FINAL RESOURCE MANAGEMENT PLAN

WRIGGLESWADE DAM

water & sanitation

Department:
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- Stutterheim Aquatic Club;
- Amahlathi Local Municipality; and
- Amatola Water

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Review:

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Annual Review of Business Plans	August	2015	2016	2017	2018	2019
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Amendments Page

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

Executive Summary

According to the Guidelines for the Compilation of Resource Management Plans (2006), the main aim of Resource Management Plans is to "attain the objectives underlying sustainability and to compile workable, functional sustainable access and utilisation plans for water resources and in particular State Dams". A Resource Management Plan is thus a planning tool aimed at working within the requirements of existing policies, while taking into account the needs and interests of stakeholders.

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

Wriggleswade Dam, a combined gravity and arch type Dam, was completed in 1991. The Dam was constructed primarily to provide water to Buffalo City Metropolitan Municipality in East London. This was deemed necessary at the time due to the formation of the Ciskei which resulted in water from Laing Dam being allocated for development in the Ciskei. Water at the Dam is fully allocated to the Buffalo City Metropolitan Municipality although there have been a number of investigations into using water from the Dam to augment supply in the Great Kei Local Municipality.

The Dam occurs within the Great Kei Catchment in the Mzimvubu to Keiskamma Water Management Area and is a component of a large internal Transfer Scheme where water from the Dam is transferred to supplement the Amatole Regional Water Supply System supplying the Buffalo City Metropolitan Municipality area with 18 million m^3/a. The Dam is thus an important component of the Amatole Regional Water Supply System and supplies water from the Kubusie River Catchment into any one of the Gonubie, Nahoon and Yellowwoods Rivers which flow into the Buffalo River.

The Stutterheim Aquatic Club is the main recreational user at the Dam and in the past had a 25 year lease with the Amatola Regional Services Council. The Club has a fulltime on site caretaker at the Dam as well as camping and ablution facilities, a bar, slipway and braai facilities. These facilities are also open to members of the public as well as members of other Clubs and Association. A number of different recreational clubs make use of the Dam including:

- King Williams Town Bass Masters Club;
- Border Bass Masters;
- Wriggleswade Yacht Club;
- East London Yacht Club; and
- Wriggleswade Bass Masters Club.

A number of events are held at the Dam including regular bass fishing competitions held by the King Williams Town Bass Masters Club as well as Inter Provincial Competitions held by Border Bass Masters. Every five years, the Dam is used as the venue for the National Qualification Events by the South African Bass Angling Association. In addition Merrifield Mile, Amatola Carp Classic Fishing competition and

the Wriggleswade Sports Festival are also held at the Dam.

Wriggleswade Dam and its surrounding area has a rich array of natural attraction due to the unique combination of natural scenery and floral diversity. Some of the more significant attractions include:

- Kologha Forest Reserve;
- Kubusi Indigenous State Forest Reserve;
- Isidenge State Forest;
- Sandile's Grace;
- Bethel Mission Station;
- Amatola Mountains;
- Kologha Forest Trails;
- Mountain biking;
- Birding;
- Fishing;
- Boating;
- The Rock Art Museum;
- The Engine Museum; and
- Mgwali Xhosa Cultural Village.

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

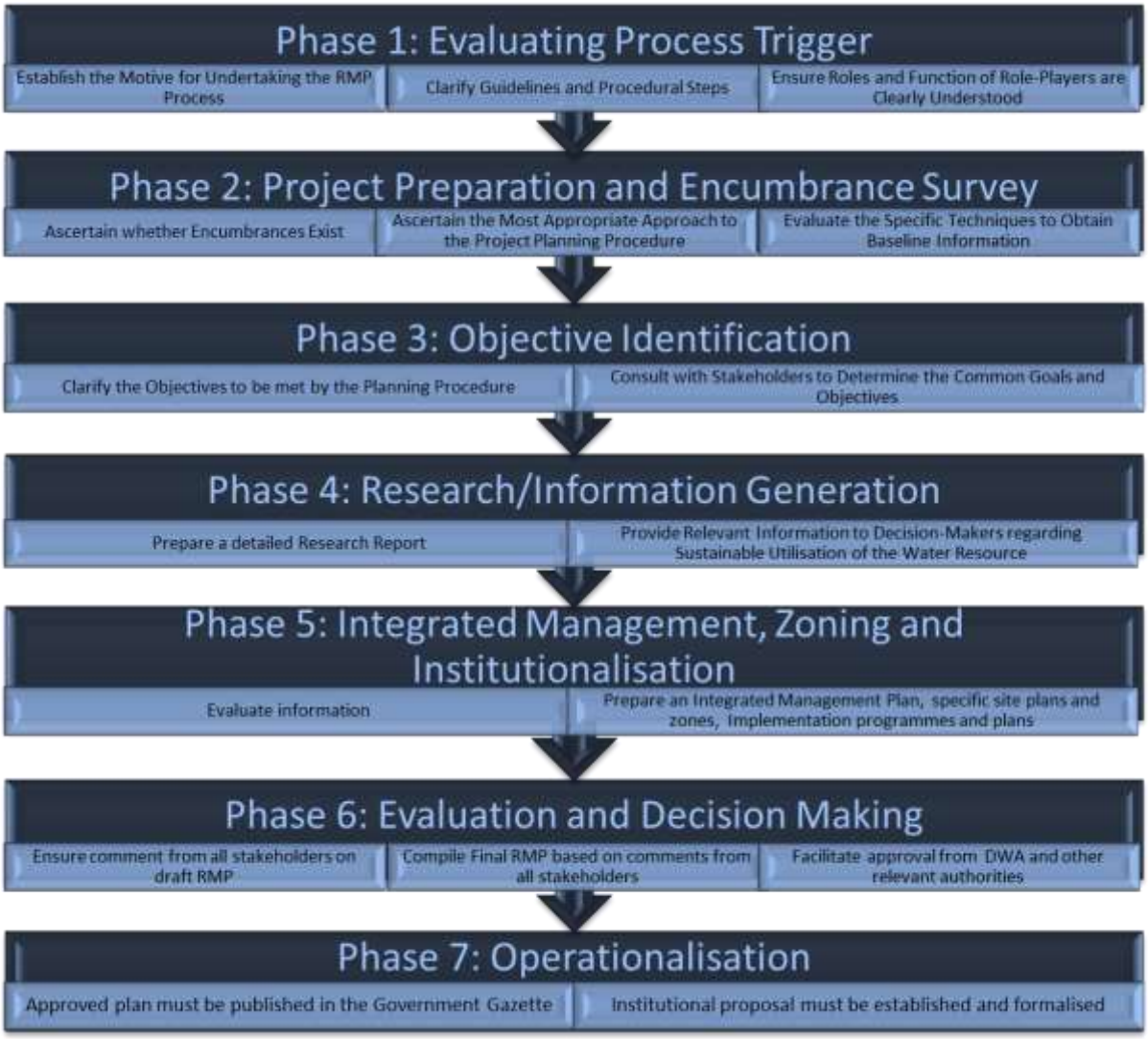

Figure 1: RMP Process (DWA, 2006)

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

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

- Implementation of the Institutional Plan including the formation of a Dam Management Committee, Operations Management Committee and RMP Steering Committee. The Institutional Plan recommends that agreements are updated to be in line with the findings of the Resource Management Plan.
- Implementation of standardised and harmonised Aids to Navigation and Demarcation Markers.
- Implementation of a Unique Positioning Number System and a Wash Bay System at the Dam.
- Review of existing agreements in line with the findings of the Resource Management Plan.
- All unauthorized use and shoreline activities to be resolved;
- Access to the Dam must be managed through appropriate legal mechanisms. It is suggested that a new agreement with Amatola Water be put in place to manage recreational use.
- A survey of the extent of the water hyacinth Infestation should be undertaken. In addition, an aquatic Invasive Species Management Plan should be compiled.
- Coordination with youth outreach programmes such as Forestway should be investigated so that the Dam can form part of education and skills programmes in the area.
- Education programmes should be instituted to encourage community members to utilise Wriggleswade Dam. Additional coordination with SailingSA should take place as part of an outreach programme.
- The feasibility of linkages with tourism initiatives such as the Amabele Berries, KraftMania and Rail based tourism etc. should be determined.
- Discussions with the Taxi Association to create a taxi route to the Dam over the weekend must be investigated. This will improve access to the Dam.
- The feasibility of overnight accommodation at the Dam should be investigated.

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Acronyms and Abbreviations

AGIS	Agriculture Geographic Information System
AtoN	Aids to Navigation
AWSS	Amatola Water Supply System
BAR	Basic Assessment Report
BBBEE	Broad-Based Black Economic Empowerment
BP	Business Plan
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
CCA	Carrying Capacity Assessment
CIWSP	Cooperative Inland Waterways Safety Programme
CMA	Catchment Management Agency
COGTA	Department of Cooperative Governance and Traditional Affairs
CPSI	Centre for Public Service Innovation
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DMC	Dam Management Committee
DoT	Department of Transport
DRDLA	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
ECC	Effective Carrying Capacity
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
FIRE	Finance, Insurance, Real Estate
GDP	Gross Domestic Product
GIS	Geographical Information System
GN	Government Notice
GVA	Gross Value Added
Ha	Hectares
I&APs	Interested and Affected Parties
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IBA	Important Bird Area
IDP	Integrated Development Plan
IWRM	Integrated Water Resource Management

LAAP	Local Accountable AtoN Parties
LED	Local Economic Development
LM	Local Municipality
mASL	Metres above Sea Level
MPTA	Mpumalanga Parks and Tourism 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)
NGP	New Growth Plan
NSDP	National Spatial Development Perspective
NTU	Nephelometric Turbidity Units
NWRI	National Water Resources Infrastructure
NWRI: IEE	National Water Resources Infrastructure: Integrated Environmental Engineering
OMC	Operational Management Committee
PCC	Physical Carrying Capacity
PFMA	Public Finance Management Ac (Act 29 of 1999)
PGDS	Provincial Growth and Development Strategy
PPP	Public Private Partnership
PSDES	Provincial Spatial Economic Development Strategy
QDS	Quarter Degree Square
RCC	Real Carrying Capacity
RHIB	Rigid-Hulled Inflatable Boat
RMP	Resource Management Plan
RQO	Resource Quality Objectives
RSC	RMP Steering Committee
RWU	Recreational Water Use
SAC	Stutterheim Aquatic Club
SAMSA	South African Maritime Safety Authority
SANBI	South African National Biodiversity Institute
SAPIA	South African Plant Invaders Atlas
SAPS	South African Police Service
SAR	Sodium Absorption Ratio
SAS	South African Sailing
SASCOC	South African Sports Confederation and Olympic Committee
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SFWS	Strategic Framework for Water Services
SMME	Small, Medium and Micro Enterprises

SPC	Strategic Plan for Commercialisation
SRP	Soluble Reactive Phosphorus
SRSA	Department of Sports and Recreation
SWOT	Strength Weaknesses Opportunities and Threats
THETA	Tourism, Hospitality and Sports Education Training Authority
ToR	Terms of Reference
TR	Treasury Regulations
UPN	Unique Positioning Number (used in the CIWSP)
WIP	Weeds and Invasive Plants
WMA	Water Management Area
WSDP	Water Services Development Plan
WULA	Water Use License Application
WWTWs	Waste water Treatment Works

1 WHAT IS A RMP AND WHY IS IT NECESSARY?

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

According to the Guidelines for the Compilation of RMPs (DWA, 2006), the main aim of the RMP is to "attain the objectives underlying sustainability and to compile workable, functional sustainable access and utilisation plans for water resources and in particular State Dams". A RMP is thus, a planning tool aimed at working within the requirements of existing Government Policy, while taking into account the needs and interests of stakeholders.

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

The RMP lays the foundation required to consolidate objectives for the resource so that the vision for the Dam can be obtained, within the framework of existing policy priorities and legislative requirements. The RMP also informs decision-making which may have a direct impact on the resource. Further, the RMP creates a platform to unlock economic potential at the Dam without compromising environmental principles and recreational use of the Dam. Recreational use includes activities which range from leisure, sport to culture and religion. Although recreational use is not consumptive, it is still a major water use and needs to be managed correctly to ensure increased personal, societal and economic benefits with minimal disturbances and environmental impacts.

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

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

Table 1: Government Departments and Agencies

DEPARTMENT	MANDATE
Department of Transport (DoT)	Responsible for legislation, policy and regulations for all transportation in South Africa, including shipping and other transport by water or sea, including inland waterways.
Department of Public Works (DPW)	Much of the State Land around the Dam is vested with DPW.
Department of Environmental Affairs (DEA)	Responsible for biodiversity management within the Dam including Invasive alien species.
Nature Conservation	The Eastern Cape Parks and Tourism Agency's (ECPTA) mandate is to ensure biodiversity conservation and sustainable utilisation of natural resources within the Province's Nature Reserves. Although, ECPTA is not responsible for the management of Wriggleswade Dam, they are a key stakeholder in terms of managing non-indigenous flora and fauna, creating mutually beneficial relationships with neighbouring communities and the preservation of cultural resources in the Eastern Cape.
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.
Amatola Water	Amatola Water is one of 20 Water Boards and Utility Organisations belonging to the South African Association of Water Utilities and mandated as a Water Services Provider to municipal authorities and certain other water customers. The utility`s primary business activity is to service the bulk, treated water requirements of urban, peri-urban and rural communities situated within a Gazetted services area which is some 43 400 square kilometres in extent and is located within the central region of the Eastern Cape Province of South Africa. DWS has an Operation and Management agreement with Amatola Water and as such the operation and management of the Dam is undertaken by the water board.

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

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

2 WHERE ARE WE NOW?

2.1 Overview of the Catchment

Wriggleswade Dam occurs within the Great Kei Catchment in the Mzimvubu - Tsitsikamma Water Management Area (WMA). This WMA has been recently been expanded and includes the previous Mzimvubu to Keiskamma WMA and Fish to Tsitsikamma WMA. Due to the recent nature of this expansion, information is sometimes provided for the Mzimvubu Keiskamma WMA although a focus on the Great Kei Catchment is provided where possible. The Great Kei Catchment can be further broken down into three sub-areas namely:

- The Upper Kei Sub-area;
- The Middle Kei Sub-area; and
- The Lower Kei-Sub-area.

Wriggleswade Dam occurs in the Lower Kei Sub-Area which is characterised by the Great Kei River valley, which is some 400 m below the surrounding plateau. On the left and right banks the valley rises steeply to meet the coastal plateau zone, which covers most of this sub-area. The Gcuwa River has its headwaters at the inland edge of this coastal plateau zone at 1200 masl. The Kubusi River has its headwaters in the Amatola mountains above Stutterheim and meanders through the coastal plateau before falling away steeply to enter the Great Kei River.

The climate is moderate for most of the year, but with hot periods from December to February. Although the area receives rainfall throughout the year, it is primarily a summer rainfall region, with the months of June and July being the driest. The mean annual precipitation (MAP) varies from 1 000 mm along the coast to 700 mm inland above Butterworth and 1200 mm in the Amatola mountains (DWAF, 2004).

The area is underlain by the Adelaide and Tarkastad formations of the Beaufort series (shale, mudstones and sandstones) with dolerite intrusions, the largest of which is located on the left bank of the Great Kei River. Soils are derived from the underlying rock and are generally shallow and low in fertility.

The plateau area is predominantly covered by grassveld with large areas of valley thicket in the Great Kei valley and its small steep sided tributaries. There is significant commercial forestry in the Kubusi catchment. Alien invasive plants (black and silver wattle) occur throughout the area with some heavy infestation around the Nqamakwe area and in the upper Kubusi catchment (DWAF, 2004).

2.1.1 Surface Water and River Systems

The main dams in the Lower Kei sub-area comprise the Gubu and Wriggleswade Dams on the Kubusi River, and the Xilinxa and Gcuwa Dams on the Gcuwa River. The development of these dams is mainly for domestic water supplies to the towns and rural villages in the sub-area as well as for inter-basin transfer of water from Wriggleswade Dam to the Buffalo City supply catchments.

Further, Wriggleswade Dam is an important component of the Amatole Water Supply System (AWSS) which provides water to about 1 million people residing in the catchments of the Buffalo, Nahoon and Upper Kubusi rivers, as well providing water to approximately 1000 hectares (ha) of irrigation along the upper and middle reaches of the Kubusi River. The communities supplied from the system fall primarily within the Buffalo City, Amahlati and Ngqushwa municipal areas with East London, King Williams Town, Bhisho and Stutterheim being the main urban centres within the supply area (DWA, 2012).

The main storage dams of the AWSS are the Gubu, Wriggleswade, Rooikrantz, Laing and Nahoon dams (owned by the Department of Water and Sanitation and operated by the Amatola Water Board) and the Maden and Bridledrift dams (owned and operated by the Buffalo City Metropolitan Municipality - BCMM). The Gubu and Wriggleswade dams are located on the Kubusi River, the Maden, Rooikrantz, Laing and Bridledrift dams on the Buffalo River and the Nahoon Dam on the Nahoon River (DWA, 2012)

Due to the rolling topography there are no natural lakes in the area, although some wetlands are found in the vicinity of Kokstad. There are some estuaries in the WMA. Many of these are in a relatively pristine state, although not of a particularly high ranking from a species conservation perspective (DWAF, 2003).

2.1.2 Land Use

At the Lower Kei Sub area level, land use and settlement patterns are influenced by the previous political division of the area with the right bank of the Great Kei being part of South Africa and the left bank being part of the former Transkei. The former Transkei is characterised by dispersed rural settlements and communal subsistence farming and grazing. Butterworth and Nqamakwe are the main formal towns in this area (DWAF, 2004).

Butterworth is the largest town in the sub-area reflecting the only urban node in the former Transkei area where most services and higher order infrastructure are to be found. The standards of these services have declined in recent years along with the economy of the town. The right bank comprises privately owned commercial stock, game and vegetable farms. The only formal towns in this part of the sub-area are Stutterheim, Komga and Kei Mouth (DWAF, 2004).

This sub-area has irrigation, stock and game farming and forestry as the main economic generator in the Kubusi catchment. However in the former Transkei area the economy is very depressed. The population generally relies on income from migrantworkers and state social grant benefits with unemployment rates exceeding 60%. The only industrial and commercial complex is located in Butterworth, which has been in decline since 1994 with removal of the Regional Industrial Development Programme. Most of the industries have moved away (notably SA Breweries) and there has been a general decline in economic opportunities. The service industry is by far the largest contributor to the local economy. Tourism at Kei Mouth and Morgan Bay is currently a small contributor to the local economy but has the potential to grow significantly in the future.

At the WMA level, economic activity is dominated by industrial development in BCMM which is known for its automotive and textile industries. Much of this economic development was stimulated by the harbour at East London.

Two hydro-electric power stations were constructed on the Mtata River near Umtata (at First Falls and Second Falls) as well as the Collywobbles hydropower station on the Mbashe River (DWAF, 2003). There is also a small hydro-electric power station on the Ncora River.

2.1.3 Water Quality

Mineralogical water quality in terms of Total Dissolved Salts (TDS) for each of the sub-catchments within the WMA are listed below and were obtained from the Mzimvubu to Kieskamma WMA Situation Assessment (DWAF, 2002) It is important to note that this assessment was done in 2002 and used data from between 1994 and 1998 and thus may be outdated. Further, it should be noted that the WMA has been expanded and now includes additional catchments. However information is only included for the catchments which were included as part of the WMA at the time of the study:

- **Amatole Catchments** (R catchments): The Keiskamma catchment has ideal water quality in its headwaters that changes to good in a downstream direction. Water quality in the Buffalo River catchment varies from good to marginal. The elevated salts are the result of natural mudstones and industrial discharges in the King William's Town area. Water quality in the Nahoon and Gqunube catchments were classified as good;
- **Kei Basin** (S catchment): Water quality in the Kei Basin varies from ideal, in the Kubusi River catchment (S60), to good for the largest part of the catchment to marginal in the western part (S32) of the Basin. The elevated TDS in the western part of the catchment is largely the result of the catchment geology;
- **Mbashe Basin** (T10 and T90): There was insufficient data in the Mbashe Basin to classify the mineralogical water quality.

However, the limited data that is available in the catchment indicates that the quality is probably ideal to good, which is similar to the adjacent catchments where the mineralogical quality was classified as good;

- **Mtata Basin** (T20, T70 and T80): With the exception of T70A and B, there was insufficient data in the Mtata Basin to classify the mineralogical water quality. However, the limited data available at sampling points in the Mtata River seem to indicate that the mineralogical status is ideal. In the Mngazi River, water quality was classified as good. The mineralogical quality is probably ideal to good over the remainder of the Basin;
- **Mzimvubu Basin** (T30): Water quality in the Mzimvubu Basin varied from ideal to good for most of the catchments; and
- **Pondoland Catchment** (T60): There was insufficient data to classify the mineralogical quality in the Pondoland coastal rivers. However, the limited data that is available in the T60 catchment indicates that water quality is probably ideal.

In addition, a number of key water quality issues have been identified:

- The quality of runoff in the former Transkei and Ciskei is dominated by runoff from extensive rural settlements. In the mid 1990s, 50% of the total population of the Eastern Province lived in the rural areas. Sanitation infrastructure was poor and concerns were expressed about microbial contamination of surface water that affected domestic water supply and contact recreation. Cattle have direct access to the water and they contributed to the microbial contamination (DWAF, 1998);
- Concerns were expressed about urban contamination from the Butterworth area (Du Preez, 1985) but not the Umtata area where it was concluded that releases for hydropower were sufficient to dilute urban contamination. However, the situation has deteriorated since then as a result of the growth of Umtata and the increased discharge of raw sewage into the Mtata River (DWAF, 2002), which is a severe health threat to rural communities downstream who use the water for household purposes;
- Elevated levels of iron and manganese were found by Du Preez (1985) which was ascribed to the natural abundance of red ochre soils in the region. Elevated iron and manganese can cause problems in the treatment of drinking water;
- Du Preez (1985) also found elevated levels of arsenic in rivers of the coastal plain. This was ascribed to cattle dipping in communal dips which were situated close to rivers (which served as the source of water for the dip). Old and unusable dip was discarded into soak pits which probably leached into surface water bodies;
- Water bodies in the Buffalo River suffer from eutrophication related water quality problems which are the result of nutrient enrichment (DWAF, 1999). Van Ginkel *et al,* (2000) found Laing and Bridle Drift Dams to be hypereutrophic (highly enriched) and that toxic cyanobacterial blooms are likely to develop. The origin of the nutrients is urban runoff and sewage effluent discharge; and
- Water hyacinth has also been observed in the Buffalo River system as well as on the Nahoon and Kabusi Rivers (DWAF, 2002).

At the Lower Kei Sub Area Level, water quality of the rivers is generally suitable for domestic and agricultural use. However, serious pollution of the Gcuwa River is occurring downstream of Butterworth due to leachate from the unlicensed solid waste site on the banks of the river. This pollution is further exacerbated by stormwater runoff from the town, poor operation of the effluent treatment works and possible runoff from the few remaining industries in town (tanneries etc). These are not monitored. The number of monitoring points in the sub-area is small and no monitoring occurs downstream of Butterworth which is potentially one of the largest sources of pollution into the Kei River. Generally, Butterworth has expended little on infrastructure services in

recent years. This is compounded by the lack of financial and skilled manpower resources to address the many problems (DWAF, 2004).

2.1.4 The Social Environment

About 3.5 % of the Gross Domestic Product (GDP) of South Africa originates from the Mzimvubu to Keiskamma WMA, which is relatively small compared to the large population in the area (DWAF, 2002). The largest economic sectors (1997) in the WMA, in terms of GGP, were:

- Government - 30.8 %;
- Manufacturing - 20.4 %;
- Trade - 14.7 %; and
- Finance - 11.4 %.

The government sector contributes the largest share of the GGP. One of the factors contributing to the importance of this sector is the presence of government services in the capital of the former Ciskei, Bisho, which houses the Provincial Legislature.

Activity in the manufacturing sector is dominated by the automotive, and textile and clothing industries. Mercedes Benz South Africa (MBSA) is the largest truck horse manufacturer in Africa and is the third largest Mercedes Benz manufacturing plant outside Germany. It also is one of the leading auto export companies in South Africa. Da Gama Textiles, which manufactures polyester-cotton fabrics, is one of the largest of its kind in the country. The food industry is also strong and the country's largest pineapple processing plants are operated in the East London area.

Trade is an important element of the activities around the East London harbour, while the finance sector mainly operates in support of other activities. Sheep and cattle farming provide a living for rural subsistence farmers. There is extensive commercial forestry in the WMA, while crops such as cotton, citrus pineapples and chicory are grown on commercial farms (DWAF, 2002).

Most of the economic production is concentrated in the BCMM area from where more than 35% of the gross geographic product in the WMA originates.

Of the work force of just over one million people in the WMA in 1994, 42% were active in the formal economy and 48% were unemployed, which is substantially higher than the national unemployment average of 29%. Of those formally employed, 40% were active in the community services sector, i.e. government and social services, while 17% were involved in manufacturing and 16% in agriculture (DWAF, 2002).

2.1.5 Tourism Potential

Tourism is currently active along the Coast at places like Port St Johns and Coffee Bay along the Wild Coast, and Hogsback in the Amatola Mountains (DWAF, 2002). However at this point it is not the main contributor to GGP in the WMA. According to the Amabele Local Spatial Development Framework Plan developed by the Amathole Economic Development Agency in 2009 it was noted that the Amathole District Municipality (ADM) is linked to six major tourism regions in the Province namely, Wild Coast, Friendly N6, Amathole, Sunshine Coast and country, Karoo Heartland and Tsitsikama. A portion of these four regions lie within ADM and thus tourism opportunities in the District lie in eco-tourism, culture, history and heritage. The District tourism sector is believed to contribute about 26% to the Province. The ADM tourism situational analysis revealed that the geographical positioning of the District has a very appealing strength for domestic tourism both within and outside the Eastern Cape (Aspire, 2009).

The ADM Integrated Development Plan (IDP) has proposed a strategic framework in order for the District Municipality to start delivering and reaching its strategic objectives. These strategies include:

- A Tourism Spatial and Support Infrastructure Strategy;
- A Tourism Product Development and Investment Strategy Overview;
- A Small, Medium and Micro Enterprises (SMME) Development and Transformation Strategy;
- A Tourism Marketing Model; and
- An Institutional Framework.

Further, a Heritage Resource Management Strategy is in place 'to safeguard the available heritage resources. A number of heritage programmes are in place namely:

- Capacitating of Local Municipalities to enable them to deal with Grade 1 heritage resources;
- Grading, development of heritage sites and improvement; and
- Promotion and marketing of heritage and control formulation of cultural villages, museum, gardens of remembrance and walls of fame.

The fact that programmes exist at a District level highlight that there is high tourism potential and also puts in place programmes to ensure that this potential is reached.

A further significant initiative by the ADM in regard to tourism potential is the proposed Amathole Biosphere which is conceptually proposed to extend from Stutterheim area westwards along the Amathole Mountains towards the Nkonkobe range.

Both the Amahlathi Local Municipality IDP and Spatial Development Framework (SDF) list a number of tourism projects for future tourism development and infrastructure programmes that will enhance tourism and to achieve the tourism objectives. In particular the SDF identified a number of tourism zones in the area including:

- **Zone 1**: this area includes Kologha Forest and Amatola Mountain Range Escarpment with eco and nature tourism potential. The fauna, flora and landscape of the area provides a number of tourism opportunities such as Amatole hiking trails, mountain bike, horse and walking trails, 4x4 trails, cape parrot conservation, canopy tours, Gubu Dam for water sports, fishing camping and picnic sites;
- **Zone 2:** Keiskammahoek and surrounding areas which have a huge potential for cultural, history and heritage potential. Many historical buildings and forts are located in the region e.g. St Matthews Mission, Castle Eyre, Fort Eyre, Chief Ngqika's grave at Ntabakandoda, etc.;
- **Zone 3**: Elukhanyisweni and surrounding area which is suitable for cultural and historical tourism;
- **Zone 4**: South Eastern section of Amahlathi for ecotourism potential due to its eye-catching landscape and environmental elements which give the potential for game farming in the region. This tourism zone also includes a number of tourism destinations such as Wriggleswade Dam for sport and recreational tourism, Wartburg falls, Rock painting at Cowsmead and Bulls Run PP and cultural village at Mgwali;
- **Zone 5:** Thomas river conservancy for eco and nature tourism potential. There are 31000 ha of available farmland for conservation and recreation. Tourism products include walking trails, horse trails, mountain biking trails, fishing, hunting, farm stay, bird watching and game viewing. The historical village of Thomas River has also been restored providing a restaurant and accommodation; and
- **Zone 6:** Cathcart area for eco and cultural tourism. There are a number of historical buildings and cultural sites in surrounding Cathcart such as Old Railway shed, town hall, Elliot's building, Standard Bank and the Kenya cottages with Windvogel post and the Goshen Bushmen painting on the outskirt. Eco-tourism opportunities include walks, mountain bike trails and to establish a municipal nature reserve.

Further, the Amahlathi IDP acknowledged the existence of natural and heritage resources such as:

- Indigenous Forests in the Toise area;
- Indigenous Forests North West of Stutterheim;
- Indigenous Forests in the Keiskammahoek area The forests are noted as conservation-worthy, to be managed and used/developed sensitively and sustainably for potential eco-tourism;
- Wartbury Falls in Toise area;
- Numerous Rock paintings in the Cathcart area; and

- Agricultural potential in Keiskammahoek and Elukhanyisweni.

Wriggleswade Dam and its surrounding area has a rich array of natural attraction due to the unique combination of natural scenery and floral diversity.

Eastern Cape Development Corporation (ECDC) has also funded a Pre-feasibility study into Rail-Based Tourism in the Province which identifies rail corridors with high tourism potential. It includes an assessment of the tourism potential of the rail link between Mthatha and East London, recommending that 'the viability of the Amabele–Mthatha further recommends investigating the 'feasibility of the manufacturing and production of light-weight diesel-powered rail cars for use on rural branch lines'. These cars could potentially be used as transport to take workers from Amabele and Kei Road villages to the blueberry farm.

2.1.6 Catchment Management Agency

There is no Catchment Management Agency (CMA) in place for the WMA however there is currently a Business Case for a CMA for the Mzimvubu to Tsitsikamma WMA.

2.1.7 Safety of Navigation

In addition to its common law responsibility, DWS is, in terms of the requirements described in the National Water Act (Act 36 of 1998), amongst others, responsible for the safety of Government's waterways and watercourses, including its Dams. DWS, its delegated public sector partner, or a delegated water management institution, has therefore the responsibility to provide the required fixed and/or floating Aids to Navigation[1] (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.

2.2 Purpose of Wriggleswade Dam

Wriggleswade Dam was constructed primarily to provide water to the greater East London Area. This was deemed necessary at the time due to the formation of the Ciskei which resulted in water from Laing Dam being allocated for development in the Ciskei. Water at the Dam is fully allocated to the Amatola Water Supply System (AWSS).

The Dam occurs within the Great Kei Catchment and is a component of a large internal transfer scheme where water from the Dam is transferred to supplement the AWSS supplying the BCMM area with 18 million m^3/a. The Dam is thus an important component of the AWSS and supplies water from the Kubusie River catchment into any one of the Gonubie, Nahoon and Yellowwoods Rivers (which flows into the Buffalo River).

2.3 Overview of the Dam

Wriggleswade Dam falls within Amalathi Local Municipality (ALM) and Amathole District Municipality (ADM). The Dam also falls within the Mzimvubu to Keiskamma WMA. Table 2 below provides an overview of the Dam whilst Figure 2 shows the locality of the Dam.

Table 2: Overview of Wriggleswade Dam (DWA, 1988)

Dam Characteristics	
Year of Completion	1991
Capacity	91.5 million cubic metres
Purpose of the Dam	Industrial and domestic use
River	Kubusi River
Nearest Town and Province	Stutterheim, Eastern Cape
Net Storage capacity	93.2 million cubic metres
Surface area of Dam at full supply	1000 ha (10 km^2)
Owner, designer and construction	Department of Water and Sanitation

[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*".

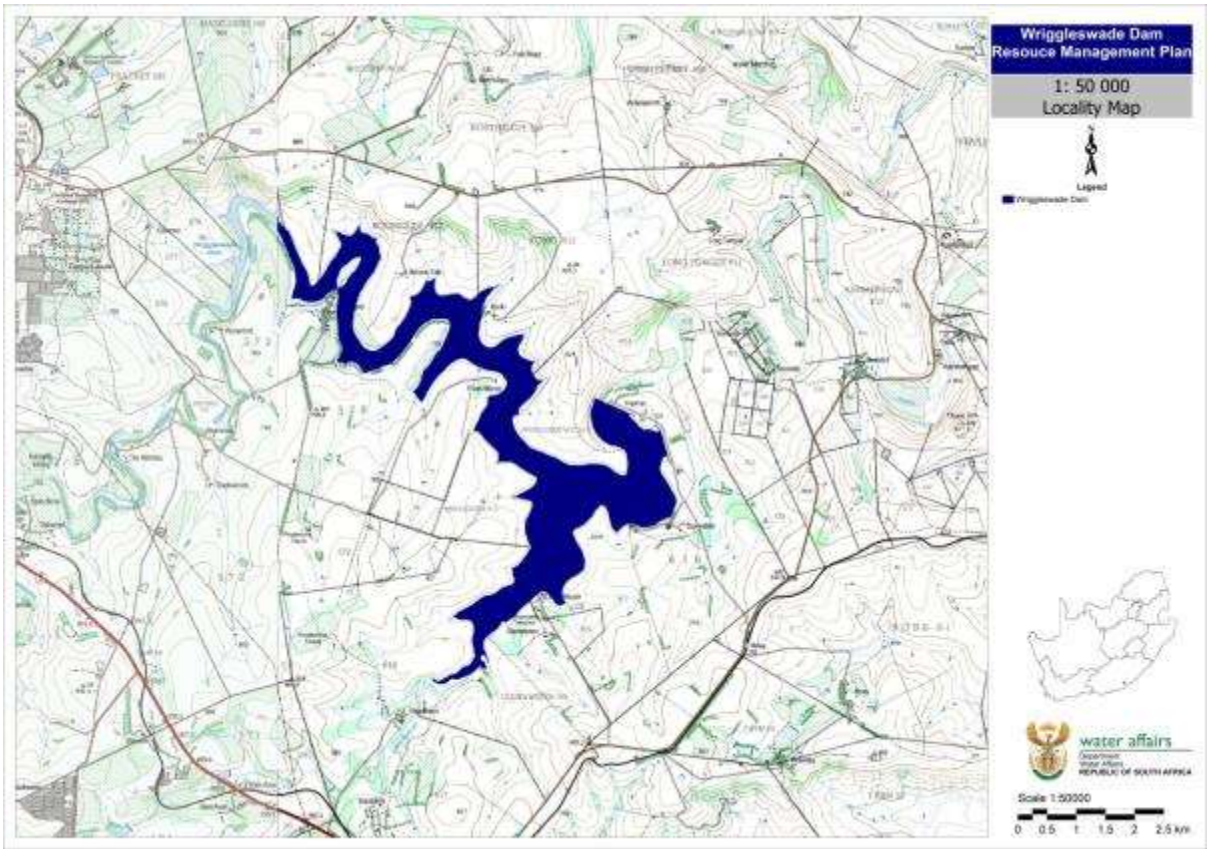

Figure 2: Location of Wriggleswade Dam

2.4 Legislative Framework

The RMP forms the overarching framework for the management of Wriggleswade 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 Wriggleswade 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);
- 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);
- Nature and Environmental Conservation Ordinance, 1974 (No 19 of 1974);
- Eastern Cape Parks and Tourism Agency Act, 2010 (Act 2 of 2010).
- South African National Biodiversity Institute (SANBI) Biodiversity GIS information;
- Sport and Recreation SA Strategic Plan - 2011-2015;
- Provincial Conservation Plan; and
- Provincial State of the Environment Report.

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

2.4.1 National Water Act (Act 36 of 1998)

The Act aims to ensure that the Nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account (amongst other factors):

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial and gender discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting Dam safety; and
- Managing floods and droughts.

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

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

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

Once the RMP has been gazetted, the RMP will regulate access and use of the Dam. It is important to note that users will need to comply with other relevant legislation including the Merchant Shipping (National Small Vessel Safety) Regulations, 2007, The National Water Act, 1998 (Act No 36 of 1998), SAMSA Marine Notices and its Directive on the Standardisation of fixed and floating AtoN and Demarcation Markers on all navigable Inland Waterways in the Republic of South Africa and the relevant provincial ordinances.

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

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

In addition, the only water use entitlement that currently applies to RWU is Schedule 1 of the Act. Currently the Act is silent on Commercial RWU and thus it is necessary for the RMP to provide guidance this regard.

2.4.2 GN 654 of May 1964

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

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

The Regulations provide guidance on access control, use of firearms and other weapons, speed limits, parking areas, trading, reserved areas, fire management, hygiene, camping and accommodation, access to works, photography, safety rules, reckless and unseemly conduct, damage to property, prohibited areas, protection of fauna and flora, swimming, angling, boat Regulations, water skiing and hydroplaning; and general rules.

2.4.3 Water Services Act (Act 108 of 1997)

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

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

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

Section 2 of the Act has the largest impact on the RMP in that future development and

management of the Dam must ensure the following:

- The disturbance of ecosystems and loss of biological diversity both in and around the Dam must be avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- Pollution and degradation of the Dam is avoided, or, where it cannot be altogether avoided, is minimised and remedied;
- The disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- Development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

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

> *"Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option."* ***(National Environmental Management Act, 1998 (Act 107 of 1998)***

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

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

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

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

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

- **Critically endangered species**: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered species:** any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- **Vulnerable species:** any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- **Protected species**: any species which is of such high conservation value or national importance that it requires

national protection. Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

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

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

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

Species	Category/Area
Common carp	1b in National Parks, Provincial Reserves, Mountain Catchment Areas and Forestry Reserves declared in terms of the Protected Areas Act. a. 2 for release into a dam within a discrete catchment system in which it occurs. b. 3 in all rivers, wetlands, natural lakes and estuaries in which it occurs. c. Subject to b, common carp is not listed for dams within discrete catchment systems in which it occurs.
Small-mouth bass	a. 1b in National Parks, Provincial Reserves, Mountain Catchment Areas and Forestry Reserves declared in terms of the Protected Areas Act.
Florida bass	
Spotted bass	b. 2 for release into dams within discrete catchment systems in which it occurs c. 3 in all rivers, wetlands, natural lakes and estuaries in which it occurs. d. Subject to (b), each listed bass species is not listed for dams within discrete catchment systems in which it (the specific listed bass species) occurs.
Large-mouth bass	a. 2 in National Parks, Provincial Reserves, Mountain Catchment Areas and Forestry 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. d. Large-mouth bass is not listed for dams within discrete catchment systems in which it occurs (excluding (a) above).
Bluegill	a. 1 b in National Parks, Provincial Reserves, Mountain Catchment Areas and Forestry Reserves declared in terms of the Protected Areas Act. b. 3 for all other discrete catchment systems in which it occurs.

Largemouth and Smallmouth Bass and Carp occur at the Dam however the Dam does not occur in 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 role-players. The Act also provides for Access Control Officers which can be appointed by the Event Organisers. These officers control access of both people and motor vehicles to an event and prevent a person from entering or requesting that a person leaves should the need arise. The act also allows for Peace Officers to be in charge of search and seizures at an event.

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

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

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

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

- Vessel Safety Requirements;
- Crewing; and
- Requirements for Water Skiing.

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

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

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

2.4.16 Provincial Parks Board Act (Act 12 of 2003)

Provincial Parks Board Act, 2003 provided for the establishment of the Eastern Cape Parks and Tourism Agency (ECPTA) now called Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (EC-DEDEAT) as a Public Entity.
The EC-DEDEAT mandate is to ensure biodiversity conservation and sustainable utilisation of natural resources inside the province's Nature Reserves.

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

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

2.4.18 Eastern Cape Parks and Tourism Agency Act (Act 2 of 2010)

The aim of the Act is to provide for the establishment of the ECPTA in order to develop and manage protected areas, to promote and facilitate the development of tourism in the Province and to confer powers, functions and duties upon that Agency; to provide for the management thereof by a Board and the appointment of members thereof; to establish the Eastern Cape Tourism Development Fund

and the Eastern Cape Biodiversity Conservation and Development Fund; to provide for the registration of certain persons and amenities involved in tourism; to provide for the collection of levies in respect of registered persons and amenities; to provide for the inspection of premises.

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 of both Local Municipalities and both Provinces were taken into account in developing the RMP:

- The IDP of ALM and ADM Municipality;
- Eastern Cape Provincial Growth and Development Strategy;
- Spatial Development Framework (SDF) of the ADM and ALM;
- Local Economic Development Plans;
- Water Services Development Plans;
- Land Use Management Plans;
- Provincial Integrated Environmental Management Plan;
- The Strategic Framework of Water Services, 2003;
- The National Water Resources Strategy, 2004;
- The Provincial Spatial Economic Development Strategy, 2003;
- National Spatial Development Perspective, 2006;
- The Cooperative Inland Waterways Safety Programme (CIWSP).
- The Water Services Development Plan of ALM; and
- The Strategic Framework of Water
- The New Growth Path, 2012.

In addition, there are a number of specific plans and programmes for the area that were considered.

2.5.1. Amabele Local Spatial Development Framework

A collaborative partnership between ECDC, ALM and Development Bank of Southern Africa resulted in the Amabele Local Spatial Development Framework Plan. This plan underpins the overarching ALM's IDP and SDF. In addition, it is aligned with the Amathole Regional Economic Development Strategy and supports State investment in the Kei Rail initiative, whereby Amabele is being revived as a rail transport hub.

2.5.2. Eastern Cape Biodiversity Conservation Plan

The Eastern Cape Biodiversity Conservation Plan (ECBCP) has at its core, a spatial representation of Critical Biodiversity Areas, and other areas in a near natural state. The plan forms the basis for Biodiversity Land Management Classes, ranging from Natural to Transformed landscapes. Recommended land use objectives are defined for each Biodiversity Land Management Class. The ECBCP also defines biodiversity corridors, which are pathways of natural or near-natural landscapes for species to travel along between critical biodiversity areas.

The land management of the areas around ALM vary from 'Maintain as Natural', south of the Wriggleswade Dam, with some scattered functional landscapes around Wriggleswade Dam and Plantations or Woodlots on either side of the N6 but the predominant recommended management with regards to land use options is given as 'Maintain near natural state'.

2.5.3. Subtropical Thicket Ecosystem Programme

The aim of Subtropical Thicket Ecosystem Programme (STEP) was to assess regional biodiversity in the south-eastern Cape, with special emphasis on the indigenous vegetation type known as Thicket. This analysis resulted in the formulation of Mega Conservancy Networks, formed by corridors of land identified as requiring special consideration to ensure sustainability. Areas outside of the Network are

also classified based on their conservation status, providing an indication of the need for protection to ensure the retention of biodiversity.

2.5.4. Eastern Cape State of Environmental Report

Some of the highest levels of Biodiversity are present in the ALM primarily west of Stutterheim and South West towards Keiskammahoek. In addition this report highlighted that this area was one of the least physically transformed municipalities, which may explain why there exists such a good representation of species diversity in the area.

2.5.5. Amathole District Municipality State of Environment Report

The ADM State of Environment Report has highlighted the high plant species diversity in the district, particularly in the Amatola Mountain region, which can be considered, threatened. The State of the Environment Report also states that the mosaic of different vegetation types contributes towards the high species diversity and that no single portion of the region can be "singled out as harbouring the majority of the species diversity", but rather that it is spread throughout the district.

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

2.5.6. 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 Wriggleswade 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.

Figure 3: Relationship between RMP and Planning Initiatives

2.6 Socio-Economic Environment

Wrigglewade Dam occurs within the ALM and the ADM of the Eastern Cape of South Africa.

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

2.6.1 Population

According to the 2011 Census, ALM has a total population of 122,778. Of the people in the municipality, 96.5% are black African, 1.2% are coloured, with the other population groups making up the remaining 2.3% (Figure 4).

There are 34 159 households in the municipality, with an average household size of 3.5 persons per household. Females head 48.8% of the households.

Of the households, 82,4% have access to electricity. Only 15,6% of households have access to piped water inside the dwelling.

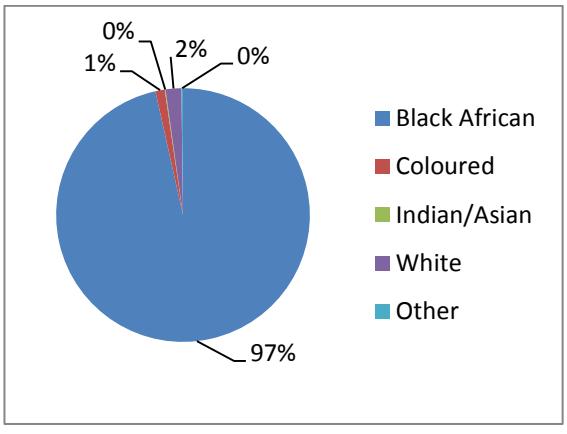

Figure 4: Population

2.6.2 Education

Of those aged 20 years and older, 7% have completed primary school, 33% have some secondary education, 6% have completed matric and 1% have some form of higher education. Of the mentioned age group, 2% have no form of schooling (Figure 5).

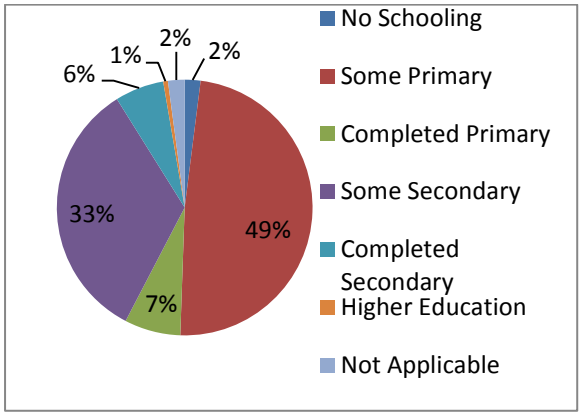

Figure 5: Education Level

2.6.3 Employment

Thirteen percent of the people in the LM are unemployed. Twenty-three percent of persons are employed while 52% of the population is not economically active (Figure 6),

During consultation it was noted that youth in the area have a number of issues regarding alcohol and drug abuse which may be related to a lack of employment opportunities in the area.

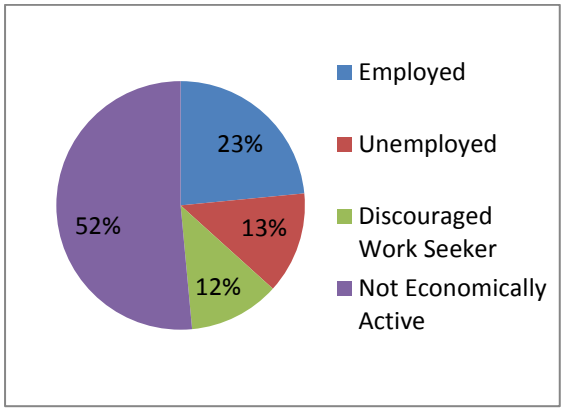

Figure 6: Employment Status

2.6.4 Average Household Income

Figure 7 shows the monthly average household income. Fourteen percent of households earn no income at all.

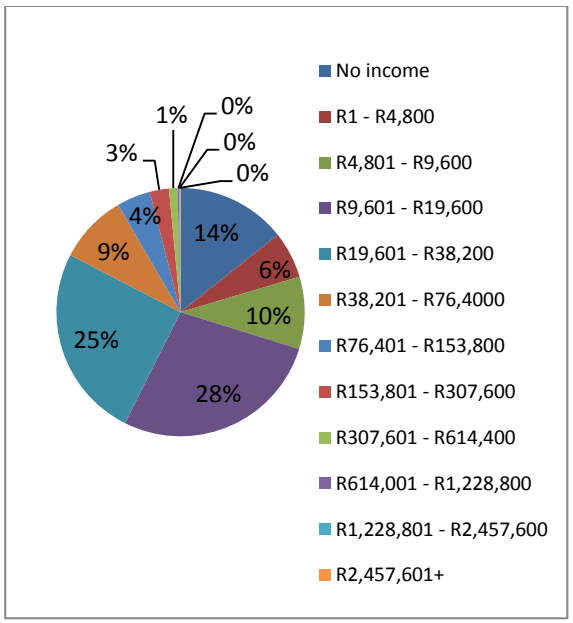

Figure 7: Income status

2.6.5 Gross Value Added

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

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

Primary Sector:

- Agriculture, forestry and fishing;
- Mining and Quarrying

Secondary Sector:

- Manufacturing. This includes food, beverages and tobacco; textiles, clothing and leather goods; wood, paper,

publishing and printing; petroleum products, chemicals, rubber and plastic; other non-metal mineral products; metals, metal products, machinery and equipment; electrical machinery and apparatus; radio, TV, instruments, watches and clocks; transport equipment; and furniture and other manufacturing.

- Electricity, gas and water; and
- Construction

Tertiary Sector:

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

Table 3 shows that general government contributes the greatest percentage to GVA (24%) followed by wholesale and retail trade, catering and accommodation (20%).

Table 3: GVA for ALM in R million at 2005 contstant prices

Industry	Amahlathi Local Municipality	%
Total	**2180**	**100%**
Agriculture, forestry and fishing	45	2%
Mining and quarrying	4	0%
Manufacturing	268	12%
Electricity, gas and water	42	2%
Construction	49	2%
Wholesale and retail trade, catering and accommodation	436	20%
Transport, storage and communication	162	7%
Finance, insurance, real estate and business services	437	20%
Community, social and personal services	204	9%
General government	533	24%

2.7 Development Potential

The development potential of Wriggleswade Dam and the surrounding area is relatively high especially in terms of tourism and water sport activities.

Amabele Local SDP (Aspire, 2009) found that there is considerable feasibility for the development of leisure tourism and eco-tourism products linked to water based tourism activities on the Wriggleswade Dam. These products could be linked to the Blueberry Farming initiative and the revitalisation/ upgrade of the Amabele Station, creating a unique offering in the area. Coupled with the existing eScape tourism routes, heritage tourism initiatives and cultural products around Stutterheim, these could act as catalysts for development around the Dam.

The eScape Tourism initiative will facilitate the extension of tourism packages linked to water based leisure tourism, limited rail based tourism excursions and seasonal agri-tourism linked to the berry harvesting season. Further, local economic enterprise initiatives will be established through partnerships between the Private Sector, Communities and Government. Such enterprises will include wattle beneficiation, Bees, Vermiculture, Transport services and game conservancies. Aspire (2009) also proposed a potential community based Lodge overlooking the Wriggleswade Dam.

Amathole Berries is a proposed packshed and processing facility that will be developed at Amabele, as well as a siding to load fresh and processed product onto rail. Packed blueberries will be rail freighted from Amabele Station to East London. Export fruit will be transported via a mixture of sea and air freight.

In addition, to the main products, a number of downstream businesses have also been proposed including:-

- A 'Blueberry Coffee Shop' and other tourism businesses at Amabele;

- Pick-your-own berries, farm tourism, guest houses, and hikes and meanders can potentially be developed from Amabele linking to Wriggleswade Dam;
- Large volumes of organic compost and bark chips will be needed for the blueberry plants; and
- Bees will be needed for pollination of the blueberry plants each year, with an opportunity to develop a 'core apiary' with individual outgrowers with hives in nearby forests. Stemming from this there are further opportunities to develop honey, mead and wine businesses.

The Local SDP (Aspire, 2009) also identified the potential for aquaculture at Wriggleswade Dam. However, it is important to note that the ECDC identified the Dam as a Leisure Dam and not a priority dam for aquaculture in studies that they completed. Aspire (2009) found that should aquaculture be considered, it should focus on Tilapia products. The total aquaculture production of Tilapia was reported to be 1,265,800 tons in 2000. The largest exporter, Taiwan, supplies Japan with high-quality Tilapia fillets for the sashimi market, and ships frozen Tilapia to the United States market (40,000 tons in 2001). Taiwan exports about 70 percent of its domestic Tilapia production. In Africa, Zimbabwe, now also produces fresh and frozen fillets for the EU market. A more detailed feasibility would be required especially in terms of potential impacts on water quality as the primary function of the Dam is to provide domestic water to the AWSS.

There is also a pre-feasibility study into Rail-Based Tourism in the Province which identifies rail corridors with high tourism potential being undertaken by ECDC. Due to the proximity of the Dam to the Station, there is a potential to include the Dam in this Rail-Based tourism.

ALM's IDP and SDF also identify a number of tourism opportunities (specifically water sports, fishing camping and picnic sites) related to Gubu Dam which is located approximately 50km from Wriggleswade Dam. Gubu Dam is also located near the Kabusi Indigenous State Forest, Isidenge State Forest and Nabakyu State Forest. The Dam appears to be a very popular fly fishing location. Whether, other water sport activities also take place at the Dam is not known. The Development potential of Wriggleswade Dam needs to take into account the recreational uses of nearby Dams so that nearby Dams do not compete with each other.

2.8 Access and Infrastructure

There is only one public access point at Wrigglewade Dam. This access point is located at the Stutterheim Aquatic Club (SAC). Facilities at SAC include a slipway and jetty, clubhouse and pub, camping and ablution facilities. There is a full time caretaker at the Dam who allows any visitor's access to the Dam for a nominal fee. However, despite this most of the local community does not make use of the Dam. The main reasons for this are the distance between the town and the Dam, lack of transport and confusion regarding whether the Dam is open to the public. There are also no education programmes or information available to the community about joining the club.

Further, due to the fact that the Dam is surrounded by private land, there is very little area available for public access.

The intake tower for Amatola Water is also located at SAC. Other infrastructure includes the Dam wall and DWS houses and offices. In addition, there are no fences between the purchase boundary and adjacent properties. This has led to illegal infrastructure such as abstraction points and cattle kraals etc. within the purchase boundary.

2.9 Biophysical Environment

2.9.1 Water Quality

Water quality at Wriggleswade Dam been monitored by DWS since 1992 at the 102561 S6H005Q01 Station however there have been numerous gaps in data collection specifically between 2008 and 2012. The median values are provided in Table 4.

Table 4: Water Quality at Wriggleswade Dam

Variable	Median
Total Dissolved Salts	131 mg/l
Electrical Conductivity	20.5 mS/m
pH	7.81
Sodium	17.5 mg/l
Potassium	2.38 mg/l
Calcium	9.97 mg/l
Magnesium	5.1 mg/l
Chloride	22.2 mg/l
Sulphates	6.74 mg/l
Total Alkalinity	54.4 mg/l
Fluoride	0.16 mg/l
Phosphates	0.016 mg/l
Ammonia	0.02 mgN/l

The ammonia levels were noted as poor and may suggest other potential issues. This is especially of concern in light of the fact that there is an increase in eutrophication in the Amatole Catchments due to nutrients originating from Wastewater Treatment Works (WWTWs) and pollution for urban run-off (DWAF, 2004).

No specific studies appear to have been done on the Kabusi River and inflows into Wriggleswade Dam however in the Buffalo River, the bad management as well as the overloading of WWTWs beyond capacity is a problem. DWAF implemented a PO4 concentration effluent standard of 1mg/L in 1980 for WWTWs effluent in order to prevent algal blooms (O'Keeffe *et al.,* 1996). However, historical monitoring data by DWAF of effluent PO4 concentrations of WWTWs in the Amatola system show that PO4 concentrations are rarely below 1 mg/L. In addition, the nutrient concentrations (PO4 and NO3) released from all the WWTWs within the Amatola system show a high degree of temporal variability. In 2013, both PO4 and N03 concentrations were higher than in previous years suggesting that water quality in the Dam may be worsening (Slaughter *et al.,* 2012).

However, according to Amatole Bulk Water Supply System Strategy (DWAF, 2008), the Stutterheim WWTW is the only point source discharging notable quantities of treated effluent to the Kubusi River. However, the quantities are relatively small and the source is relatively far upstream of the Wriggleswade Dam, allowing ample travel time for in-stream decay processes. The summary of water quality shows relatively low pollutant concentrations in the Wriggleswade Dam.

The median salinity (20.5 mS/m) is about twice as high as that in the Rooikrantz Dam, but is nevertheless relatively low. The salinity of the water in the Wriggleswade Dam is assumed to be due to natural salt sources (DWAF, 2008).

Wriggleswade Dam has some issues with anthropogenic eutrophication. This is also partly due to land uses in the catchment and around the Dam. The main land use in the WMA is livestock farming and subsistence agriculture. There are also several extensive rural settlements which result in poor quality run off into the rivers entering the Dam.

There are also no fences between the adjacent private farms and the Dam and thus cattle have direct access to the water and they contributed to the microbial contamination (DWAF, 1998). There is also unauthorised agricultural use directly adjacent to the Dam and run off from fertlizers etc. may have negative impacts.

This has implications for algal blooms as eutrophication can allow the formation of mass populations of cyanobacteria. These bacteria are capable of producing a number of toxins including β-N-methylamino-L-alanine (BMAA).

Studies by Esterhuzien-Londt (2010) evaluated BMAA which is produced in most cyanobacterial blooms and found that cyanobacteria such as Microcystis and Limnothrix has been found in Wriggleswade Dam. This has potential negative impacts on human health as very low BMAA concentrations are required to yield neurological damage and even motor neuron death. However it should be noted that the extent of the risk to humans from direct exposure of free BMAA in these waters remains unknown (Esterhuizen-Londt, 2010).

BMAA was first detected in 2005 and thus the necessary tolerable daily intake and guideline values for BMAA have not been established. In addition there is limited information on prevalence, incidence, and toxicology. The efficiency of standard water treatment processes to remove other cyanotoxins such as microcystin has been extensively studied but no studies on the removal of BMAA have been undertaken. However, it should be noted that Esterhuzien-Londt (2010) found that in the absence of dissolved organic carbon in the water, BMAA is efficiently removed by sand filtration, chlorination by calcium hypoclorite, and powdered activated carbon during water treatment.

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

2.9.2 Aquatic Invasive Plant Species

Currently 14 alien aquatic and wetland plant species are declared weeds or invader plants in South Africa and their control is subject to the Conservation of Agricultural Resources Act (CARA), Act 43 of 1983, and amended in 2001. Another 13 species have been proposed for listing under CARA and the National Environmental Management Biodiversity Act (NEMBA), Act 10 of 2004. There are also a number of indigenous or cosmopolitan (world-wide) species that can flourish and become troublesome in disturbed aquatic habitats. However, according according to Agriculture Geo-Referenced Information System (AGIS) Weeds and Invasive Plants (WIP) website, no aquatic invasive plant species occur around the Dam. This may be a result of poor collection in the area as *Eichhornia crassipes* (water hyacinth) is known to infest the Dam.

The Kubusie River suffers from a severe water hyacinth infestation. Wriggleswade Dam itself also has a medium infestation of algal and water hyacinth. The cause is thought to industrial or farming practices which have spread this invasive plant. To a certain extent this is a symptom of the eutrophic water conditions discussed above. Water hyacinth is indigenous to the New World tropics, with its centre of origin in Amazonia, Brazil (Barrett & Forno 1982). To date the distribution of water hyacinth is mostly pan-tropical, but it also occurs in warm temperate regions of the world, extending to latitudes 40o N and S (Gopal 1987).

Reproduction of water hyacinth is both sexual and asexual, with asexual reproduction being the most predominant (Center & Spencer 1981). However, sexual reproduction does occur and each flower can produce a large number of seeds that can remain viable up to 20 years (Gopal 1987). There are several sites in South Africa where seeds have been found in the substrate and several of these seeds are viable, with germination between 25 and 80 % (Albano Pérez et al. 2011).

Due to vegetative growth under suitable conditions water hyacinth populations can grow very quickly and in some cases double their biomass in as little as 11 to 18 days (Edwards & Musil 1975). As the nutrient concentrations (nitrogen and phosphorous) increase it has been shown that water hyacinth biomass also increases (Reddy et al. 1989, 1990).

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

- Altering of water clarity and decrease in phytoplankton production, dissolved oxygen, nitrogen, phosphorous, heavy metals and concentrations of other contaminants;
- Decreasing abundance and diversity of aquatic invertebrates through decreased phytoplankton (food) availability;
- Decreased dissolved oxygen concentrations and decreased phytoplankton negatively impact fish species.

- Increasing of sedimentation rates within the plant's complex root structure; and
- Increased evapotranspiration rates from water hyacinth leaves when compared to evaporation rates from open water.

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

Due to some of these potential negative impacts, much research has been done on mechanisms for biological control. A number of biocontrol species have been released at the Dam including 3 600 *Neochetina eichhorniae* (a weevil) in 2000 and 3 200 *Eccritotarsus catarinensis* (a myrid) in 2003 (Weyl, 2011). Since the first release, both insects have been established at several sites on the Kubusie River as well as the infestations on Wriggleswade Dam (Weyl, 2011). Further, according to the Amatola Water 2012/2013 Annual Report, a number of interventions to decrease water hyacinth on the Kubisi river, Wriggleswade Dam and Laing Dam were undertaken with a total area of 260ha impacted with a 90 percent success rate in fighting the invasive aquatic weed (Amatola Water, 2013).

Figure 8: Eichhornia crassipes (SAPIA, 2010)

2.9.3 Terrestrial Invasive Plant Species

According to AGIS WIP website, a large number of alien species occur in the 3227DA Quarter Degree Grid which surrounds the Dam. These include the following.

- *Acacia baileyana;*
- *Acacia dealbata;*
- *Acacia mearnsii ;*
- *Acacia melanoxylon;*
- *Cortaderia jubata/selloana;*
- *Echium plantagineum;*
- *Eucalyptus sp.;*
- *Lantana camara;*
- *Melia azedarach;*
- *Opuntia ficus-indica;*
- *Pinus halepensis;*
- *Pinus patula;*
- *Prunus persica;*
- *Ricinus communis;*
- *Rubus fruticosus;*
- *Senna multiglandulosa;*
- *Sesbania punicea ;* and
- *Solanum mauritianum.*

Wattle infestations also occur in the area. Although these are not commercial, they do have positive economic implications as they are used for fuelwood for local communities. The removal of these infestations as well as other invasive species would result in approximately 4.2 cubic mega-litres per annum increased yield for Wriggleswade Dam (DWAF, 2008).

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

- Loss of indigenous species as a result of competition for space and resources with alien species;
- Disruption of aquatic and riparian ecosystems;
- Erosion of river banks and riparian areas;

- Alterations in environmental flows as a result of water use by invasive alien plants; and
- An increased fire risk, which destroys indigenous habitats.

In addition, approximately 380 km^2 of commercial *Pinus* and *Eucalypt* species, and indigenous afromontane forests occur in the catchment which can have a negative impact on water availability. Specifically, water-hungry, non-native plantations, above indigenous forest zones, deprive indigenous forests of water, potentially changing forest structure and functioning.

2.9.4 Fauna

2.9.4.1 Fresh Water Fish

Freshwater Ecosystem Priority Area (FEPA) maps provide an overview of the threatened fish species in an area. The northern portion of the Dam falls within a FEPA area as *Barbus amatolicus* (Amatola Barb) which is Vulnerable occurs in the area.

Recent sampling has also noted the following species at the Dam:

Table 5: Different fish species sampled in Wriggleswade Dam (Taylor, 2012)

Species	Common Name	Type
Micropterus salmoides	Largemouth Bass	Non-native
Micropterus floridanus	Florida Bass	Non-native
Micropterus punctulatus	Spotted Bass	Non-native
Micropterus dolomieu	Smallmouth Bass	Non-native
Lepomis macrochirus	Bluegill sunfish	Non-native
Glassogobius callidus	River Goby	Native
Gilchristella aestuaria	Estuarine round herring	Translocated
Anguilla mossambica	African longfin eel	Native
Labeobarbus aeneus	Smallmouth yellowfish	Translocated
Cyprinus carpio	Common Carp	Non-native
Clarias gariepinus	African sharptooth catfish	Translocated
Tilapia sparrmanii	Banded tilapia	Translocated

2.9.4.2 Amphibians

Using the Frogmap Atlas (www.vmus.adu.orga.za) which is run by the Avian Demography Unit (ADU, 2013), 14 species were found for the 3227DA square. These species are provided in the Table 6. The only species which is vulnerable is the Natal Leaf-folding Frog (*Afrixalus spinifrons*)

Table 6: Frog species occuring in QDS 3227DA around Wriggleswade Dam (ADU, 2013)

Species		Common Name
Breviceps	adspersus	Bushveld Rain Frog
Breviceps	verrucosus	Plaintive Rain Frog
Amietophrynus	gutturalis	Guttural Toad
Amietophrynus	pardalis	Leopard Toad
Amietophrynus	rangeri	Raucous Toad
Afrixalus	spinifrons	Natal Leaf-folding Frog
Hyperolius	marmoratus	Painted Reed Frog
Kassina	senegalensis	Bubbling Kassina
Semnodactylus	wealii	Rattling Frog
Phrynobatrachus	natalensis	Snoring Puddle Frog
Xenopus	laevis	Common Platanna
Amietia	angolensis	Common or Angola River Frog
Cacosternum	boettgeri	Common Caco
Cacosternum	nanum	Bronze Caco
Strongylopus	fasciatus	Striped Stream Frog
Strongylopus	grayii	Clicking Stream Frog
Tomopterna	natalensis	Natal Sand Frog

2.9.4.3 Reptiles

Sixteen reptile species are recorded in the 3227DA square according the Reptile Map Atlas run by the Avian Demography Unit (ADU, 2013). The majority of these species are listed as Least Concern (Table 7).

Table 7: Reptile species occuring in QDS 3227DA around Wriggleswade Dam (ADU, 2013)

Species		Common name
Homoroselaps	*lacteus*	Spotted Harlequin Snake
Dispholidus	*typus*	Boomslang
Pseudaspis	*cana*	Mole Snake
Chamaesaura	*anguina*	Cape Grass Lizard
Cordylus	*cordylus*	Cape Girdled Lizard
Hemachatus	*haemachatus*	Rinkhals
Pachydactylus	*maculatus*	Spotted Gecko
Gerrhosaurus	*flavigularis*	Yellow-throated Plated Lizard
Tropidosaura	*montana*	Ranger's Mountain Lizard
Leptotyphlops	*scutifrons*	Eastern Thread Snake
Acontias	*gracilicauda*	Thin-tailed Legless Skink
Trachylepis	*homalocephala*	Red-sided Skink
Trachylepis	*varia*	Variable Skink
Afrotyphlops	*bibronii*	Bibron's Blind Snake
Causus	*rhombeatus*	Rhombic Night Adder
Homoroselaps	*lacteus*	Spotted Harlequin Snake

2.9.4.4 Mammals

According to ADU (2013) MammalMap, no mammal species have been noted in the 3227DA QDS around the Dam. However, this is likely to be related to a lack of sampling in the area. At a larger scale, three species have been found in the 3227 degree square (ADU, 2013).

- Blue Duiker (Vulnerable);
- Samango Monkey (Endangered); and
- Tree Hyrax (Vulnerable).

However, as none of the land around the Dam forms part of a nature reserve, it is unlikely that any of these species occur at the Dam. A number of small mammal species such as rodents are likely to occur around the Dam although currently a list of these species is unavailable.

Much of the surrounding land use around the Dam is agricultural and thus domestic animals such as cows, sheep and goats are likely to occur around the Dam.

2.9.4.5 Avifauna

Bird life at Wriggleswade Dam is very species rich, with over 280 bird species noted in the area (www.mybirdpatch.adu.org.za) including the following species:

- Forest Buzzard;
- Burchells Coucal;
- White-browed Coucal;
- Blue Crane;
- African Crowned Eagle;
- Booted Eagle;
- Long-crested Eagle;
- Martial Eagle;
- Verreaux's Eagle;
- Cape Eagle-Owl;
- Spotted Eagle-Owl;
- Knysna Turaco;
- Livingstone's Turaco; and
- Schalow's Turaco.

2.10 Heritage

The Amathole region has significant heritage attractions linked to the various layers of history relating to the San, Khoi, Xhosa, English, Afrikaans and German settlers and the liberation struggle in more recent times (Aspire, 2009).

In the Amathole region a significant part of history relates to the 100 years "Frontier Wars" which involved a number of historical incidents, confrontations and battles. Therefore, there are a large number of sites, buildings and monuments which bear witness to the struggle engaged between the people of the region, resulting in a uniquely rich heritage tourism offering (Aspire, 2009). The Amathole District Municipality (ADM) Heritage Initiative Business Plan proposed four heritage tourism routes comprising 4 routes and incorporating 8 Local Municipalities.

Historical sites in and around Stutterheim include the following sites:

- Gangers Fortified Cottage;

- Keiskammahoek;
- Boma Pass;
- Burnshill Massacre;
- St. Matthews Mission;
- Amathole Hiking Trail;
- Castle Eyre;
- Middledrift;
- Chief Kama's grave;
- Anne Shaw Mission;
- Jabavu House;
- Fort White;
- Frankfort; and
- German graves.

2.11 Current Institutional Arrangement

2.11.1 Official Institutional Structure

DWS is the official custodian and owner of the Wriggleswade Dam. Based on a Deed Search of properties within the purchase boundary, most of the land around the Dam belongs to the Government. However, the specific department of the Government is not provided. This has resulted in the disputes whereby land falling within the Purchase Boundary and therefore managed by DWS has been leased by DPW to an adjacent landowner. This lease agreement has however been terminated and new lease agreements will be required between DWS and adjacent landowners. Further, there are two properties to the south of the Dam as well as around the northern inlet where no landownership information is available.

In terms of management, management of the Dam Basin and Surface Water of Wriggleswade Dam is undertaken by Amatola Regional Services Council (ARSC) based on an agreement signed in 1993. The agreement had a number of specific conditions including that ARSC could lease any part of the Dam basin to any person for the purpose of extramural recreation.

As part of this last condition, the Council leased 5 ha of land at the Dam to the SAC on 6 June 1994. The period of the lease was 15 years and according to the lease, SAC was permitted to erect the following facilities:

- Clubhouse;
- Ablution facilities;
- Slipway; and
- Jetty.

There is no exact record of when the lease agreement with the Council was terminated, however it is no longer in place. The lease agreement between SAC and the Council has also expired.

However on 31 October 2001, a Memorandum of Agreement (MoA) was signed between Amatola Water and DWS regarding the control, operation, administration and maintenance of a number of Dams in the area including Wriggleswade Dam (including the Dam wall structure, outlet structure and tunnel, measuring weir on the Kabusie River, tunnel outlet structure and completed canal system; and all buildings, office/workshop complex, staff houses, Water Control Officer house; Water Purification Plant, Boat House, Car Port and Shed; **water surface and surrounding land** as per the survey diagram).

Based on the MoA, Amatola Water is responsible for the following functions (please note that only functions that have an impact on the RMP have been included):

- *Negotiate leases and/or usage agreements with water users for leisure activities in behalf of and to the satisfaction of DWS. Any such agreements must be approved by DWS and shall be subject to relevant DWS policies, guidelines and zoning plans applicable at the time;*
- General maintenance of structures;
- Maintaining of fences around the Dam, the Dam structures and associated buildings;
- Controlling of alien vegetation within the surveyed area for the Dam and on the Dam surface;

- Maintaining access roads to and roads at the Dam as required;
- Provide a basic water resource management function for each Dam;
- Monitor raw water quality in the Dam;
- Perform routine water sampling and analysis; and
- Monitor possible contamination levels in the Dam.

However, Point 6 of the Preamble of the MOA specifies that no leisure activities or developments are included as part of the MOA and thus separate agreements may be necessary to govern these activities.

Based on this requirement, DWS (NWRI: Southern Operations) entered into a lease agreement with SAC. The period of the lease agreement was one year although the lease made provision for it to be extended annually. At this point in time, DWS does not have a current agreement in place with SAC.

2.11.2 Informal Institutional Structure

Although there is no formal agreement in place between DWS and SAC at this current time, SAC is still responsible for management of recreational use at the Dam. SAC has a fulltime caretaker at the Dam who is responsible for access control. The caretaker also ensures that visitors have skippers licenses etc. in place.

Facilities at SAC include a slipway and jetty, clubhouse and pub, camping and ablution facilities. The facilities are open to members as well as the general public however for the most part, the local community does not know that there is access to the Dam.

There has also been some confusion regarding vested land around the Dam, whereby, despite the agreements between DWS and Amatola Water, The DPW leased out some of the land around the Dam to an adjacent landowner for grazing purposes. This land included the area where the SAC facilities occur as well as the area surrounding the Dam Wall and other DWS infrastructure.

Further, a number of unauthorized uses occur around the Dam including an unauthorized abstraction point as well as unauthorized agricultural activities (including cattle watering and grazing). There are also no fences demarcating the purchase boundary or agreements in place managing the use of the purchase boundary for grazing or cattle watering by adjacent farmers.

2.11.3 Management of the Water Surface

Currently, in terms of access for recreational use, management of the surface water is done by SAC.

Management of the surface water in terms of operation of the Dam is done by Amatola Water in line with the 2001 MOA. According to the MOA, Amatola Water is responsible for implementing of Zonal Plans and control of alien invasive species in the purchase boundary as well as on the surface water.

In terms of AtoN and demarcation markers, there is no formal system in place at the Dam. Going forward, payment for AtoN and demarcation markers (for general navigation) will be undertaken by DWS. Discussions between Amatola Water and DWS will be required to determine whether AtoN are included under the current MOA. The provision and maintenance of the demarcation markers at SAC will be for the cost of the Club.

2.11.4 Access

The public access at the Dam is through SAC. Amatola Water has access to the Dam via a slipway at the Dam wall however this is not open to the public.

In general, access to the Dam is an issue as most of the purchase boundary is landlocked by private land. However, a number of these adjacent farmers have unauthorized access to the Dam. These access points are not used by the public. In addition, as there are no fences demarcating the purchase boundary, cattle belonging to adjacent landowners access the

purchase boundary for grazing and drinking purposes.

2.11.5 Permits

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

2.11.6 Safety

There is no overall safety system in place at the Dam. However SAC does have a caretaker and rescue boat available. The caretaker does check that users of the Dam have valid skipper's licenses.

2.11.7 Overnight facilities

The only overnight facilities at the Dam are located at SAC. These include 40 boat houses for members, approximately 60 campsites, 60 caravan sites provided with power and 3 ablution blocks. There is also a single roomed log cabin on the water's edge available for rent as well as a clubhouse, jetty and slipway.

In addition, there are a number of bed and breakfast/guest house accommodation available in Stutterheim.

2.11.8 Event Management

Events are facilitated by SAC and managed by DWS. SAC is required to notify DWS of all planned events.

2.12 Users and Uses of Wriggleswade Dam

2.12.1 Domestic Use

The primary purpose of Wriggleswade Dam is to provide domestic and industrial water to AWSS.

Water is also allocated for domestic supply for Kei Road and surrounding areas is in the order of 0.1 million m^3/a. Water for the supply to Kei Road is abstracted from the Wriggleswade Canal (open concrete canal), and treated at the town's Water Treatment Works before distribution to the consumers (DWS, 2010).

2.12.2 Irrigation and Agricultural Use

Downstream of Wriggleswade Dam, provision is to be made to irrigate 400 ha, with an average annual quantity of 3,00 million m3/annum. Actual irrigation allocations are determined by DWS, Amatola Water and the Department of Agriculture in consultation with the Irrigation Boards and Water User Associations (ALSDFP 2009).

Further, as there are no fences between adjacent farmers and the purchase boundary, water from the Dam is also used for cattle watering. There are is also an unauthorized abstraction point which is used for irrigation of crops.

2.12.3 Recreational Use

Wriggleswade Dam stretches across 17km and covers approximately 1000 ha (10 km^2) and has become a popular destination for avid fishermen and those who enjoy boating and water sports.

SAC is the main recreational user at the Dam. In addition, a number of different recreational clubs make use of the Dam including:

- King Williams Town Bass Masters Club (KWTBM);
- Border Bass Masters (BBM);
- Wriggleswade Yacht Club (WYC);
- East London Yacht Club (ELYC) ; and
- Wriggleswade Bass Masters Club (WBM).

A number of events are held at the Dam including regular bass fishing competitions held by the KWTBM as well as Inter Provincial Competitions held by BBM. Every five years, the Dam is used as the venue for the National Qualification Events by the South African Bass Angling Association (SABAA). In addition Merrifield Mile, Amatola Carp Classic Fishing competition and the Wriggleswade Sports Festival are also held at the Dam.

However, during public consultation it was noted that there many stakeholders (including the Local Municipality) thought the Dam was a private Dam operated and managed by SAC and thus not open to the public. Thus the Dam has not been included in a number of municipal planning projects.

2.13 Catchment Interactions

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

- Land use in the catchment, especially agricultural use has impact on the water quality of the Dam. This is further impacted by the highly rural nature of the WMA which results in a lack of sanitation services;
- Land use directly around the Dam also impacts the Dam. Firstly, there are no fences demarcating the purchase boundary and thus cattle from adjacent farms use the purchase boundary for grazing and the Dam is used for cattle watering. This can have implications on water quality at the Dam;
- The eutrophic conditions at the Dam have also led to occasional algal blooms which can have health impacts;
- The presence of Water Hyacinth along the Kabusi River and at the Dam has enormous negative implications;
- Terrestrial invasive plant species have negative implications on water availability as well as biodiversity;
- Confusion regarding land ownership and the vesting of land also has implications for the access and use of the Dam;
- The Dam has not been included in Municipal planning initiatives due to confusion regarding management and ownership of the Dam. This has resulted in decreased recreational use and inequitable access;
- The fish stocks at the Dam allow for varied competitive and recreational angling; and
- The lack of access to the purchase boundary (as the purchase boundary is in many cases landlocked by private properties) decreases the number of available recreational areas.

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

3 WHERE DO WE WANT TO BE?

3.1 Vision

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

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

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

Stakeholders agree that youth development in the area is a priority and that the Dam should form part of education and skills training programmes, outreach programmes and youth sailing programmes. The development of tourism and recreation at the Dam and increased community use is also seen as important. Improved water quality and control of aquatic invasive species so that all users can enjoy a clean resource is vital. Clear roles and responsibilities, institutional arrangements and resolution of issues regarding land ownership are also key as all other objectives require a management system in place.

The vision statement that encompasses this is:

"A sustainably managed Dam that provides recreational and economic opportunities for current and future generations without compromising the rich diversity of the area"

3.2 Objectives

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

Clarification of Current Institutional Arrangements and Roles and Responsibilities and improved communication

- Formalised institutional structure;
- Updated agreements taking into account RMP; and
- Agreement with SAC to be put in place.

Swift Resolution of Land Matters and unauthorised activity

- Land matters to be resolved and new agreements with adjacent landowners to be drawn up; and
- Unauthorised water use (i.e. abstraction) and activities on State Land to be addressed.

Control of Aquatic Invasive Species

- Aquatic Invasive Management Plan to be compiled and implemented;

- Education programmes regarding the impacts of alien invasive species;
- Species Management Plan for Invasive Fish Species to be compiled; and
- Wash bay system to be implemented to prevent further infestations.

Improved Resource Management

- Water quality monitoring to be undertaken together with an assessment of the main pollution sources;
- Shoreline management strategy to be compiled and implemented this should include management of terrestrial invasive plant species;
- Promotion of ecological, zoological and botanical studies at the Dam through discussions with local universities;
- Discussions should be undertaken with Working for Water to ensure terrestrial invasive plant species are cleared in the catchment;
- Siltation prevention measures to be assessed and put in place; and
- Assessment of current biodiversity at the Dam to be undertaken.

Improved Marketing of the Dam as a Tourism and Recreational Area

- Coordination between the Local and District Municipality, DWS, Amatola Water and SAC with regards to marketing and tourism;
- Marketing and Tourism Strategy to be compiled and implemented; and
- Potential linkage between KraftMania Initiative, Amabele Berries and Wriggleswade Dam to be assessed.

Improved Equitable Access and Use

- Potential of adding a taxi route to the Dam to be assessed as discussed with Taxi Association;
- Information brochures to be developed to inform communities about the potential uses of the Dam and how to join recreational clubs and societies;
- Feasibility of a community access card to be assessed; and
- Formalised public access picnic area to be put in place.

Improved Facilities for tourism and Recreational Use

- The potential for additional Overnight and day visitor facilities to be built at the Dam to be assessed;
- Potential of hiking and cycling trails to be assessed; and
- Potential for the construction of bird hides to increase bird viewing to be assessed.

Increased and Improved Use of the Dam for Youth Training and Community Outreach Programmes

- The Dam should form part of current youth outreach programmes;
- Coordination between SAC and local schools and SAS to introduce youth sailing programme at local schools; and
- Coordination with adjacent farmers to include potential youth farm skills training as part of outreach programmes.

Increased but Well Managed and Safe Recreational Use

- Zonal plan to take into account different recreational activities;
- Wash Bay and Unique Positioning Number (UPN) System to be implemented;
- Standardised AtoN and demarcation markers in line with SAMSA requirements to be implemented;
- Lifeguard skills training and first aid training to ensure safe public use of the Dam; and
- All recreational use and access to be regulated through agreements.

4 HOW DO WE GET THERE?

4.1 How does the RMP Work?

The overarching framework for the Wriggelswade Dam RMP is presented in Figure 9 below. It highlights the consultative nature of the RMP process where stakeholder meetings, public meetings and authority meetings were used to identify the Vision and Objectives for the Dam. The Vision and Objective forms the central tenet around which the RMP is based. The RMP is further broken down into 4 main Plans namely, the Institutional Plan, Financial Plan, Strategic Plan and Zonal Plan.

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

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

The OMC will be formed at an Operations or Cluster Level and is a current reporting line within DWS. The DMC will include authorised access point representatives and those who have an official mandate at the Dam. All three committees are chaired by a DWS official.

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

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

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

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

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

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

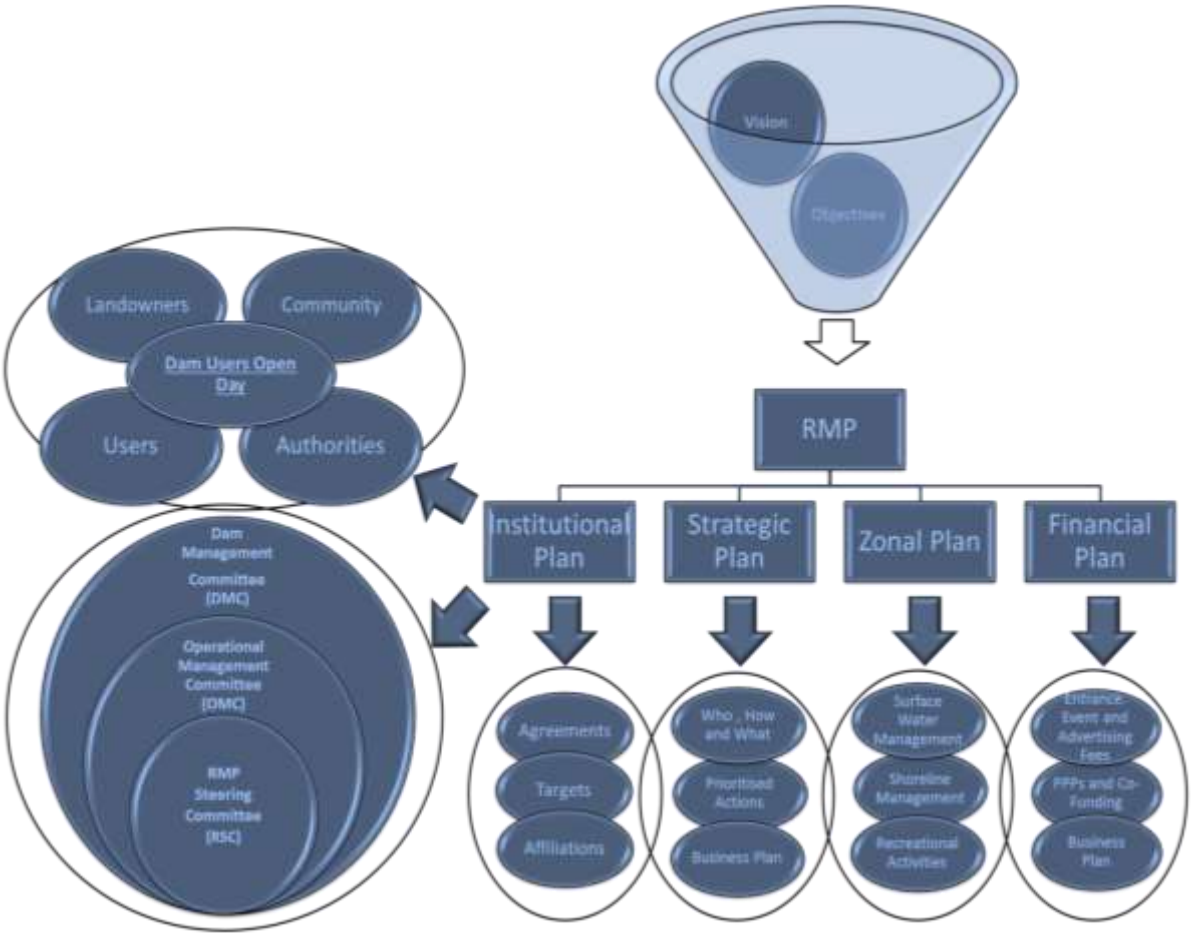

Figure 9: RMP Framework

4.2 Institutional Plan

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

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

The second toolset involves an open communication forum which allows all stakeholders to be involved in the management of the Dam. The purpose of this forum is to share information and allow stakeholders to raise concerns and ideas regarding the management of the Dam. It also provides a platform for dealing with issues and challenges faced by users.

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

Figure 10 below provides a visual representation of how these toolsets function together.

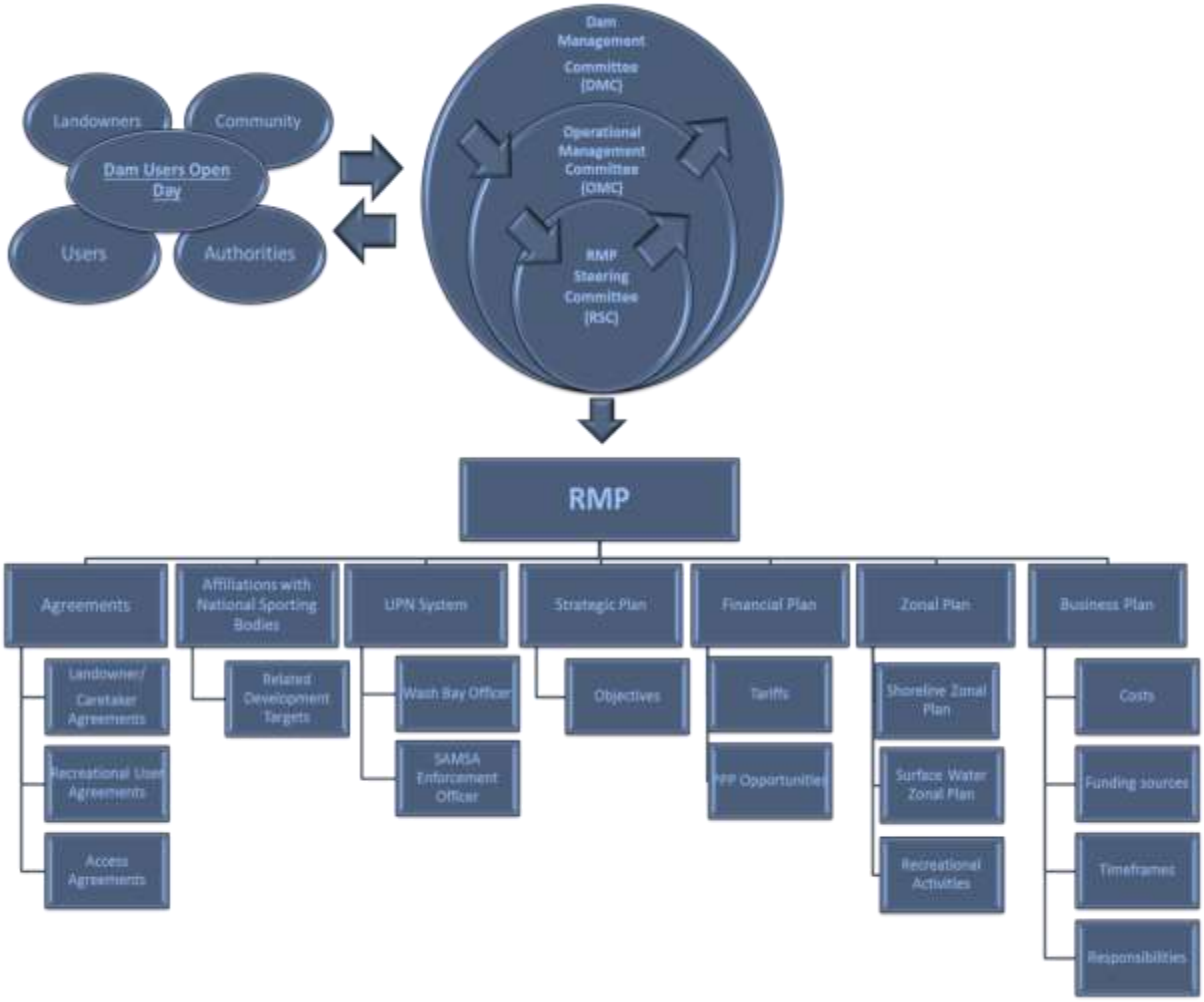

Figure 10: Institutional Framework

4.2.1 RMP Steering Committee (RSC)

The RSC is made up of representatives from National Government/Agencies. The main focus of this meeting is to ensure both the DMC and OMC are performing all necessary functions. The committee will also provide high level guidance. The RSC allows for a formal reporting structure between the Chief Director: Operations and the National Water Resources Infrastructure Branch: 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 11 below provides details of the membership of the RSC.

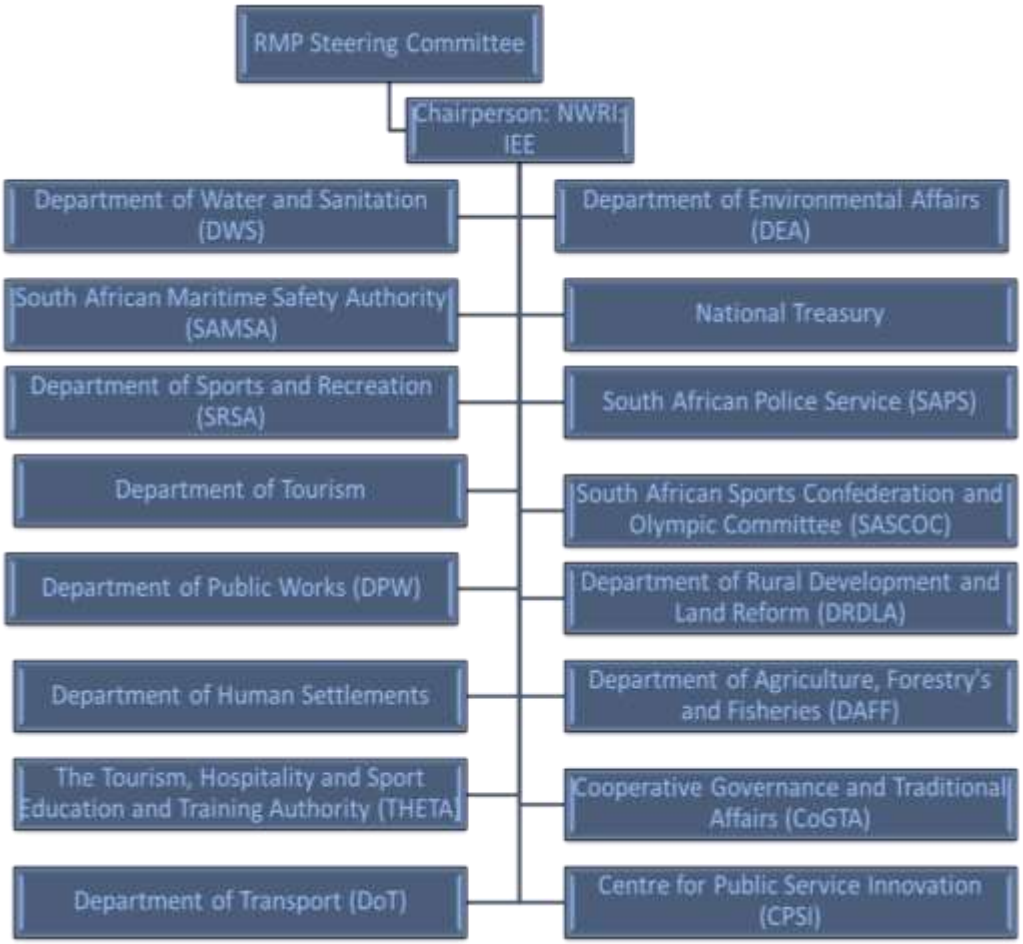

Figure 11: RSC Membership

4.2.2 Operations Management Committee (OMC)

The OMC will function at a catchment level and will provide high level guidance for all Dams occurring within one catchment. This is an existing reporting line between Area Managers for various schemes, the Operations 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 Operations Manager will be fully aware of all commercial and/or recreational activities/opportunities at all Dams within the cluster.

Figure 12: OMC Membership

4.2.3 Dam Management Committee (DMC)

The DMC is responsible for the operationalisation of the RMP and includes a larger pool of representatives. This committee is chaired by the delegated DWS Official. The DMC is involved in the management of the UPN System as part of the CIWSP and includes the following representatives:

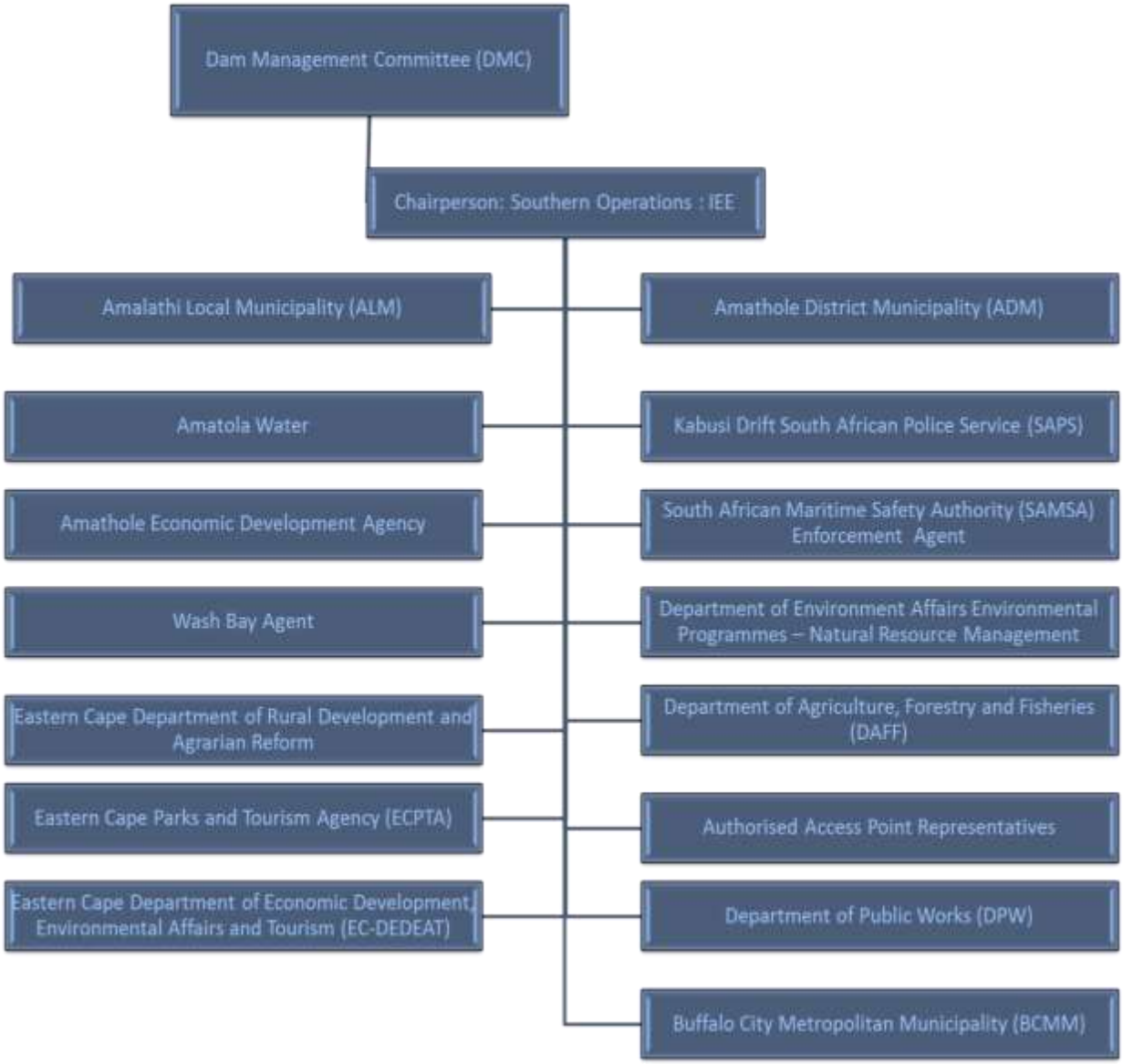

Figure 13: DMC Membership

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).

One of the most important functions of the DMC is to organise and facilitate the quarterly Dam

User Open Day. All stakeholders should be invited to this meeting so that issues regarding use of the Dam can be discussed. If necessary, serious issues can be escalated from the Public Open Day to the OMC and then RSC so to ensure swift conflict resolution. The Open Day also provides an opportunity for the DMC to inform users of the Dam of all rules and regulations governing the access and use of the Dam.

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

The final structure of the DMC may change once agreements with Authorised Access Points Representatives are concluded. The updated DMC membership list will be added as an addendum of the Gazetted RMP.

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

4.2.4 Management tools

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

4.2.4.1. Terms of Reference

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

- Meeting frequency;
- Roles and Responsibility of Chairperson;
- Roles and Responsibilities of Members;
- Minutes and attendance requirements;
- Reporting requirements;
- Management of agreements;
- Management of access objectives;
- Management of development targets;
- Strategic Plan for Commercialisation (SPC);
- Management of Water quality monitoring;
- Management of the Control of Aquatic Invasive Species;
- Management of Development Pressure; and
- Management of UPN system and wash bays.

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

4.2.4.2. Agreements

1.) Agreements between DWS, Amatola Water and SAC

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

DWS signed a MOA with Amatola Water regarding the control, operation, administration and maintenance of a number of Dams in the area including Wriggleswade Dam (including the Dam wall structure, outlet structure and tunnel, measuring weir on the Kabusie River, tunnel outlet structure and completed canal system; and all buildings, office/workshop complex, staff houses, Water Control Officer house; Water Purification Plant, Boat House, Car Port and Shed; **water surface and surrounding land** as per the survey diagram).

DWS also previously entered into an Agreement with SAC however at this point in time, DWS does not have a current agreement in place with SAC (although SAC is still managing the area).

It is thus recommended that DWS extend the scope of the current MoA with Amatola Water to include recreational use at the Dam. It is then suggested that Amatola Water enter into an agreement with SAC regarding their management of recreational activities at the Dam.

The first objective of the RMP is to update these agreements in line with the requirements of the RMP. These agreements should be updated within 12 months of the gazetted RMP.

The updated agreements between Amatola Water and DWS must as a minimum achieve the following:

- Terms and conditions regarding equitable access must be included in ALL agreements;
- Safety management to be in line with SAMSA requirements;
- Roles and responsibilities regarding the following:
    - Maintenance of AtoN and Demarcation Markers;
    - Maintenance of Wash Bays;
    - Maintenance of Recreational Infrastructure;
    - Maintenance of Fencing; and
    - Maintenance of the UPN System including signage.
- Management 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. All agreements between Amatola Water and 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. Failure to do so will result in unauthorized access points being closed (see section on Access agreements for more details);
- Amatola Water and therefore DWS's exclusion of liability;
- Terms and conditions of improvements made to the property should be stipulated. All improvements require consent from DWS and the DMC. Furthermore, the financial consequences should this requirement not be met should also be stipulated in the agreement. No permanent structures shall be built within the 1:100 year floodline without additional approval as required by Section 21 (c) and (i) of the National Water Act (Act no 36 of 1998);
- The extent of the rights to use the resource should be stipulated;
- Clear instructions on the financial requirements of both parties, and where and when money must be paid should also be stipulated. All recreational clubs and societies on State Land must be managed in line with National Treasury requirements. Lease agreements for use of State Land should include fair remuneration at the current market value;
- All agreements should include a cancellation clause if requirements cannot be met;
- All clubs or associations must be affiliated to a National Sporting Body recognised by the South African Sports Confederation and Olympic Committee (SASCOC). All agreements must include a cancellation clause if clubs or associations fail to obtain affiliation within one year from date of signature of the agreement;
- Limitations of the number of people allowed to access the water surface of the Dam based on carrying capacity of Dam as well as the carrying capacity of the CIWSP wash-bays must be adhered to;
- A list of current and potential recreational activities allowed at the Dam;
- Requirements for safety, disaster management and emergency response plans;

- Duties and responsibilities of either party regarding maintenance, management and infrastructure;
- A list of prohibited activities;
- Prohibition of subletting portions of the leased area;
- 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 recreational activities must be in line with the RMP, which once gazetted, becomes the mechanism to control and manage recreational use. Although no Section 21k Water Use License Application (WULA) is required, all activities must comply with all other relevant legislation requirements including the following:
    - The Merchant Shipping (National Small Vessel Safety) Regulations, 2007, - Control of Boating;
    - Section 21 (a) of the National Water Act, 1998 – abstraction;
    - Section 21 (c) and (i) of the National Water Act, 1998 – construction of slipways/infrastructure;
    - Safety at Sports and Recreational Events Act, 2010 – Events; and
    - Provincial Ordinances – Fishing.

These agreements should be updated within the next year.

2.) Recreational Use Agreements

Recreational users at the Dam must sign an agreement with Amatola Water as they are responsible for the surface water management of the Dam. All recreational use at the Dam must be through an appropriate legal framework between the recreational user and Amatola Water. However all agreements must be approved in writing by DWS and the DMC. Recreational Use Agreements must be developed inline with the conditions stipulated in the agreement between DWS and Amatola Water.

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

3.) Land Management Agreements

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

Agreements must be developed with appropriate legal advice and consultation.

In the case of Wriggleswade Dam, the majority of the purchase boundary is landlocked by private property.

Land Management Agreements would also thus need to take into account management of access to the shoreline.

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 (SAC – should the necessary agreements be put in place). 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 Amatola Water may also be necessary.

The wash bay must be built on State Property as part of the CIWSP. A formal agreement is necessary between Amatola Water 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

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

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

- Number of participants;
- Emergency Response Plan;
- Advertising and branding (will need to be in line with DWS communication requirements);
- Access points to be used;
- Costs; and
- Films/photographs that will be generated to be in line with DWS communication requirements.

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

4.2.4.3. National Affiliations and Development Targets

All recreational clubs should be affiliated to a SASCOC affiliated organisation. The development targets set by the National Organisations must be met.

SAC has two divisions dealing with angling and sailing. Both are nationally affiliated. Further, a number of angling and sailing clubs also make use of the Dam through SAC. These clubs are also nationally affiliated however should any additional clubs wish to operate at Wriggleswade Dam they must become affiliated within two years of the RMP coming into effect.

4.2.4.4. Community Participation and Beneficiation

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

1.) Socio-Economic Development

Socio-economic development is a key aspect of the RMP. The vision makes specific mention of the need and importance of economic importance and as such socio-economic development is one of the central tenets of the RMP. A number of objectives (and related actions) are specifically related to socio-economic development.

Improved Marketing of the Dam as a Tourism and Recreational Area

- Coordination between the Local and District Municipality, DWS, Amatola Water and SAC with regards to marketing and tourism;
- Marketing and Tourism Strategy to be compiled and implemented; and
- Potential linkage between KraftMania Initiative, Amabele Berries and Wriggleswade Dam to be assessed.

Improved Facilities for tourism and Recreational Use

- The potential for additional Overnight and day visitor facilities to be built at the Dam to be assessed;
- Potential of hiking and cycling trails to be assessed; and
- Potential for the construction of bird hides to increase bird viewing to be assessed.

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

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

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

The BP has a specific intervention regarding determining the feasibility of a PPP for additional accommodation and recreational activities.

2.) Equitable Access

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

Improved Equitable Access and Use

- Potential of adding a taxi route to the Dam to be assessed as discussed with Taxi Association;
- Information brochures to be developed to inform communities about the potential uses of the Dam and how to join recreational clubs and societies;
- Feasibility of a community access card to be assessed; and
- Formalised public access picnic area to be put in place.

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 between Amatola Water and SAC.

One of the main factors limiting equitable access is the location of the Dam and the difficulty for the local community to travel to the Dam. It is therefore suggested that a taxi route be put in place. Discussions with landowners regarding the potential for allowing public access through their properties (especially land located close to Stutterheim) should also take place.

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

Youth Training programmes were specifically emphasized as an important component of the management and use of the Dam due to the high level of drug and alcohol abuse by youth in the area. In addition, the RMP also focuses on skills development in terms of safety. There are thus, two objectives (and related actions) related to skills development and training.

Increased and Improved Use of the Dam for Youth Training and Community Outreach Programmes

- The Dam should form part of current youth outreach programmes;
- Coordination between SAC and local schools and SAS to introduce youth sailing programme at local schools; and
- Coordination with adjacent farmers to include potential youth farm skills training as part of outreach programmes.

Increased but Well Managed and Safe Recreational Use

- Zonal plan to take into account different recreational activities;
- Wash Bay, AtoN and Demarcation Markers and Unique Positioning Number (UPN) System to be implemented
- Lifeguard skills training and first aid training to ensure safe public use of the Dam; and
- All recreational use and access to be regulated through agreements.

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. In addition, youth outreach programmes, sailing programmes and coordination between various groups is suggested.

4.3 Financial Plan

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

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

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

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

Further, Wriggleswade Dam is a State Resource and as such all profits made from the recreational use of the Dam should be used for further development of the Dam.

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

The BP provides a financial framework to undertake certain interventions.

4.4 Zonal Plan

The Zonal Plan for Wriggleswade 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

SAC is the main recreational user at the Dam and has a fulltime on site caretaker at the Dam as well as camping and ablution facilities, a bar, slipway and braai facilities. These facilities are also open to members of the public as well as members of other clubs and association. A number of different recreational clubs make use of the Dam as well.

A number of events are held at the Dam including regular bass fishing competitions held by the KWTBM as well as Inter Provincial Competitions held by BBM. Every five years, the Dam is used as the venue for the National Qualification Events by the SABAA. In addition Merrifield Mile, Amatola Carp Classic Fishing competition and the Wriggleswade Sports Festival are also held at the Dam.

The Dam is also very popular with the angling community and a number of angling competitions take place at the Dam.

4.4.2 Potential Recreational and/or Commercial Opportunities and Uses

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

The scores utilised to determine viability are as follows:

Table 8: Scores for Recreational Use

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

Table 9: Potential and Current Recreational Activities

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accom-modation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportu-nities	
No Contact	Day Hiking/ Walking Trail	Only the purchase boundary is available and thus changing water levels may impact any trails.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cell-phone reception available	None. Would require UPN System	None	N/A	Not required for Day hikes	At SAC	Not required	No available land for this activity due to the fact that the purchase boundary is landlocked by private land. The only access would be SAC and there is not enough space for a full hiking trail in this area.	Not at this time.	N/A	0
	Camping at SAC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cell-phone reception available	None. Would require UPN System	May be disturbed by noise from recreational users	N/A	Facilities available	At SAC	Agreement with SAC required	SAC	Currently takes place	Not required	3
	High end accommodation	Only the purchase boundary is available and thus changing water levels may impact potential accomodation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cell-phone reception available	None. Would require UPN System	May be disturbed by noise from recreational users	N/A	Limited land available for development	All facilities for the high end accommodation would be required	Not required however access to water may be the main drawcard and thus an agreement with DWS would be required	Only land within the purchase boundary is available. There does appear to be some land to the north eastern side of the Dam (near the Dam wall) which may be available however this may impact on operations with Amatola Water	Potential for tourism in the area	PPPs	1
	Housing Estate next to the Dam	Only the purchase boundary is available and thus changing water levels may impact potential accomodation	N/A	N/A	N/A	N/A	N/A	N/A	Proper stormwater and sewerage management would be required	N/A	N/A	N/A	Cell-phone reception available	None. Would require UPN System	May be disturbed by noise from recreational users	N/A	Limited land available for development.	All facilities would be required	Not required however access to water may be the main drawcard and thus an agreement with DWS would be required	Only land within the purchase boundary is available. There does appear to be some land to the north eastern side of the Dam (near the Dam wall) which may be available however this may impact on operations with Amatola Water	None at this time	PPPs	0
	Birding	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cell-phone reception available	None. Would require UPN System	May be disturbed by noise from recreational users	N/A	No accommodation specifically required however a bird hide would be necessary	At SAC	Not required	At SAC	Already occurs at Wriggles wade Dam and the Dam has a large number of bird species	Through creation of Bird Watching Club and related membership fees or through potential agreements with MPTA	3
	Picnicking	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cell-phone reception available	None. Would require UPN System	May be disturbed by noise from recreational users	N/A	Picnicking facilities at SAC	At SAC	At SAC	At SAC	Currently used	Entry fees to SAC	3

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accom-modation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportu-nities	
Primary Contact	Open Water Swimming - Recreational	N/A	N/A	Water quality is acceptable for primary contact	No specific health risks associated	Water hyacinth does occur however Zonal map will ensure swimming area is located away from weeds	N/A	N/A	N/A	Would be required	Acceptable for swimming	Acceptable	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate swimmers	N/A	N/A	Ablution facilities are available at SAC.	At SAC	At SAC	Swimming events have been held at the Dams. However due to the cold winters, this would only be viable in summer.	SwimSA, Telkom Splash or similar foundations or through entrance fees to SAC	3
	Open Water Swimming – Development Programme	N/A	N/A	Water quality is acceptable for primary contact	No specific health risks associated	Water hyacinth does occur however Zonal map will ensure swimming area is located away from weeds	N/A	N/A	N/A	Would be required	Acceptable for swimming	Acceptable	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate swimmers	N/A	N/A	Ablution facilities are available at SAC However, if a larger programme were based at the Dam additional facilities would be required.	At SAC	At SAC	Swimming events have been held at the Dam but the local community did not express any interest in a swimming programme. It may be useful in developing swimming skills in the community. Due to the cold water, only possible during summer.	SwimSA, Telkom Splash or similar foundations. Coordination with schools may also be possible.	1
	Snorkelling	N/A	N/A	Water quality is acceptable for primary contact	No specific health risks associated	Water hyacinth does occur however Zonal map will ensure swimming area is located away from weeds	N/A	N/A	N/A	Would be required	Acceptable for swimming	Water is too turbid for snorkelling or diving	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate snorkelers	N/A	N/A	Ablution facilities are available at SAC.	At SAC	At SAC	None at present	N/A	0
	Diving	N/A	N/A	Water quality is acceptable for primary contact	No specific health risks associated	Water hyacinth does occur however Zonal map will ensure swimming area is located away from weeds	N/A	N/A	N/A	Would be required	Acceptable for swimming	Water is too turbid for snorkelling or diving	Cell-phone reception available	None. Would require UPN System	Zoning would need to be adjusted to accommodate divers	N/A	Facilities and infrastructure required.	Ablution facilities are available at SAC.	At SAC	At SAC	None at present	N/A	0

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accom-modation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportu-nities	
Secondary Contact	Commercial Fisheries	N/A	N/A	Acceptable	Acceptable	Water hyacinth may spread further	Fishing of invasive species may assist indigenous populations	May disturb bird nesting	Maintenance of boats and equipment required to prevent contamination	Required for aquaculture	N/A	N/A	Cell-phone reception available	None. Would require UPN System	May reduce fish stocks and interfere with competitive fishing. May also impact the water quality at the Dam and impact the primary function of providing drinking water.	N/A	Facilities and infrastructure required.	Facilities and infrastructure required.	Required	There is some areas available in the purchase boundary however this may impact private landowners	None at present	PPPs	0
	Shore Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	The Zonal map should prevent impacts	None	None	Required	N/A	N/A	Cell-phone reception available	None. Would require UPN System	Shore fishing takes place at SAC. No fishing allowed at any other shoreline around the Dam as it may impact private landowners.	No required	Not required	At SAC	At SAC	Only available area is at SAC as the rest of the land is landlocked by private landowners who may be negatively affected.	Fishing is very popular at the Dam	Would be funded by clubs themselves	3
	Tube Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Potential interest due to large fish stock	N/A	2
	Pontoon Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Potential interest due to large fish stock	N/A	2
	Bass Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3
	Motorised Boats	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3
	Jet Powered Boats	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3
	Rigid Hulled Inflatable Boats (RHIB)	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accom-modation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportu-nities	
	Water-skiing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3
	Jet Ski	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Potential conflicts	No	N/A	At SAC	At SAC	At SAC	Likely to be interest	N/A	3
	Dragon Boats	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	No interest at this point	N/A	3
	Slalom Canoe	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	No interest at this point	N/A	3
	Fishing Canoe	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Canoeing occurs at the Dam	No	N/A	At SAC	At SAC	At SAC	Canoeing occurs from boats	N/A	3
	Jet Ski Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Likely to be interest	N/A	0
	Wind Surfing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	Yes, winds available at the Dam	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3
	Kite Surfing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users, zoning to prevent major conflict	Yes, winds available at the Dam	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accom-modation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportu-nities	
	Ski Jumping	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Similar to water skiing – events may be popular	N/A	2
	Slalom Skiing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3
	Ski and Wakeboard Boat	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	None	None	None	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users zoning to prevent major conflict	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3
	Kayaking Sprints	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Canoeing occurs at the Dam	No	N/A	At SAC	At SAC	At SAC	Not known however canoeing already occurs at the Dam	N/A	2
	Kayaking Marathons	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Canoeing occurs at the Dam	No	N/A	At SAC	At SAC	At SAC	Not known however canoeing already occurs at the Dam	N/A	2
	Kayaking Water Polo	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Canoeing occurs at the Dam	No	N/A	At SAC	At SAC	At SAC	Not known however canoeing already occurs at the Dam	N/A	2
	Kayaking Touring	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Canoeing occurs at the Dam	No	N/A	At SAC	At SAC	At SAC	Not known however canoeing already occurs at the Dam	PPP	2
	Kayaking Fishing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	Canoeing occurs at the Dam	No	N/A	At SAC	At SAC	At SAC	Canoeing already occurs at Dam	N/A	3
	Paddle Ski	N/A	N/A	Water quality is acceptab	No specific health	Water hyacinth may	No impact	No impact	No impact	Zoning AtoN and Demarcatio	Depth is suitable	N/A	Cell-phone reception	None. Would require UPN	None	No	N/A	At SAC	At SAC	At SAC	Current activity	N/A	3

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accom-modation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportu-nities	
				le	risks associated	spread further				n Markers required			available	System									
	Surf Ski	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	None	No	N/A	At SAC	At SAC	At SAC	Not known but similar to current activities	N/A	2
	Pedal Boat	N/A	N/A	N/A	N/A	Water hyacinth may spread further	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers require	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	None foreseen at present	No	N/A	At SAC	At SAC	At SAC	Potential activity	N/A	2
	Hovercraft	N/A	N/A	N/A	N/A	Water hyacinth may spread further	Disturbance to local fauna	Disturbance to local fauna	Disturbance to local environment	N/A	Depth is suitable	Not required	Cell-phone reception available	None. Would require UPN System	May conflict with current users	N/A	Not required	At SAC	At SAC	At SAC	None at present	N/A	1
	Stand Up Paddling	N/A	N/A	N/A	N/A	Water hyacinth may spread further	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers require	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	None foreseen at present	No	N/A	At SAC	At SAC	At SAC	Similar to current activities	N/A	2
	Parasailing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users, zoning to prevent major conflict	The Dam is known for strong winds	N/A	At SAC	At SAC	At SAC	Similar to current activities	N/A	2
	Sailing	N/A	N/A	Water quality is acceptable	No specific health risks associated	Water hyacinth may spread further	No impact	No impact	No impact	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	May conflict with other users, zoning to prevent major conflict	The Dam is known for strong winds	N/A	At SAC	At SAC	At SAC	Current activities	N/A	3
	Water Toys	N/A	N/A	N/A	N/A	Water hyacinth may spread further	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers required	N/A	Safety concern as not visible to bigger craft,flags and other safety measures required	Cell-phone reception available	None. Would require UPN System	None foreseen at present	No	N/A	At SAC	At SAC	At SAC	Occasional use at Wriggleswade Dam	N/A	3
	Flying Boats/Water Planes	N/A	Possible Damage to infrastructure	N/A	N/A	Water hyacinth may spread further	Disturbance to local fauna	Disturbance to local fauna	Disturbance to local environment	Specific aviation requirement would need to be met	Some sections of the Dam are very deep	N/A	Cell-phone reception available	None. Would require UPN System	Conflict with current use	N/A	Not required	N/A	Would be required	Wriggleswade Dam does not have land area available for aviation requirements	None at present	N/A	0
	House Boats	N/A	Possible Damage to infrastructure	N/A	N/A	Water hyacinth may spread further	N/A	N/A	Possible pollution from litter	Zoning AtoN and Demarcation Markers required	Required depth to be determined in feasibility study	Zoning would be required to prevent danger to smaller crafts such as tube-	Cell-phone reception available	None. Would require UPN System	Conflicts with current recreational operating hours	N/A	N/A	N/A	Required	Required	None at this time	PPP	1

Contact Type	Activity	Operational Management Issues		Environmental Impacts on Recreational Use			Recreational Use Impacts on the Environment			Safety Requirements					Recreational Requirements				Legal Requirements		Economic Viability		Score
		Change in Water Level	Impacts on Dam Wall	Water Quality	Health Impacts	Aquatic Invasive Species	Fish Spawning	Bird Nesting	Water Quality	AtoN and Demarcation Markers	Water Depth	Visibility	Radio Signal	Emergency Response	Conflicts with current activities	Winds required	Accom-modation	Ablution facilities	Access to water	Access to Land	Interest in the activity	Funding Opportu-nities	
												fishermen											
	Junior Sailing School	N/A	N/A	N/A	N/A	Water hyacinth may spread further	N/A	N/A	N/A	Zoning AtoN and Demarcation Markers required	Depth is suitable	N/A	Cell-phone reception available	None. Would require UPN System	No	The Dam is known for strong winds	Depends on the scope of the School. No accommodation facilities will be required for a local schools programme	At SAC	At SAC	At SAC	SAC has mentioned interest in a junior sailing school. Would need teachers from schools to assist.	SAS	2

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 Wriggleswade Dam.

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

1. Physical Carrying Capacity (PCC). This is the maximum number of users that can physically fit onto the water surface at any given time.

2. Real Carrying Capacity (RCC). This is the maximum number of users that can use the resource once corrective factors (such as wildlife or weather conditions) that are unique to the dam are taken into account.

3. Effective (permissible) Carrying capacity (ECC). This is the number of visitors that can use the resource, given the management capacity available at the dam.

4.4.3.1. Physical Carrying Capacity (PCC)

PCC is calculated as PCC = A ÷ U/a x 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: 9.8 km ^{2}, or 980 hectares (ha)

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

Craft	Water Depth (m)	U/A (ha/ craft)
Canoes	>0.6	0.5
Windsurfers	>0.6	0.5
Rowing	>1.0	0.5
Dinghies	>1.0	1.0
Yachts	>1.8	2.0
Powerboats	>1.4	4.0
Fishing	>1.0	4.0
Water-skiing	>1.4	16.0
Average		3.0

Based on the fact that most activities do not require much space, and that the average hectares per user is 3 ha (30 000 m^2), the value of 4 ha (40 000 m^2) is an acceptable area per user.

As Wriggleswade 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 PCC for Wriggleswade Dam can therefore be calculated as:

PCC = 998÷ 4 x 1

PCC = 250 boats on the Dam.

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

4.4.3.2. Real Carrying Capacity (RCC)

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

- Conservation areas,
- Safety No Go Zones; and
- Swimming Areas.

The above factors result in an 10.4% decrease in water area available for recreation at the Dam (Area available for use decreases from 998 ha (9.98 km^2) to 893 ha (8.93 km^2). Therefore, 89.5% of the surface area of the Dam is still available for recreation.

The RCC for Wriggleswade Dam is therefore:

- RCC = PCC x (100 – Cf1) % x (100 – Cf2) % x … (100 – Cfn)%
- Where Cf = a corrective factor expressed as a percentage.
- RCC = 998 x (100 – 89.5)%

RCC = 105 boats on the Dam at any given time ***Based on water surface.***

During Events, special permission can be obtained from the DMC to exceed the Carrying Capacity

4.4.3.3. Effective (permissible) Carrying Capacity (ECC)

Effective Carrying Capacity is the maximum number of visitors that a site can sustain, given the management capacity available. Given that Wriggleswade Dam has a formal, nationally affiliated club with safety provisions in check, the ECC is 1.

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

4.4.4 Water Surface Zonal Plan

The Zonal plan for the water surface at Wriggleswade 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: Combination Zone. All crafts and all activities are allowed in this zone, however motor boats are required to maintain an idling speed as this Zone is a No Wake Zone;
- Zone B: Primary Contact – Swimming and Water Toys. This blue zone is a zone available for recreational swimming and the use of water toys. No Boats are allowed in this area for safety reasons;
- Zone C: No Go Zone – Safety. This is the 100m buffer area around the Dam Wall and intake tower and is denoted in orange. No access to the public is allowed;
- Zone D: No Go Zone – Aquatic Invasive Species Containment. This dark blue zone is a No Go area for recreational use due to the large infestation of Water Hyacinth at the Dam. The inlet areas also provide good fish breeding areas. The extent of this zone may be modified based on the Aquatic invasive survey which is included as a BP;
- Zone E: Secondary Contact – Motor Boats and Associated Activities. This zone is designated for the use of Motor Boats at high speed. This also includes water skiing activities as well as jet skis;

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

Table 10: Surface Water Management Zones

Zone Name	Contact Type	Permissible Activities - Current	Permissible Activities - Potential	Access Point	Safety Requirements for Users	Safety Requirements for DMC
Zone A	Secondary Contact	Motorised Boats – No Wake zone Canoeing Kayaking Rowing Tubing Paddle Ski Bass Fishing Fishing from Boats Wind Surfing Kite Surfing Sailing	Subsistence fisheries Dragon Boats Slalom Canoe Fishing Canoe Kayaking Sprints Kayaking Marathons Kayaking Touring Kayaking Fishing Pedal Boat House Boats Stand Up Paddling Shore Fishing Tube Fishing Pontoon Fishing	SAC (if access agreement is updated) DWS/Amatola Water (for management purposes only)	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 SAC will require system of checking UPN tag and date stamp
Zone B	Full Contact	Swimming - recreational	Swimming – Development School	SAC		AtoN and Demarcation Markers UPN system OPS point Rescue Boat available at all times
Zone C	N/A	DWS maintenance and management activitiess	None	DWS/Amatola Access (for management purposes only)	N/A	AtoN and Demarcation Markers
Zone D	No Go Zone – Aquatic Invasive Species Containment	Research related activities Control of invasive species (such as spraying, biocontrol etc.)	None	SAC (if access agreement is updated) DWS/Amatola Water Access	Registered Safe for Water Vessel Valid Skipper's License First Aid Kit UPN date stamp UPN tag Approval for Research by DWS	AtoN and Demarcation Markers UPN System OPS Point Wash Bay Rescue Boat available at all times Wash Bay Officer Enforcement Officer Survey of aquatic invasive plant species to be undertaken and the Zonal plan to be updated with the extent of the no go areas
Zone E	Secondary Contact – Motorised Boats and Associated Activities	Motorised Boats Jet Powered Boats RHIB Paragliding Ski and Wakeboard Boat Water Skiing Slalom Skiing, Jet Ski	Jet Powered Boats Ski jumping Jet Ski fishing	SAC (if agreements are put in place with DWS) Wriggleswade Dam Resort	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 SAC will require system of checking UPN tag and date stamp

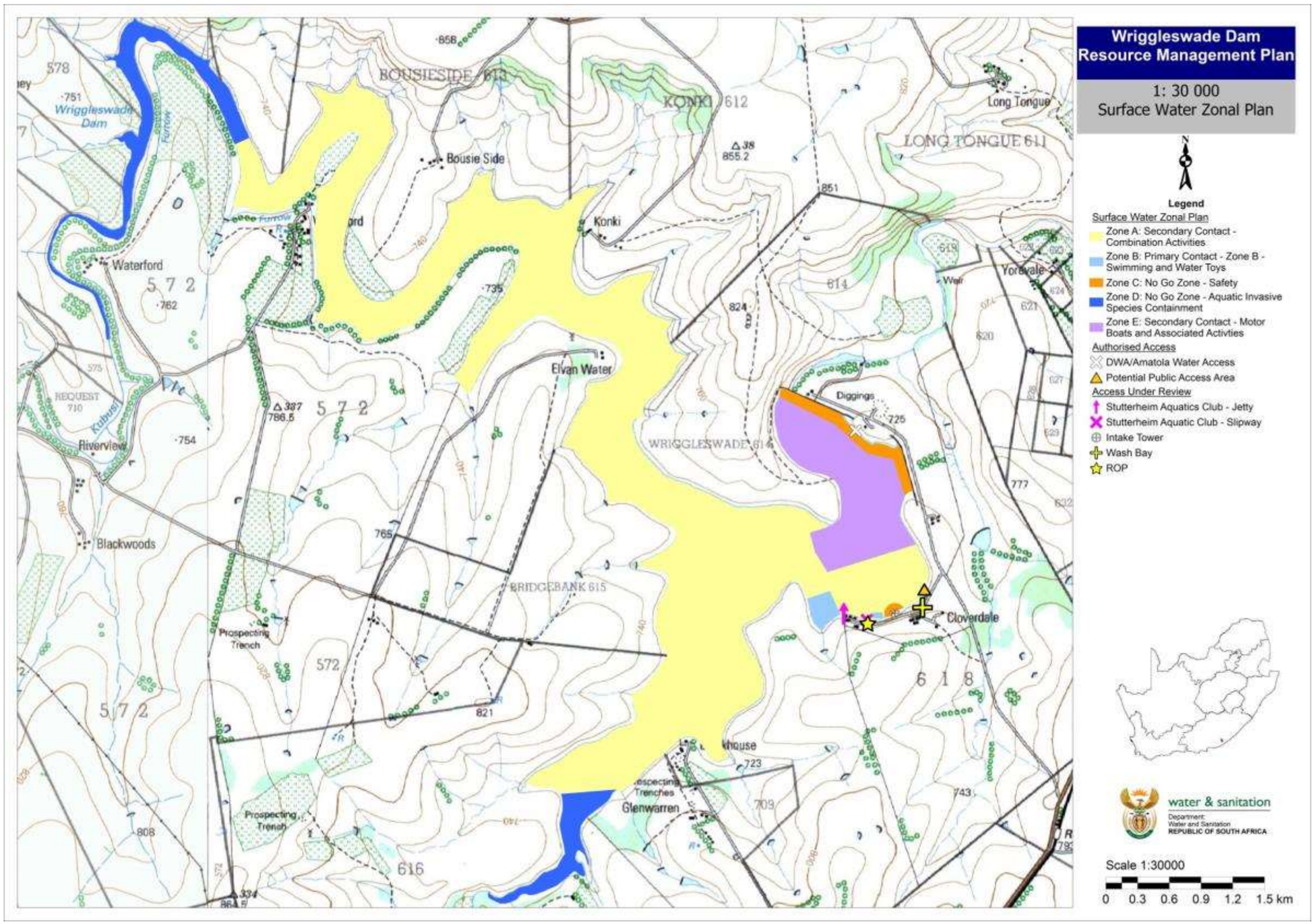

Figure 14: Map of the Water Surface Zonal Plan

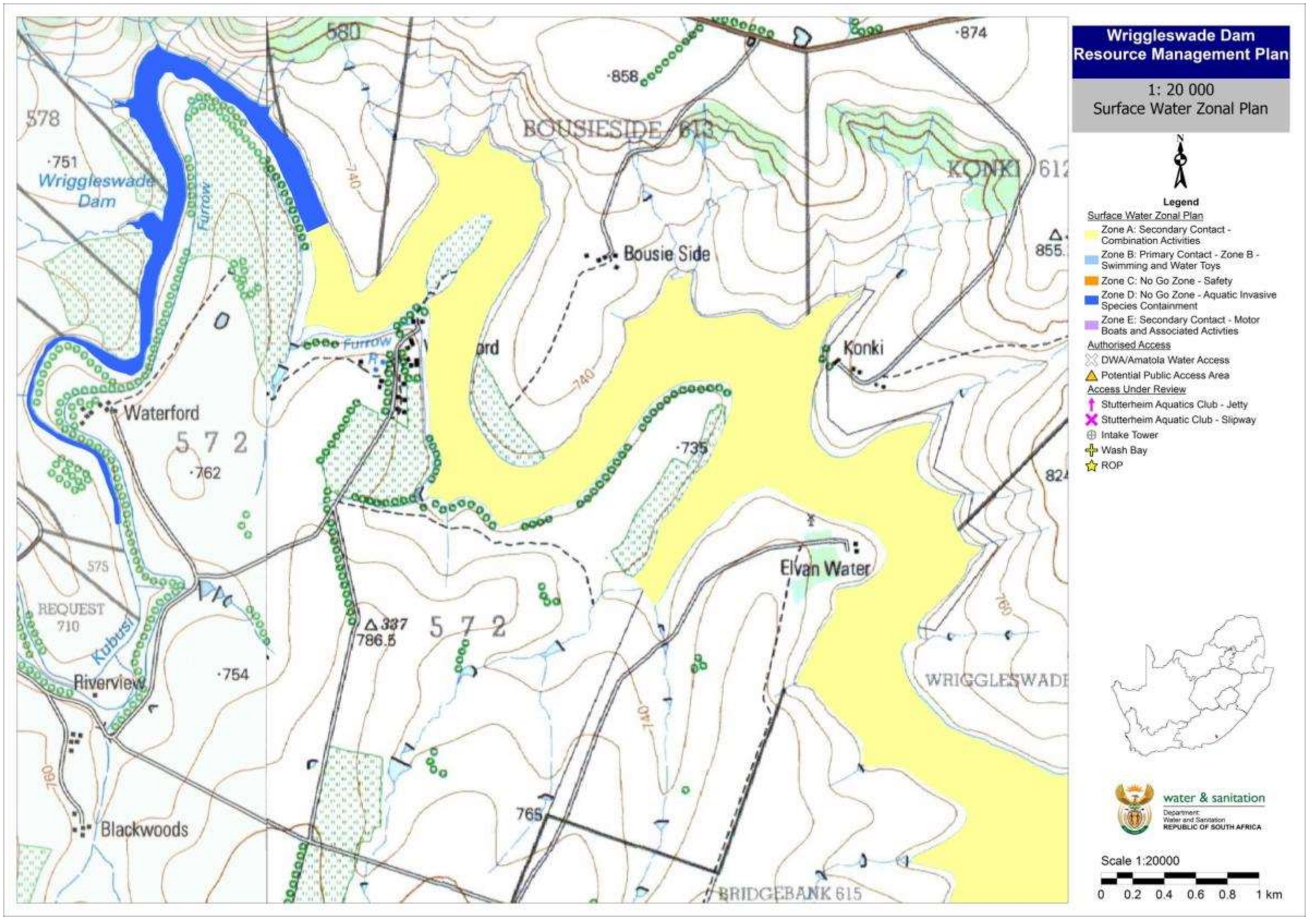

Figure 15: Map of the Water Surface Zonal Plan – Section 1

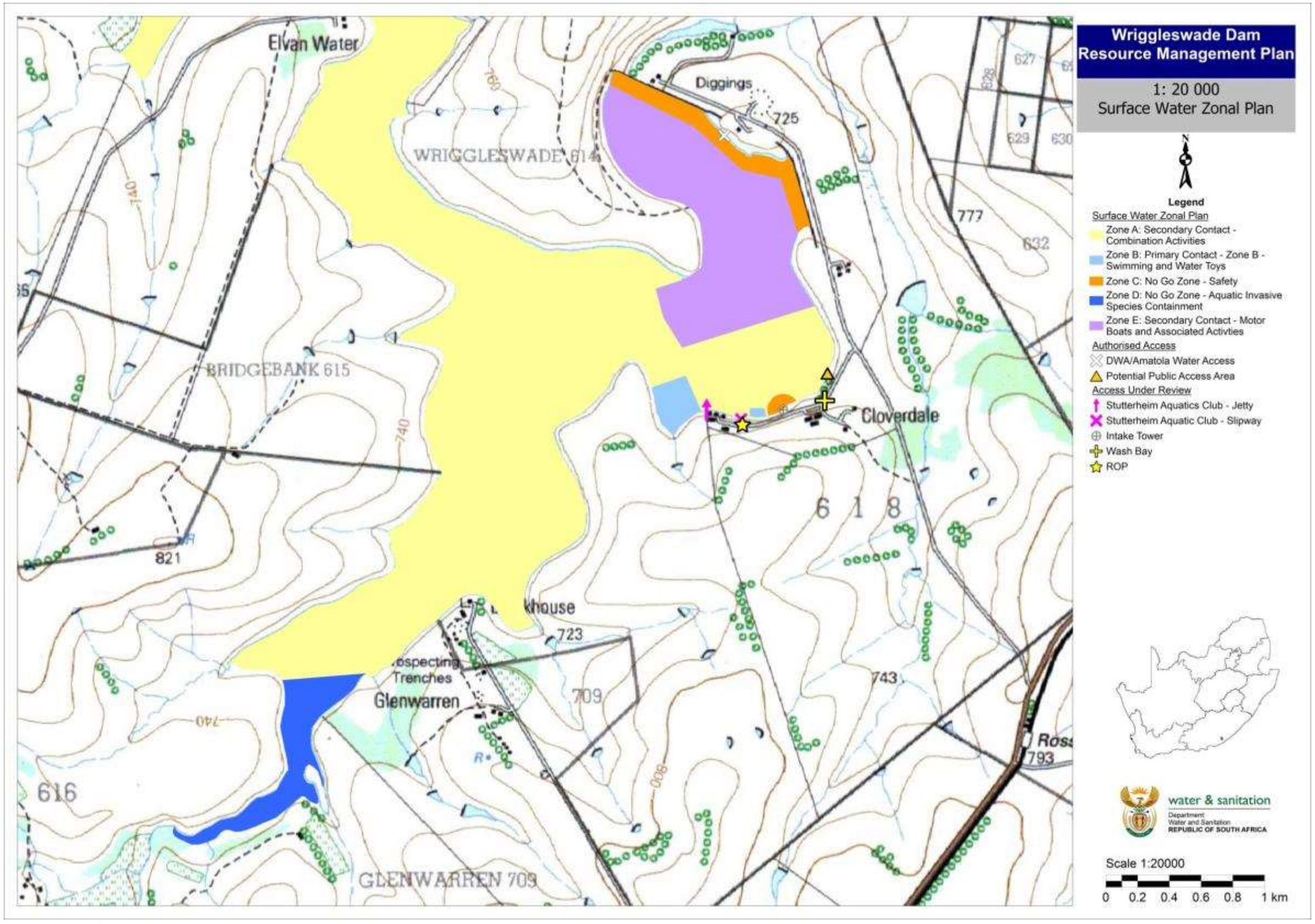

Figure 16: Map of the Water Surface Zonal Plan – Section 2

4.4.5 Shoreline Zonal Plan

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

The Shoreline Zonal Plan can only manage state owned land around the Dam. Much of the Purchase Boundary around the Dam is landlocked by private land. It is thus suggested that this land be managed through caretaker agreements with adjacent landowners. It should be noted that due to the gradient of the land around the Dam, it is possible for boats to be launched without a slipway. Adjacent landowners may not access the Dam via informal launches without agreements with DWS being in place.

The management zones include:

- Zone A: Management through agreements. This area is to be managed through relevant agreement which should be put in place within one year of the RMP being gazette (see section on agreements);
- Zone B- No Public Access – Management Only;
- Zone C: Development and Recreation. This zone is specifically designated for development for recreation purposes and no grazing is allowed. Further, all activities will require DMC approval and the relevant agreements to be in place within one year of the RMP being gazette (see section on agreements); and
- Zone D: Education and Recreation.

Permissible activities are detailed in the table below.

Table 11: Shoreline Management Zones

Zone Name	Zone Type	Permissible Activities	Requirements for Users	Requirements for DMC
Zone A	Zone A: Management through agreements	Management of firebreaks Management of litter Management of Invasive Plant Species	Agreements with DWS/Amatola Water	Agreements with adjacent landowners
Zone B	Management – No Public Access	Fire management Invasive alien species clearing Management of Dam Infrastructure Access to surface water for management purposes	N/A	N/A
Zone C	Recreation and Development	Expansion 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 No grazing is allowed in this zone	Camping, birding, hiking, picnicking, shoreline fishing and access to the water must be done in accordance to access agreements Camping allowed only in designated areas Noise levels to be kept at a minimum. No littering at Picnic spots All users bringing boats to go through Wash Bay All activities to be formalised and agreements drafted before the expansion of existing facilities No private slipways to be built without approval from DWS. In addition Section 21 (c). and (i) Water Use License Application (WULAs) would be required	Enforcement Officer to check all designated picnic spots Feasibility of employing local community members as part of "Working For Dams" programme to be assessed. Potential jobs include management of picnic sites/picking up of any litter DMC must ensure that all developments have been approved by DWS and DMC. Requirements of National Water Act and National Environmental Management Act must be taken into account All developments should have an approved Environmental Management Plan (EMP) to ensure construction does not impact on Dam Wash Bay system to be put in place UPN system to be put in place
Zone D	Education	Use for education and recreational	Access agreements with DWS/Amatola Water	Access agreements with Schools, NGOs, Churches etc.

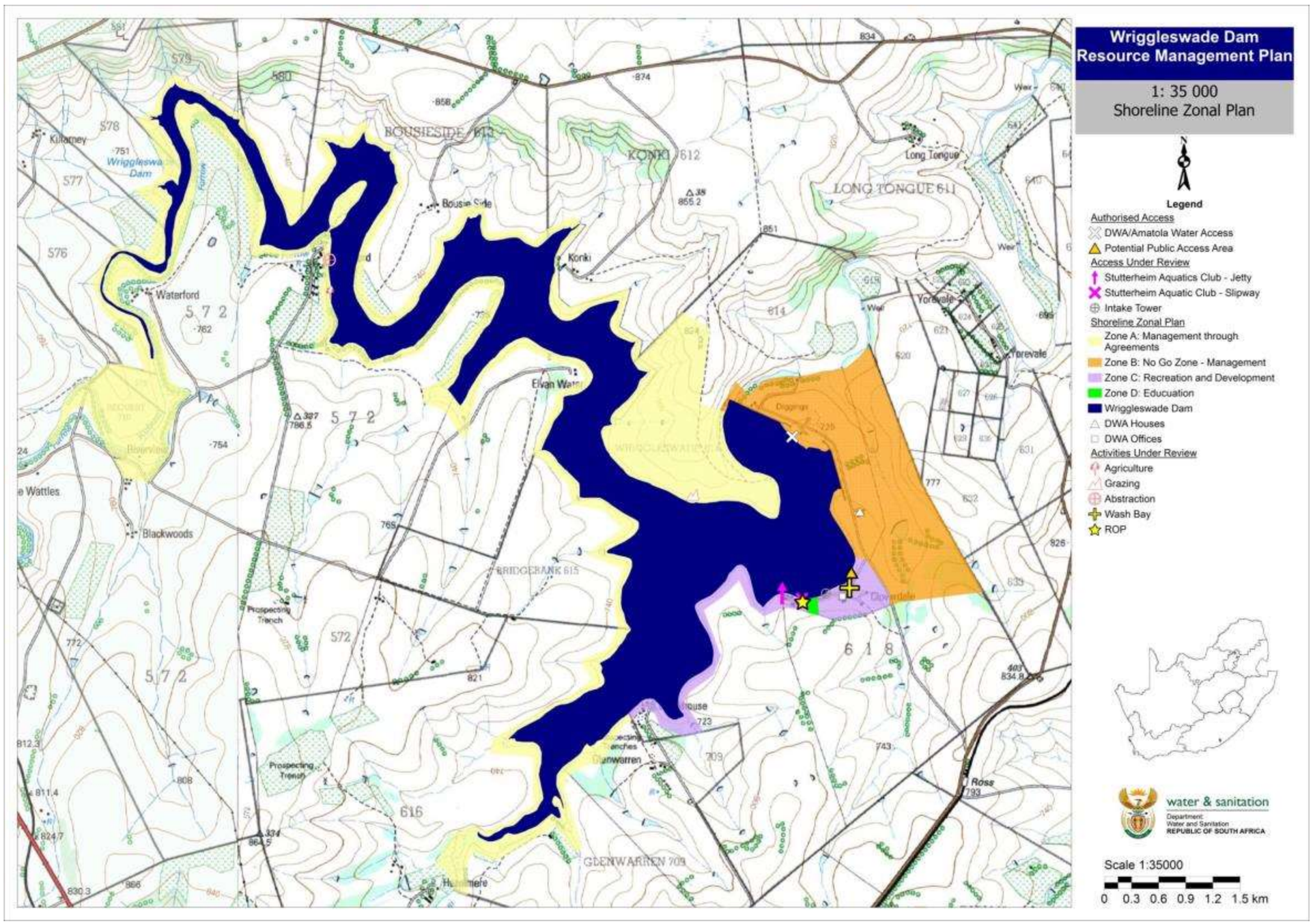

Figure 17: Map of the Shoreline Zonal Plan

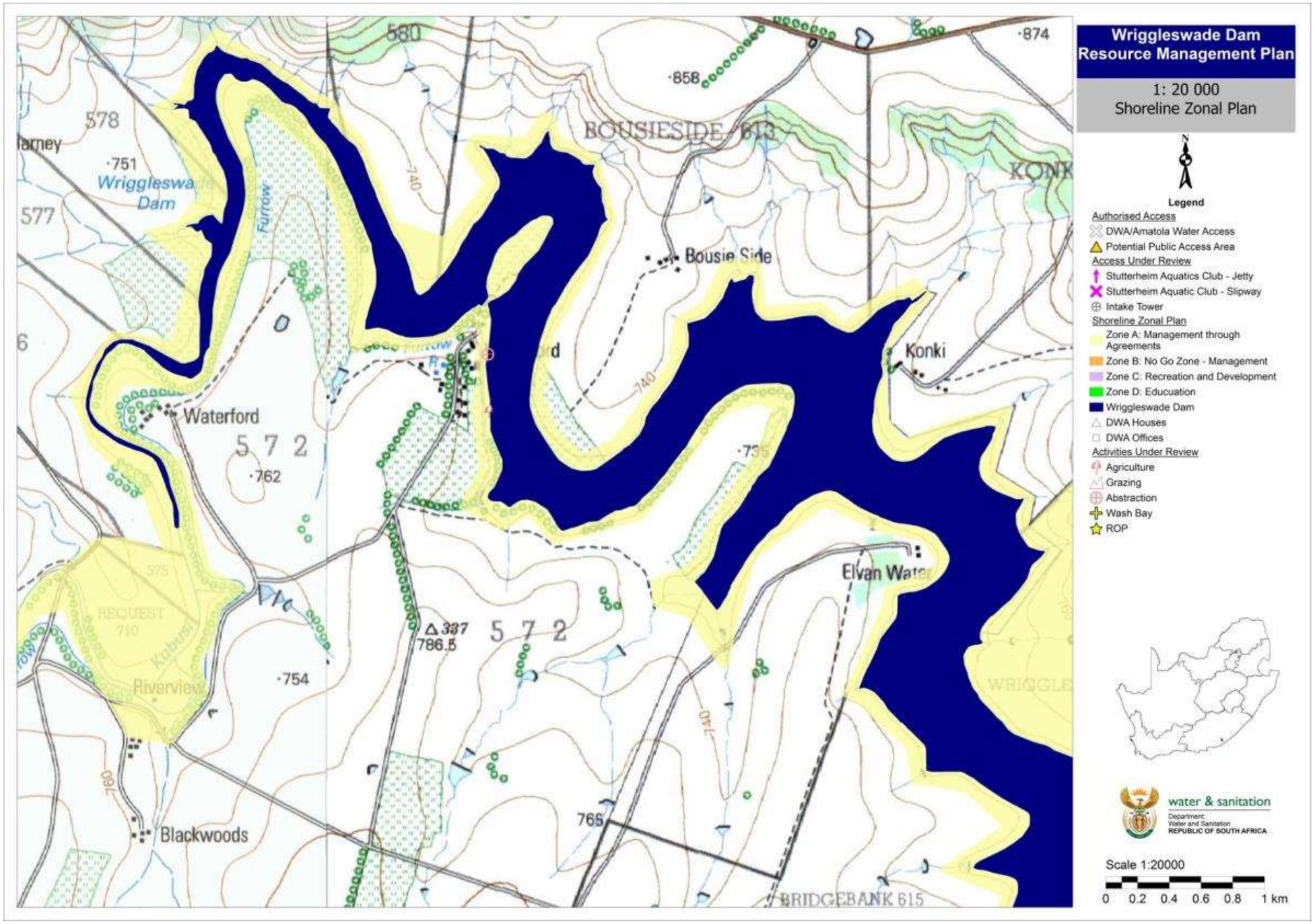

Figure 18: Map of the Shoreline Zonal Plan – Section 1

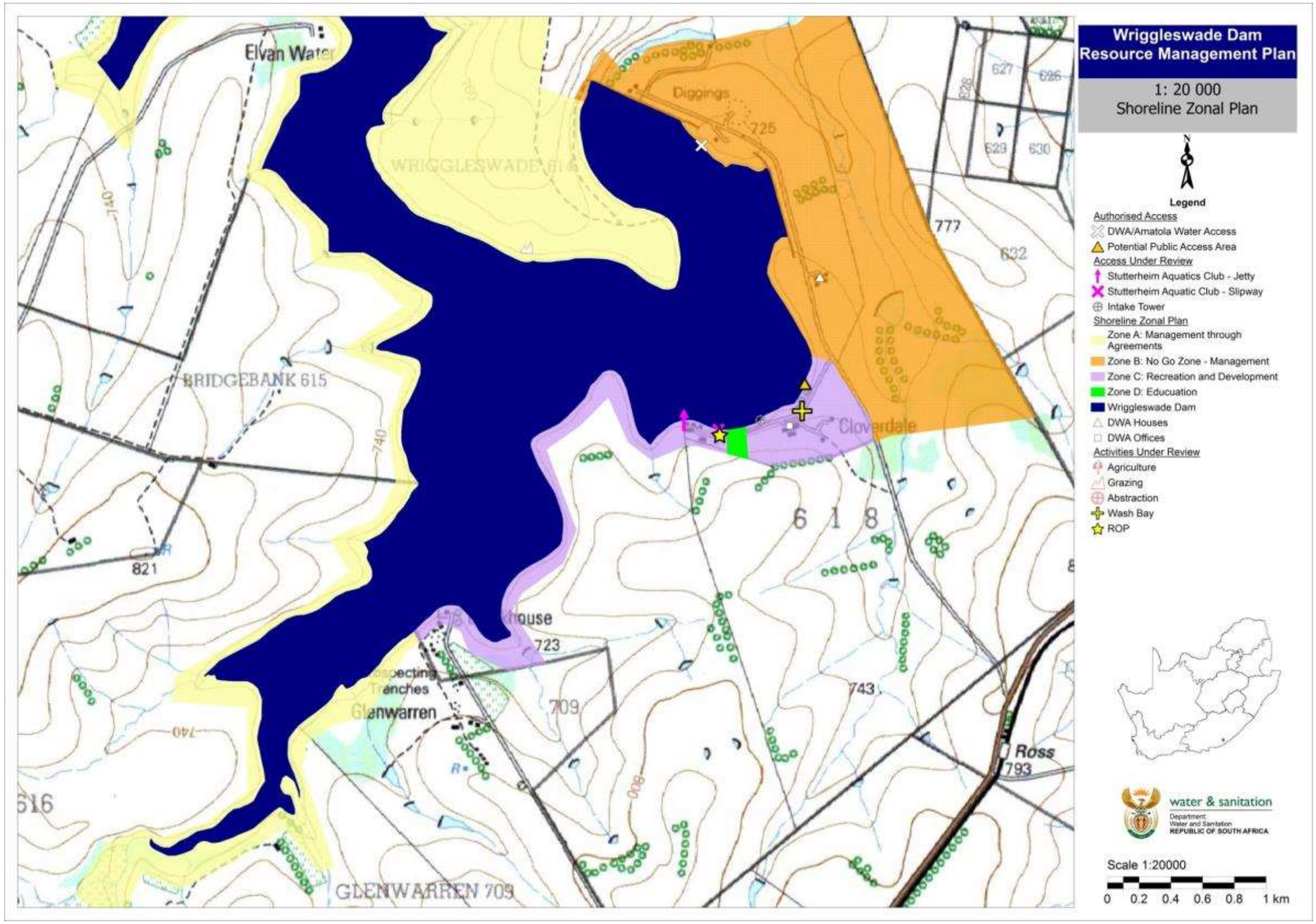

Figure 19: Map of the Shoreline Zonal Plan – Section 2

4.5 Strategic Plan

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

Objective category /major objective	What	Why	How	Who
Clarification of Current Institutional Arrangements and Roles and Responsibilities and improved communication	Formalised institutional structure	The current agreement with Amatola Water does not include management of recreational use and there is no formalised structure for coordination at the Dam.	Institutional structure suggested as part of the RMP DWS to put in place the DMC, OMC and RSC	DWS Amatola Water
	Updated agreements taking into account RMP should be put in place	During consultation with Ward Councillors, it was determined that most local community members are not informed about the Dam and the potential recreational activities. This decreases access by the local community members	An additional agreement with Amatola Water should be put in place regarding recreational use Agreements between Amatola Water and SAC should be put in place	DWS Amatola Water SAC
Swift Resolution of Land Matters and unauthorised activity	Land matters to be resolved and new agreements with adjacent landowners to be drawn up	There two areas at the Dam where land ownership needs to be confirmed. There is a current dispute with an adjacent landowner regarding leasing of land for grazing. This needs to be resolved and a new agreement in line with the RMP drawn up.	Land matters to investigate landownership of the unknown portions A legal opinion should be obtained regarding the validity of the current lease agreement which is being disputed. Based on the findings, the dispute should be resolved and if possible, it is suggested that a new lease agreement with the adjacent landowner is drawn up.	DWS
	Unauthorised water use (i.e. abstraction) and activities (i.e. agriculture) on State Land to be addressed	There is unauthorised water use at the Dam in the form of a unauthorised abstraction point as well as unauthorised activities (such as the construction of a Kraal on State Land).	These uses should be addressed and new agreements detailing acceptable use should be put in place.	DWS
Control of Aquatic Invasive Species	Aquatic Invasive Management Plan to be compiled and implemented	The Dam has an extremely large infestation of Water Hyacinth which threatens the water quality, biodiversity and recreational use at the Dam. Further, there is the potential for additional infestations to occur which would have an additional negative impact.	A detailed Alien Invasive Plant Management Plan should be compiled and should include biological, chemical and mechanical control measures required to contain and minimise the infestation. A survey of the current extent of the infestation should be undertaken and the No Go Zone in the Zonal Map should be updated if necessary to prevent access into these areas. Yearly surveys should be undertaken to determine whether containment strategies are having a positive impact. These surveys should	Amatola Water DEA

Objective category /major objective	What	Why	How	Who
			also ascertain the presence of any other aquatic invasive plant species	
	Education programmes regarding the impacts of alien invasive species	The impacts of alien invasive plants and fish are not known. There is an opportunity to improve environmental education at the Dam.	Information brochures detailing the impacts of alien invasive species and plants should be compiled Information boards with information on alien invasive plants and species should be placed at the Wash Bay to educate recreational users	DMC DEA Amatola Water
	Species Management Plan for Invasive Fish Species to be compiled	The Dam has both Bass and Carp. The new NEMBA regulations require that Containment Plans be compiled for these species.	A containment plan should be compiled in line with the legislation and best practices.	DMC Amatola Water DEA
	Wash bay system to be implemented to prevent further infestations	A Wash Bay System where all vessels are sprayed to remove any potential invasive plant material has been devised. The aim is to decrease spread of invasive plant species between Dams.	The location of the Wash Bay should be decided in consultation with Amatola Water and SAC. The Wash Bay should be located on State Land. The Wash Bay should be constructed. Agreements in terms of management of the Wash Bay should be put in place.	DWS Amatola Water DEA CIWSP SAC
Improved Resource Management	Water quality monitoring to be undertaken together with an assessment of the main pollution sources	Water quality monitoring is undertaken by DWS however a number of variables are not monitored. This should be addressed.	An agenda item should be added to the DMC agenda to discuss water quality issues. Water quality monitoring should include all necessary variables.	DWS DMC
	Shoreline management strategy to be compiled and implemented	There is no overarching shoreline management plan which provides guidance on grazing activities allowed, prevention of erosion or management of terrestrial invasive species and fire. This can result in poor management practices Further, terrestrial invasive plant species can also have a negative impact especially in regard to water availability. The shoreline management plan should include management of terrestrial invasive plant species and should include input from	An overarching shoreline management plan should be compiled and include carrying capacity for grazing, control of terrestrial invasive plants, management of firebreaks and erosion control. Agreements should be updated in line with the requirements of this plan. The shoreline management plan should include management of terrestrial invasive plant species and should include input from Working for Water etc.	DWS Amatola Water EC-DEDEAT DEA Working for Water

Objective category /major objective	What	Why	How	Who
		Working for Water etc.		
	Discussions with Working for Water should be undertaken regarding clearing programmes for terrestrial invasive plant species	A number of terrestrial invasive plant species occur in the catchment. Clearing of these species would improve water availability. Invasive plant species are also known to decrease biodiversity	DMC and Amatola Water to initiate discussions with Working for Water regarding potential clearing in the catchment Working for Water to clear terrestrial invasive plants	DMC Amatola Working for Water
	Promotion of ecological, zoological and botanical studies at the Dam through discussions with local universities	There is a potential for increased research to be undertaken at the Dam by postgraduate researchers at various universities. This would improve the amount of information available on the aquatic and terrestrial environment at the Dam and would improve management practices	The DMC should facilitate discussions with local universities regarding the potential for postgraduate research to conducted at the Dam All research projects undertaken at the Dam should be approved by the DMC and DWS Further, the research should be presented to the DMC once concluded	DMC
Improved Marketing of the Dam as a Tourism and Recreational Area	Coordination between Local Municipality, DWS, Aspire, Amatola Water and SAC with regards to marketing and tourism including potential linkages between KraftMania Initiative, Amabele Berries and Wriggleswade Dam to be assessed. Linkages to rail-based tourism should also be determined .	Amathole Economic Development Agency (AEDA) has identified a number of tourism development strategies for the area. These should be linked to the Dam so to increase economic development in the area.	Discussions between ALM, Aspire, DWS and Amatola Water to take place	ALM AEDA DWS Amatola Water
	Marketing and Tourism Strategy to be compiled and implemented	The Dam is currently not well marketed or well-known which limits recreational use at the Dam.	Based on the discussions between ALM, Aspire, DWS and Amatola Water, a strategy for marketing should be developed. This should include a website and road signage.	ALM AEDA DWS Amatola Water
Improved equitable access and	Potential of adding a taxi route to the Dam to be assessed as discussed with Taxi Association	The Dam is located approximately 18 km from the access area. There are no taxi routes to the Dam and thus the local community does	Discussions between SAC, DWS, Amatola Water and ALM should take place Discussions between ALM and the Taxi association should take place	ALM SAC Amatola

Objective category /major objective	What	Why	How	Who
use		not have an opportunity to use the Dam.		Water DWS Taxi Association
	Information brochures to be developed to inform communities about the potential uses of the Dam and how to join recreational clubs and societies	During consultation it was determined that most local community members are not informed about the Dam and the potential recreational activities. This decreases access by the local community members	The DMC should develop informative brochures to ensure that the local community members are aware of opportunities at the Dam. It is also suggested that the DMC develops a presentation which can be made to the Ward Councillors, Local Schools, Churches etc. about the potential for recreational use at the Dam	DMC
	Formalised public access picnic area to be put in place; and	There is no formalised picnic area for the public at the Dam although SAC does have some day visitor facilities	Discussions with Amatola Water regarding the potential for signing an additional agreement with them which would include recreational use Should this not be feasible, it is suggested that ALM be approached as their IDP places a strong emphasis on eco-tourism and job creation This would be dependent on ALM's capacity. It may be necessary for a PPP process to be undertaken for the management of recreational use, eco-tourism activities and the public access area There is also potential for SAC to manage the public access facilities as part of their updated agreement. This would also be based on their capacity to do so	DWS Amatola SAC ALM DMC
	Feasibility of a community access card to be assessed	A local community access card would ensure that the entrance fees are not prohibitive.	Discussions between SAC, Amatola Water and DWS regarding access	DWS Amatola Water SAC
Improved facilities for tourism and recreational use	The potential for additional Overnight and day visitor facilities to be built at the Dam to be assessed	There is no formal accommodation at the Dam. Self-catering chalets, hostels etc would allow more recreational use at the Dam.	A feasibility study on potential overnight accommodation should be assessed.	DWS Amatola Water
	Potential of hiking and cycling trails	There is an opportunity for the creation of a	Feasibility for additional recreational activities should be undertaken	DWS

Objective category /major objective	What	Why	How	Who
	to be assessed	cycling or hiking trail in the area.		Amatola Water
	Potential for the construction of bird hides to increase bird viewing to be assessed	Over 280 bird species have been identified around the Dam and the Dam is known for its bird diversity. The construction of a hide would allow bird watches access to certain areas. This would need to be in consultation with adjacent landowners.	Discussions with adjacent landowners to be undertaken regarding potential bird hide.	DWS Amatola Water
Increased and improved use of the Dam for youth training and community outreach programmes	The Dam should form part of current youth outreach programmes including coordination with Forestway.	During consultation it was noted that there are numerous issues with youth drug and alcohol abuse in the area. There are a number of outreach programmes which attempt to use the outdoors to prevent this behaviour. None of these programmes currently make use of the Dam. The Dam offers a number of opportunities for skills development as part of these programmes. This should include coordination with adjacent farmers to include potential youth farm skills training as part of outreach programmes	Discussions with Forestway, schools, churches and recreational users should be undertaken to determine how best the Dam can be used for outreach programmes Agreements should be put in place with current programmes such as Forestway which allow them access to the Dam. An area near the Dam wall has been earmarked for education purposes. Coordination with adjacent farmers to develop skills training programme	DWS Amatola Water Outreach Programmes SAC Adjacent farmers
	Coordination between SAC and local schools and SAS to introduce youth sailing programme at local schools	During consultation it was noted that schools in the area would be interested in a school sailing programme. SAC also showed interest in working with schools to develop sailing in the area.	Discussions between SAC and schools to develop training programme Discussions between SAC, SAS and DWS regarding potential funding opportunites	DWS Amatola Water SAC SAS Local Schools
Increased but	Wash Bay and Unique Positioning Number (UPN) System to be	There is no overarching safety system at place. There is also no wash bay to ensure no	UPN System to be put in place Wash Bay to be constructed	DWS SAMSA

Objective category /major objective	What	Why	How	Who
Well Managed and Safe Recreational Use	implemented	further infestations of aquatic invasive species		CIWSP
	Standardised AtoN and demarcation system to be implemented	There is currently no formalised and standardised AtoN and demarcation markers at the Dam	SAMSA and DWS to undertake survey of the Dam to identify obstacles and areas which require demarcation markers AtoN and Demarcation Markers to be put in place Agreements between SAMSA and DWS and other recreational clubs regarding AtoN and Demarcation markers to be put in place	DWS SAMSA Recreational Clubs CIWSP
	Lifeguard skills training and first aid training to ensure safe public use of the Dam	This programme would provide, skills, jobs and ensure safe use of the Dam.	Feasibility study to be undertaken.	DWS SAMSA COGTA

5 WAY FORWARD

5.1 Compilation of Business Plans

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

The Business Plans are approached in the following manner:

- Identify Strategic Objective – informed by RMP;
- Determine Interventions – Each objective was divided into practical interventions;
- List Detailed Activities – Interventions were further divided into activities, in order to establish timeframes and provide guidance to the entity who implements the business plan;
- Establish Key Performance Indicators per intervention – Key Performance Indicators allow for monitoring and evaluation; and
- 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 RMP presents a twenty-year vision for the Dam. This vision will be implemented through the RMP which will be revised and updated every five years, according to changing priorities, constraints and achievements. Within a five-year cycle of the RMP, the BPs will identify key objectives in line with a changing status quo and potential change in circumstances. After five years the RMP will be reviewed and updated so to identify new objectives in line with the vision for the Dam.

The BPs are updated annually.

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