community participation at the Dam. The Dam is seen an opportunity for tourism development and related job creation. It is also seen as a life giving source of water and resources such as fish.

The 2004 SUP also highlighted the importance of sustainable use with their mission statement, vision and objectives. The Dam also occurs within the current ICMA and thus the vision of the Dam needs to be in line with the overarching vision for the catchment.

The vision statement that encompasses this is:

"A clean sustainably managed Dam benefitting all"

3.2 Objectives

The vision was distilled into a number of key objectives which relate to the 2004 SUPs original Key Performance Areas (KPI) where possible (highlighted in bold italics below). In addition, some of the requirements to meet each of these objectives are also provided.

Improved Institutional Arrangements and Management

- A three tier management system including Dam Management Committee (DMC), Catchment Management Committee (OMC) and RMP Steering Committee (RSC) should be formed and include various stakeholders;
- Terms of references for each of these bodies must be developed;
- All lease agreements should be updated to take into account the findings of the RMP;
- A Memorandum of Agreement (MOA) with an Implementing Agent (IA) regarding the management of the public access area should be signed;
- Access agreements should be drafted with all recreational clubs. A Wash Bay System should be implemented and all recreational users will need to go through the Wash Bay prior to using their specific club access;
- Event management system including rates be developed and implemented;
- All land matters to be addressed; and;
- All private clubs/association's on state land will need to comply with National Treasury requirements.

Improved Resource management

- Water Quality Management Plan to address the impact of mining and effluent pollution;
- Study of yellowfish population must be undertaken;



- Wash Bay System to be implemented to prevent aquatic invasive species at the Dam;
- The large eroded area adjacent to the Public Access Area should be rehabilitated;
- An alien invasive species management plan should be developed. This plan should include aquatic and terrestrial plant species;
- A waste management plan, which will address solid waste will be developed; and
- A Cultural heritage resources audit should be undertaken around the Dam. Wherever possible cultural resources, both tangible and intangible, should be incorporated into the visitor experience programmes and products at Vygeboom Dam.

Improved Recreational Use and Tourism

- Unauthorised House Boats should be addressed;
- Law enforcement control officer/Safety Officer to be employed to ensure all boats and recreational users have relevant permits;
- Creation of a Public Access Picnic Area;
- A Marketing Plan including Road Signs, Road upgades and a Website should be developed; and
- A feasibility study for creating additional sports fields/courts at the public access area to be undertaken.

Community participation and beneficiation;

- The feasibility of creating a stock watering trough in the community area around the Dam to be investigated. This would prevent the necessity of cattle using the Public Access Area;
- Feasibility of small scale water purification plant and potable water service infrastructure to the local community to be determined;

- Feasibility of the implementation of a local community access card/subsidy programme to subsidize access for community members should be determined;
- Information programmes to be implemented by DMC to educate local community about the benefits of the Dam.
- Access for education programmes to be subsidized; and
- Funding for Public Access area to be upgraded and maintained to be determined.

Proper Policing and Safety Management

- Standardized AtoN and Demarcation System to be implemented;
- Trained Safety officer with authority to be put in place;
- Active Enforcement of Rules and Regulations;
- Unique Positioning Number (UPN) and Wash Bay System to be implemented;
- All vessels to meet SAMSA requirements;
- Safety system to include and coordinate between all recreational users;
- Potential for Inland Water Life savers to man public access areas/swimming areas to be investigated; and
- Formalised institutional agreements that include policing and safety.

Formalised Education and Skills Programmes

- Clubs to be affiliated to National Clubs such as under South African Sports Confederation and Olympic Committee (SASCOC) and thus incorporate training and development as per SASCOC requirements;
- Feasibility of opening a Swimming School to be determined (co funding mechanisms should be researched);



- The potential feasibility of training local community members as 'inland water life guards' to be determined; and
- The use of the Dam for Science education and learning by local schools to be investigated.

Management of Development Pressure

- DMC to play active role in EIA's and BAR and to act as a custodian for the Dam;
- DMC should involve representatives from MTPA and the Mpumalanga Department of Economic Development, and Tourism (DEDT) so that non compliances can be reported to Compliance unit; and
- Development pressure and commenting on BARs and EIAs should be included in the DMC, OMC and RSC's agenda and discussed at each meeting.

Land Matters

- Legal assessment of the subdivision of State Land which are currently used by the various clubs to be undertaken; and
- Unauthorised structures and use (for example fishing along the ridge area) on State Land to be addressed.



4 HOW DO WE GET THERE?

4.1 How does the RMP Work?

The overarching framework for the Vygeboom 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 Objectives form 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). However DWS reserves the right to appoint an Implementing Agent (IA) at the Dam. The IA would then form part of the Institutional framework.

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 DWS.

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

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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.



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Figure 14: Institutional Framework

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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 Resources Infrastructure: Integrated Environmental Engineering (NWRI: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

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4.2.2 Operational 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

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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/IA. 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.

The DMC will be required to provide feedback to stakeholders on issues raised at previous



meetings, event applications and progress of agreements etc. at each Open Day (i.e. every 120 days or quarterly).

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.

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 (ToR) regarding roles and responsibilities. ToR is not required for the OMC as this is an existing reporting structure. The ToR provides guidance on the following management aspects:

- Frequency of meetings;
- Roles and responsibility of the Chairperson;
- Roles and responsibilities of the Members;
- Minutes and attendance requirements;
- Reporting requirements;
- Management of agreements;
- Management of objectives;
- Management of development targets;
- Implementation of the SPC; and
- Management of the UPN system and wash bays.

4.2.4.2 Agreements

1.) <u>Agreements between DWS and</u> <u>Implementing Agent:</u>

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. In terms of an IA, the Embhuleni Traditional Council (ETC) has recently settled a land claim for the land around Vygeboom Dam (excluding the DWS land within the purchase boundary). This means that there is a large portion under their management and they are in a position to extend their management to State Owned Land around the Dam. This arrangement would need to be through a Memorandum of Agreement (MOA).

Management of recreational use at the Dam would include the following components:

- 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).

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;

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- 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 The RMP makes provision for one current legal access points at the DWS offices. Additional access points are provided for at the recreational clubs. These access points require formalization. In additional. two additional potential access points are suggested at the Public Access Areas

(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. financial Furthermore. the consequences should this requirement not be met should also be stipulated in agreement. No the permanent structures shall be built within the 1:100 year floodline without approval as required by Section 21 (c) and (i) of the National Water Act, 1998 (Act no 36 of 1998):
- 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;
- 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;
- 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; and
- All recreational activities must be in line with the RMP, which once gazetted, becomes the mechanism to access and use at the Dam. 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 put in place with one year of the RMP being gazetted.

2.) <u>Recreational Use Agreements</u>

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 in line 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.

All agreements should be 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 will 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.

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

Vygeboom Dam is used for a number of fishing competitions.

All events must be managed through an event application process. All events applications must be made to ETC (as the IA) and co-approved by DWS and the DMC. 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.

Currently, the recreational clubs operating at the Dam are not affiliated to any National Body. There are also a large number of clubs, some of which offering the same activities. It is suggested that where possible, a number of these clubs join together as this will make the affiliation process easier. All clubs are required to be affiliated in two years.

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. The vision for the Dam involves 'benefiting all' and socio-economic development is key to achieving this. One specific objective (and related actions) is specifically related to socio-economic development:

Improved Recreational Use and Tourism

- Unauthorised House Boats should be addressed;
- Law enforcement control officer/Safety Officer to be employed to ensure all boats and recreational users have relevant permits;
- Creation of a Public Access Picnic Area;
- A Marketing Plan including Road Signs and a Website should be developed; and
- A feasibility study for creating additional sports fields/courts at the public access area to be undertaken.

Further, as discussed in the Financial Plan below, Vygeboom 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.

2.) Equitable Access

One of the main triggers for the RMP was the issue of inequitable access. In order to rectify this, one of objectives (and related actions) is specifically related to community participation and beneficiation.

Community participation and beneficiation;

- The feasibility of creating a stock watering trough in the community area around the Dam to be investigated. This would prevent the necessity of cattle using the Public Access Area;
- Feasibility of small scale water purification plant and potable water service infrastructure to the local community to be determined;
- Feasibility of the implementation of a local community access card/subsidy programme to subsidize access for community members should be determined;
- Information programmes to be implemented by DMC to educate local community about the benefits of the Dam.
- Access for education programmes to be subsidized; and
- Funding for Public Access area to be upgraded and maintained to be determined.

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).

Formalised Education and Skills Programmes

- Clubs to be affiliated to National Clubs such as under South African Sports Confederation and Olympic Committee (SASCOC) and thus incorporate training and development as per SASCOC requirements;
- Feasibility of opening a Swimming School to be determined (co funding mechanisms should be researched);
- The potential feasibility of training local community members as 'inland water life guards' to be determined; and



The use of the Dam for Science education and learning by local schools to be investigated.

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

Vygeboom 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 BBBEE, LED and SMMEs. 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, Vygeboom 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.

Currently, the recreational clubs generate an income from membership fees. There are no specific day visitor facilities available at the Public Access Areas.

There is an opportunity for DWS/ETC to generate an income from special events, leasing of State Land, filming and/or advertising and fishing competitions.

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 Vygeboom 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 activities related to the numerous clubs at the Dam include:

- Motor Boats;
- Bank Angling;
- Bass Fishing;
- Boat Angling;



- Sailing and Windsurfing (occasionally);
- Canoeing/Kayaking;
- Water Skiing;
- Jet Skis; and
- Water Toys.



4.4.2 Potential Recreational and/or Commercial Opportunities and Uses

A matrix model was used to determine the feasibility of possible recreational and ecotourism 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:

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.

Table 7: Scores for Recreational Use

Based on the table below the following commercial activities have been assessed as potential commercial activities that require further feasibility assessments.

- Feasibility for a PPP for High Income Accommodation;
- House Boats;
- Swimming School;
- Development of tourism and recreational infrastructure and facilities at public access areas; and
- Creation of development programmes for local communities.

_		Operation Managem Issues	nal Ient	Environ Recreati	mental Im onal Use	pacts on	Recreationa Environmer	al Use Impacts o nt	on the	Safety	Requireme	ents			Recreationa	al Requireme	nts			Legal Require- ments	Economic Viabili	ity	Score
Contact Type	Activity	Change in Water Level	Impacts on Dam Wall	Water Quality (<i>E. coli</i>)	Health Impacts	Aquatic Invasive Species	Fish Spawn-ing	Bird Nesting	Water Quality	AtoN/ Demar cation Buoys	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation / Facilities	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Hiking/ Walking Trails	N/A	N/A	N/A	N/A	N/A	N/A	Sensitive bird nesting areas must be identified and avoided	N/A	N/A	N/A	N/A	Cell phone signal available	Emergency response plan required from potential operators	None	N/A	Day hikers would not require accommodation, longer hikes would require camping or similar accommodation	Required	N/A	Required	Local community is interested in unlocking economic potential of the area.	МТРА	2
	Camping at Vygeboom Dam	N/A	N/A	N/A	N/A	N/A	None	Sensitive bird nesting areas must be identified and avoided	Waste management required to prevent impacts on water quality	N/A	N/A	N/A	Cell phone signal available	Emergency response plan required from potential operators	None	N/A	No camping facilities.	No ablution facilities.	N/A	State Land.	Some informal camping does occur.	РРР	1
No Contact	High end accommodati on	N/A	N/A	N/A	N/A	N/A	Possible effects during constructio n phase	Sensitive bird nesting areas must be identified and avoided	Waste management required to prevent impacts on water quality	N/A	N/A	N/A	Cell phone signal available	Emergency response plan required from potential operators	Concern that housing develop- ment may limit economic potential of these type of developme atc	N/A	Require development	Require development	May be required as part of a resort	State Land	Feasibility required	РРР	1
	Birding	N/A	N/A	N/A	N/A	N/A	None	None	Waste management required to prevent impacts on water quality	N/A	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	None	N/A	Day visitors would not require accommodation, longer hikes would require camping or similar accommodation	Existing facilities requiring upgrade/reno vation	N/A	Required	Local community is interested in unlocking economic potential of the area.	МТРА	2
	Picnic areas	N/A	N/A	N/A	N/A	N/A	None	Irresponsible waste management may affect bird behaviour	Waste management required to prevent impacts on water quality	N/A	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	None	N/A	Day visitors would not require accommodation, longer hikes would require camping or similar accommodation	Existing facilities requiring upgrade/reno vation	N/A	Required	Local community is interested in unlocking economic potential of the area.	РРР	2
	Open Water Swimming - Recreational	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to prevent conflict	N/A	Changing rooms required	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Local community is afraid of swimming in the Dam, but may develop an interest if the swimming school is successful Some children expressed interest in swimming	Telkom Splash, Swimming SA	2
Primary Contact	Open Water Swimming – Development School	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	Water clarity is good	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to prevent conflict	N/A	There is no facilities/infrastructur e at the public access areas.	Access through public access area.	State Land	There is no facilities/infrastr ucture at the public access areas.	Local community is afraid of swimming in the Dam, but may develop an interest if the swimming school is successful Some children expressed interest in swimming	Telkom Splash, Swimming SA	2
	Snorkelling	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	Water clarity is good	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to prevent conflict	N/A	Changing rooms required	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	None at present	N/A	1

Table 8: Potential and Current Recreational Activities



		Operation Managem Issues	nal lent	Environ Recreati	mental Im onal Use	pacts on	Recreationa Environment	al Use Impacts ont	on the	Safety	Requireme	ents			Recreation	al Requireme	ents			Legal Require- ments	Economic Viabili	ity	Score
Contact Type	Activity	Change in Water Level	Impacts on Dam Wall	Water Quality (<i>E. coli</i>)	Health Impacts	Aquatic Invasive Species	Fish Spawn-ing	Bird Nesting	Water Quality	AtoN/ Demar cation Buoys	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation / Facilities	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Diving	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	Min 5m	Water clarity is good	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to prevent conflict	N/A	Changing rooms required	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	None at present	N/A	1
	Commercial Fisheries	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	Environmental feasibility studies required before any large-scale activities are authorised	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	May affect recreational anglers and subsistenc e fishermen	N/A	Accommodation required	Facilities required	Required	Land will be required to process fish	None at present	N/A	0
	Shore Fishing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None, as long as effective management of waste takes place	N/A	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	May conflict with other anglers	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Already occurs at Vygeboom Dam	N/A	3
	Tube Fishing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None, as long as effective management of waste takes place	Requir ed	N/A	May not be visible to large vessels, warning flags must be carried if this poses a risk	Cellphone signal available	Emergency response plan required from potential operators	May conflict with other anglers	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Fishing is popular at the Dam	N/A	2
Secondar y Contact	Pontoon Fishing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None, as long as effective management of waste takes place	Requir ed	N/A	May not be visible to large vessels, warning flags must be carried if this poses a risk	Cellphone signal available	Emergency response plan required from potential operators	May conflict with other anglers	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Fishing is popular at the Dam	N/A	2
	Bass Fishing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None, as long as effective management of waste takes place	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	May conflict with other anglers	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Already occurs at the Dam	N/A	3
	Motorised Boats	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	All boats to be SAMSA certified	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Already occurs at the Dam	N/A	3
	Jet Powered Boats	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	All boats to be SAMSA certified	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Already occurs at the Dam	N/A	3



		Operational Management Issues Becreational Use Recreational Use Environment							on the	Safety	Requireme	ents			Recreation	al Requireme	ints			Legal Require- ments	Economic Viabil	ity	Score
ype	Activity	Change in Water Level	Impacts on Dam Wall	Water Quality (<i>E. coli</i>)	Health Impacts	Aquatic Invasive Species	Fish Spawn-ing	Bird Nesting	Water Quality	AtoN/ Demar cation Buoys	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation / Facilities	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
	Rigid Hulled Inflatable Boat (RHIB)	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	All boats to be SAMSA certified	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Already occurs at the Dam	N/A	3
	Jet Ski	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zonal plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Already occurs at the Dam	N/A	3
	Dragon Boats	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Requires large areas, may conflict with other users	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	No interest at present	N/A	1
	Slalom Canoe	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Requires large areas, may conflict with other users	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	No interest at present	N/A	1
	Fishing Canoe	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	May not be visible to large vessels, warning flags must be carried if this poses a risk	Cellphone signal available	Emergency response plan required from potential operators	May conflict with other anglers	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Fishing is popular at the Dam	N/A	2
	Jet Ski Fishing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	May conflict with other anglers	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Fishing is popular at the Dam	N/A	2
	Wind Surfing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	Wind usually variable enough that there is always a suitable location for wind-sports	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Already occurs but not popular		3
	Kite Surfing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	Wind usually variable enough that there is always a suitable location for wind-sports	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown but likely to be interest	N/A	2



	Operational Management Issues Environmental Impacts on Recreational Use Impacts on the Environment						on the	Safety	Requireme	ents			Recreation	al Requireme	ents		Legal Require- ments	Economic Viabil	ity	Score		
Activity	Change in Water Level	Impacts on Dam Wall	Water Quality (<i>E. coli</i>)	Health Impacts	Aquatic Invasive Species	Fish Spawn-ing	Bird Nesting	Water Quality	AtoN/ Demar cation Buoys	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation / Facilities	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
Ski Jumping	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	Suitable	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown but likely to be interest	N/A	2
Slalom Skiing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	Suitable	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown but likely to be interest	N/A	2
Ski and Wakeboard Boat	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	Suitable	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown but likely to be interest	N/A	2
Kayaking Sprints	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Requires large areas, may conflict with other users	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	1
Kayaking Marathons	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Requires large areas, may conflict with other users	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	1
(ayaking Nater Polo	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	1
Kayaking Touring	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	2
€ayaking ≓ishing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	May not be visible to large vessels, warning flags must be carried if this poses a risk	Cellphone signal available	Emergency response plan required from potential operators	May conflict with other anglers	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	2
Paddle Ski	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	2


1		Operation Managen Issues	nal nent	Environ Recreat	mental Im ional Use	pacts on	Recreationa Environmen	al Use Impacts nt	on the	Safety	Requireme	ents			Recreation	al Requireme	ents			Legal Require- ments	Economic Viabil	ity	Score
act	Activity	Change in Water Level	Impacts on Dam Wall	Water Quality (<i>E. coli</i>)	Health Impacts	Aquatic Invasive Species	Fish Spawn-ing	Bird Nesting	Water Quality	AtoN/ Demar cation Buovs	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accommodation / Facilities	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportunities	
							identified and avoided										will require it.						
ł	Pedal Boat	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	2
ŝ	Stand Up Paddling	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	2
8	Boat Paragliding	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	Suitable	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Unknown	N/A	1
ę	Sailing	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	Requir ed	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	Suitable	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Occasional sailing currently takes place.	N/A	3
1	Water Toys	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None	N/A	N/A	N/A	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	N/A	Day visitors do not require accommodation, but those visiting for longer time periods will require it.	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Currently takes place.	N/A	3
ł	House Boats	N/A	N/A	Water quality very good	N/A	None recorded at present	Sensitive fish spawning areas must be identified and avoided	Sensitive bird nesting areas must be identified and avoided	None, as long as effective management of waste takes place	N/A	N/A	Care must be taken to ensure that smaller craft are not overlook ed	Cellphone signal available	Emergency response plan required from potential operators	Zoning plan to minimise conflict	N/A	Not required	There is no facilities/infra structure at the public access areas.	Access through public access area.	State Land	Currently takes place.	РРР	1





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 Vygeboom 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.
- 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 = $A \div U/a \times Rf$

Where A = area available for public use;

U/a = area required for each user; and

Rf = Rotation Factor (the number of visits per day)

A is calculated as the area of the water surface: 6.6461km², or 646 hectares

U/A = There is a range of literature regarding the area required for different recreational users, which ranges between 1.6ha (0.016 km²) per boat to 16ha (0.16 km²) per boat. Typical U/A values are as follows:

Craft	Water Depth (m)	U/A (ha/craft)
Canoes	>0.6	0.5 (0.005 km ²)
Windsurfers	>0.6	0.5 (0.005 km ²)

Craft	Water Depth (m)	U/A (ha/craft)
Rowing	>1.0	0.5 (0.005 km ²)
Dinghies	>1.0	1.0 (0.01 km ²)
Yachts	>1.8	2.0 (0.02 km ²
Powerboats	>1.4m	4.0 (0.04 km ²
Fishing	>1.0m	4.0 (0.04 km ²
Water-skiing	>1.4m	16.0 (0.16 km ²)

For the purposes of this calculation, bearing in mind that the uses of Vygeboom Dam are currently informal and subject to change with the introduction of management principles and formal operators, a conservative value of 4.04ha is assumed to be an acceptable estimate of area per user.

As Vygeboom Dam 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 RF = 1.

The PCCs for Vygeboom Dam can therefore be calculated as:

PCC = $A \div U/a \times Rf$ = 646 ÷ 4.04x1 = **159 craft** on the Dam at any time

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 the conservation no go areas at the inlet to the Dam, the primary contact areas and the no-go safety areas.

Calculating the area of the surface of the Dam and removing the areas of restricted access, approximately 576 ha (5.76 km^2) of water surface remain available for recreation. This means that 12.1 % of the Dam is not available for recreational use.

The RCC for Vygeboom Dam is therefore:

 $RCC = PCC \times (100 - Cf1) \% \times (100 - Cf2) \% \times ... (100 - Cfn) \%$

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Where Cf = a corrective factor expressed as a percentage. In this case all corrective factors have been consolidated.

RCC = 159 x (100 – 12.1)% = <u>140 boats</u> on the Dam at any given time.

For special events, permits may be given to use an extra area of the Dam, provided that certain safety and conservation measures are taken into account. Should these permits be issued, then an extra 33ha will become available for recreational use for the duration of the permit.

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. Currently there is no public access slipway or infrastructure/facilities for day visitors. All users are therefore from the recreational clubs. In addition, there is no overarching surface water management or safety system in place or agreement to manage public access areas.

ECC = [Infrastructure Capacity x MC]/ RCC Where: ECC = Effective Carrying Capacity;

MC = Management capacity based on staff and budget;

RCC = Real Carrying Capacity

In this case calculating ECC is not possible until such a point where the infrastructure capacity and management capacity is known.

4.4.4 Water Surface Zonal Plan

The Zonal plan for the water surface at Vygeboom Dam is divided into thirteen 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 Activities Combination;
- Zone B: Full Contact Activities Swimming and Angling (current or potential) (This zone extends approximately 50m from the shoreline);
- Zone C: No Go Zone Management;
- Zone D: Secondary Contact High Speed Motorised Boats, Sailing and Jet Skis;
- Zone F: No Go Zone Conservation; and
- Zone G: No Go Zone Safety Buffer (This zone extends 50m from the end of the swimming zone as well as around obstacles).

Detailed information of the current and potential activities is provided in the table below. Information on requirements for each zone is also provided.



Zone Name	Contact Type	Permissible Activities - Current	Permissible Activities - Potential	Access Point	Safety Requirements for Users	Safety Requirements for DMC
Zone A	Secondary Contact - Combination	Motorised Boats (no wake zone) Canoeing Kayaking Rowing Tubing Paddle Ski House Boats Pleasure boats Bass Fishing Shore fishing	Small-scale fisheries Dragon Boats Slalom Canoe Fishing Canoe Kayaking Sprints Kayaking Marathons Kayaking Touring Kayaking Fishing Pedal Boat House Boats Stand Up Paddling Tube Fishing Pontoon Fishing	Recreational Clubs once access agreements are in place Public access area once developed.	Registered Safe for Water Vessel Valid Skipper's License First Aid Kit UPN date stamp UPN tag	AtoN and Demarcation Markers UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer Recreational Clubs will require system of checking UPN tag and date stamp as Wash Bay will likely be located at Public Access Area
Zone B	Full Contact - Swimming	Swimming - recreational	Swimming – development school	Recreational Clubs once access agreements are in place; Public access area once developed.		UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer Demarcation buoys markers: in conjunction with AtoN around obstacles and shallow areas, recreational clubs will be responsible for adding AtoN and demarcation markers buoys around swimming areas.
Zone C	No Go Zone - Safety	Management and maintenance activities by DWS	None	N/A	N/A	AtoN and Demarcation Markers
Zone D	Secondary Contact- Motorised Boat and Associated Activities	Bass Fishing Motorised Boats Jet Powered Boats RHIB Wind Surfing Kite Surfing Paragliding Sailing Ski and Wakeboard Boat Canoeing Rowing	Jet Powered Boats Dragon Boats Slalom Canoe Fishing Canoe Jet Ski Fishing	Recreational Clubs once access agreements are in place Public access areas once developed.	AtoN and Demarcation Markers UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer Recreational Clubs will require system of checking UPN tag and date stamp as	AtoN and Demarcation Markers UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer Recreational Clubs will require system of checking UPN tag and date stamp as Wash Bay will likely be located at Public Access Area

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
		Kayaking Sprints Jet Ski			Wash Bay will likely be located at Public Access Area	
Zone E	No Go Zone Conservation	N/A	Research	N/a	Research permit from DWS	AtoN and Demarcation Markers UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer Recreational Clubs will require system of checking UPN tag and date stamp as Wash Bay will likely be located at Public Access Area
Zone F	No Go Zone – Safety Buffer	None	None	N/A	No access to this area to prevent conflict/potential safety issues between boats and swimmers/anglers and/or due to obstacles/shallow water.	Demarcation buoys around obstacles and shallow areas. Recreational clubs will be responsible for adding buoys around swimming areas.

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Figure 18: Map of the Water Surface Zonal Plan

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

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

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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. However in this case, all land around the Dam is owned by the State.

The management zones include:

- Zone A Conservation and Recreation/Tourism;
- Zone B Development and Recreation;
- Zone C- No Public Access Management Only.

Zone A includes the sensitive ridge area which has a high biodiversity. It also includes the area around the inlet of the Dam. Some development for low impact recreation such as hiking trails/walks is permitted. No high impact development is permitted.

Zone B allows for recreation and development of facilities for recreational purposes. This includes public access areas and areas currently used by recreational clubs. Please note that all developments will require approval from the DMC as well as the requisite agreements in place with DWS (see agreements section).

Zone C is a No–Go zone for the public. Access for management activities by DWS is permitted.

Permissible activities are detailed in the table below.



Table 10: Shoreline M	Management Zones
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Zone Name	Zone Type	Permissible Activities	Requirements for Users	Requirements for DMC
Zone A	Conservation and Tourism/Recreation	Conservation management activities including birding, picnicking, swimming, low impact activities such as hiking and canoeing Small developments such as creating hiking trails in the area is also permitted	Noise levels to be kept at a minimum No littering	Updated agreements with landowner MOA for management of public access areas
Zone B	Recreation and Development	Development of facilities/infrastructure for recreation Development of facilities/infrastructure for development/training Development of facilities/infrastructure for tourism Fishing Camping/Accommodation Birding Picnicking Access to surface water for recreational purposes	Camping allowed only in designated areas Noise levels to be kept at a minimum No littering at Picnic spots Access to surface water only through approved access 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 No permanent structures within the 1: 100 year floodline	Enforcement Officer to check all designated picnic spots. 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
Zone C	Management – No Public Access	Fire management Alien invasive species clearing Management of Dam Infrastructure Management and maintenance activities by DWS and IA	Caretaker agreemenst must be in place prior to use/management by adjacent landowners	Access to this area for strictly management purposes (i.e. DWS)



Figure 21: Shoreline Zonal Map

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Figure 22: Shoreline Zonal Map – Section 1

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Figure 23: Shoreline Zonal Map – Section 2

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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	What	Why	How	Who
	A three tier management system including Dam Management Committee (DMC), Operational Management Committee (OMC) and RMP Steering Committee (RSC) should be formed and include various stakeholders	There is no overarching management system in place	Creation of DMC, OMC and RSC with associated agenda's and reporting lines	DWS
	New leases with recreational users formalising terms of recreational use New agreements eliminating or formalising current arrangements	Leases are outdated and unclear and do not fulfil the conditions of Best Practice for lease agreements	New lease agreements to be drafted between DWS and all users of the Dam that require a lease agreement to access the water	Affected Parties DWS
Institutional	A MOA with ETC (as IA) for the management of the Dam and public access area to be put in place	ETC has settled a Land Claim for the land surrounding the Dam (excluding the purchase boundary). They are therefore may be in a position to extend their management into the State Land around the Dam	MOA to be drafted	DWS ETC
and management practices	Control of access	Access to the Dam is not strictly controlled due to the large number of slipways and the fact that there is no overarching system with regards to access and safety. Safety concerns also exist as many vessels do not meet SAMSA requirements	Establishment of DMC to ensure regulated and equitable access Wash Bay and UPN System to be implemented. It is suggested that the Wash Bay be set up at the Public Access Area. Access agreements to be signed	Recreational Users DWS ETC
	Development of a unified rulebook for recreation on the Dam	Currently no consistency in rules and regulations between different groups of recreational water users	DMC to develop a rulebook based on existing management regulations and practices. This includes the zonal plan from the RMP, the operating hours at which the safety boat can monitor the water surface and SAMSA vessel requirements	DMC
	Fire management Plan to be developed to ensure quick response to fires	There is no unified response to fire management in the area	A fire management Plan should be developed	DWS
	Event Management System to be implemented	There is no specific event management system in place	Event Applications to be drafted Event management system to be implemented.	DWS

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Objective	What	Why	How	Who
			Event rules to be included in unified rulebook	
	Rates for events and advertising should be determined	There are no specific rates for events or advertising. The Dam has income generating potential which is untapped	Rates for events to be determined Rates for advertising to be determined	DWS
	Water Quality Management Plan to address the impact of mining and effluent pollution	Currently, Vygeboom Dam has good water quality however there is concern that new mines in the area are negatively impacting water quality. In addition, there may be vessels disposing effluent into the Dam. This has the potential to impact water quality	Water Quality Management Plan to be developed Discussions with nearby mines regarding discharges Continued water quality monitoring Water quality monitoring results to be discussed and DMC and changes in water quality to be submitted to OMC and RSC	ICMA DWS DMC
	Wash Bay System to be implemented to prevent aquatic invasive species at the Dam	Aquatic weeds can cause harm to indigenous aquatic ecosystems and increased populations of these weeds can stop the use of the water surface	The CIWSP programme should been launched at Vygeboom Dam. A Wash bay should be built	DWS DMC DEA ETC
Resource Management	The area adjacent to the Public Access Area should be rehabilitated	The area has never been rehabilitated and makes access to the public access area difficult	Rehabilitation plan to be developed. Rehabilitation based on the plan to be undertaken	DWS
	An alien invasive species management plan should be developed. This plan should include aquatic and terrestrial plant species as well as fish species	Invasive fish species harm indigenous fish species through disrupting food webs and preying on indigenous species	Alien invasive management plan to prevent alien invasive species infesting the Dam	DWS DEA ETC
	Study of yellowfish population must be undertaken	The current status of the Yellowfish population at the Dam is unknown	A Yellowfish population study should be undertaken	DWS MTPA
	A waste management plan, which will address solid waste will be developed	There are a number of separate recreational clubs and no municipal refuge services in the area, This can lead to pollution of the environment	Waste Management plan to be developed and waste management specifications must be included in all agreements	DWS Recreational Clubs ETC



Objective	What	Why	How	Who
	Unauthorised House Boats should be addressed	There are a number of unauthorised House Boats on the Dam. The legality of these needs to be addressed	A legal opinion regarding the House Boats should be obtained Discussions with Treasury and the Landowners should take place If necessary a PPP process should be followed	DWS
	Law enforcement control officer/Safety Officer to be appointed to ensure all boats and recreational users have relevant permits	There is no system wide safety system in place. The different recreational clubs all have different safety rules and requirements. By having a safety officer appointed it is possible to ensure that all users are meeting the correct safety requirements	Safety management system to be put in place including the appointment of a Safety Officer	DWS Recreational Clubs ETC
Improved Recreational Use and Tourism	Creation of a Public Access Picnic Area and fishing area	The community around the Dam would like to use the Dam for functions and events however there are no facilities or infrastructure. This limits equitable access at the Dam	MOA in terms of management of Public Areas to be signed with ETC ETC to create public access area	DWS ETC DMC
	Funding for road signage, website, tourism initiatives to be determined The upgrade of the road to the Dam should be undertaken if possible	The Dam occurs in an area with much tourism potential however it is not well known. The economic potential of the Dam has therefore not be unlocked The road leading to the Dam is also not formalised and this also restricts use	Discussions between MTPA, MEGA, Department of Sports and Recreation, Department of Transport and Department of Tourism should be undertaken to determine funding sources for marketing initiatives The DMC should develop marketing material for the Dam The DMC should develop a website for the Dam which includes details on all the clubs and associations as well as rules and regulations Funding sources for the road upgrade should be determined The municipality should upgrade the road	DMC ETC DWS DoT MTPA MEGA Department of Tourism



Objective	What	Why	How	Who
	The feasibility of creating additional sports fields/courts at the public access area to be determined. This would create a 'recreational hub' at the Dam where the youth of the surrounding communities could benefit from a number of water and land based sports	Information gained during focus groups suggest that the community around the Dam has no available recreational or sporting facilities. There was a definite interest in creating a recreational hub at the Dam which included soccer, volley ball and netball courts a s well as demarcated swimming areas, picnic spots, ablution facilities etc.	MOA in terms of management of Public Areas to de discussed and signed if possible. If not possible, PPP process for the management of the surface water to be undertaken	DWS ETC DMC
	The feasibility of creating a stock watering trough in the community area around the Dam to be investigated. This would prevent the necessity of cattle using the Public Access Area	Many people within the community surrounding the Dam have cattle. The cattle use the public access area at the Dam for drinking water as well as a small spring. However there is no specific area for stock watering	Feasibility study to be undertaken	DWS DAFF ETC
Community Participation	Feasibility of small scale water purification plant and potable water service infrastructure to the local community to be determined	Most of the community around the Dam do not have access to potable water other than through Jojo tanks which are not always filled	Feasibility study to be undertaken	DWS Chief Albert Luthuli LM ETC
Beneficiation.	Feasibility of the implementation of a local community access card/subsidy programme to subsidize access for community members should be determined	The local community around the Dam do not have the resources to pay access fees to the Dam. Fees should not be allowed to prevent equitable access at the Dam	The Feasibility of a cross subsidy programme/community access card should be determined	DWS DMC ETC
	Information programmes to be implemented by DMC to educate local community about the benefits of the Dam	There are a number of cultural beliefs in the local community which prevent the use of the Dam	The DMC should develop educational material to ensure the local community understands the benefits of using the Dam	DMC ETC
Proper Policing and Safety	Standardised AtoN and Demarcation Marker system to be implemented	Improve safety of navigation.	Implement AtoN and Demarcation markers as required. Agreements between SAMSA, DWA, LAAPs and other relevant parties to be concluded	SAMSA DWS Recreational Clubs Relevant Parties
management	Trained Safety officer with authority	There is no safety system in place for all recreational clubs and users. There is a need for a trained safety officer to implement all rules and regulations	Safety officer to be appointed and trained	DWS SAMSA DMC



Objective	What	Why	How	Who
	Detailed safety system to be designed and implemented including the compilation of a rules handbook. All recreational clubs to ensure members meet all SAMSA and DWS requirements. Safety officer to ensure rules are implemented and enforced	There is no enforcement of SAMSA and DWS rules and regulations in place at this time	Safety Management System to be designed and implemented Safety officer to be appointed and trained. Rules handbook to be developed All agreements with recreational clubs to include safety requirements	DWS SAMSA DMC Recreational Clubs
	Unique Positioning Number (UPN) and Wash Bay System to be implemented	There is no system to ensure users are meeting SAMSA requirements. In addition, although the Dam is currently not infested with aquatic invasive species, there is no specific mechanism to prevent future infestation	UPN system to be implemented. Centralised Wash Bay System to be built. Safety management system to ensure that all recreational clubs have measures in place to ensure all members have been through the centralised wash bay	DWS SAMSA DMC Recreational Clubs
	Potential for Inland Water Life savers to man public access areas/swimming areas to be investigated	During focus group sessions, the issue of swimmer safety was raised. Currently, there are no measures to ensure safe swimming. There is also a shortage of skills in the community. There is potential for a skills training programme that provides skills to the local community and ensures the safety of swimmers at the public access area	The feasibility of an Inland Waterways Lifesaving programme to be determined	DWS SwimSA SASCOC ETC
Formalised Skills	Clubs to be affiliated to National Clubs such as under South African Sports Confederation and Olympic Committee (SASCOC) and thus incorporate training and development as per SASCOC requirements	There is no standard for recreational clubs at this point. However, if affiliated, all clubs will be required to meet SASCOC requirements in regards to development training	Agreements to include requirement for clubs to be nationally affiliated	DWS DMC Recreational Clubs
and Education Programme	Feasibility of opening a Swimming School to be determined (co funding mechanisms should be also be researched)	Children in the community indicated an interest in a swimming school. Swimming is a skill which is not often developed. This can be dangerous and may lead to drowning	Discussions with SwimSA to determine potential co-funding mechanisms. Feasibility study for a swimming school to be developed	DWS DMC SwimSA
	Access for education programmes to be subsidized. The feasibility of using the Dam	There are some local schools in the area which would benefit from using the Dam for school	Fee structures to be developed to include education programmes subsidies	DMC DWS



Objective	What	Why	How	Who
	Science education and learning by local schools should also be investigated	learning programmes. Fee structures for learning programmes should take into account socio-economic status		
Management of Development Pressure	DMC to play active role in EIA's and BAR and to act as a custodian for the Dam	There is concern that development such as Waste water Treatment Works (WWTWs) will result in the pollution of Vygeboom Dam. There is also concern that new developments in the area could also lead to pollution	DMC to include agenda item regarding development in the catchment DMC to comment on EIAs/BARs in the catchment from the perspective of impacts to the Dam	DMC
	DMC should involve representatives from MTPA and the DEDT so that non compliances can be reported to the relevant compliance units	Non compliances in terms of NEMA and NWA occur however currently these regulations are not enforced. This could lead to negative impacts to the environment around the Dam	All non-compliances to be reported	DMC MTPA DEDT DWS
Swift Resolution of Land Matters	Legal assessment of the subdivision of State Land which are currently used by the various clubs to be undertaken Unauthorised structures and use (such as fishing along the ridge area) on State Land to be addressed	A number of the recreational clubs around the Dam have 'subdivided' State Land and houses for members have been built. The legality of this needs to be determined as well as the best way to address this going forward There are a number of unauthorised permanent and non-permanent structures on State Land	Legal Assessment to be undertaken	DWS

5 WAY FORWARD

5.1 Compilation of Business Plans

Based on the strategic objectives identified for Vygeboom Dam, a suite of Business Plans were developed. The Business Plan 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
- Determine Funding sources Innovative mechanisms to obtain funding were identified.

5.2 Review of RMPs and Business Plans

The vision in the RMP process has identified 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 Business Plans 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 Business Plans are updated annually.



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