

SUSTAINABLE UTILISATION PLAN
FOR THE NANDONI DAM IN THE THOHOYANDOU DISTRICT OF THE
LIMPOPO PROVINCE



Prepared for:



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- **Department of Water Affairs and Forestry** is responsible for the overall co-ordination, management and control of the Nandoni Dam project and all its components.
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- **Womiwu** are responsible for the management and implementation of the land and natural resources component of the Relocation Action Plan.
- **Van Riet and Louw Landscape Architects** are the consultants responsible for the development of the Nandoni Sustainable Utilisation Plan and Environmental Management Plan.
- **The Community Action Committee (CAC)** is the central committee for assisting the project team in the development of policies, implementation of the Relocation Action Plan and other community issues and concerns arising from the scheme. The CAC reports to the PSC and formed the basis from which the Dam Zoning Committee emerged.
- **The Dam Zoning Committee (DZC)** is a sub-committee to the CAC and consists of representatives nominated by the CAC to consider issues pertaining to the relevant zoning and planning issues of the new dam and communicate these between the zoning consultants and the various local communities.
- **Ecotourism Afrika Trust** provided much insight into the policy and workings of concession management and the implementation of workable solutions.
- **The Project Steering Committee (PSC)** is an advisory committee consisting of government officials, traditional councils, development agencies, SANCO and NEHAWU. The PSC considers matters in a regional and national perspective.

ABBREVIATIONS

DWAF	Department of Water Affairs and Forestry
NWA	National Water Act, 1998 (Act No. 36 of 1988)
SUP	Sustainable Utilisation Plan
SUPP	Sustainable Utilisation Planning Procedure
EIA	Environmental Impact Assessment
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
I&AP	Interested and Affected Parties
LRGWS	Luvuvhu River Government Water Scheme

EXECUTIVE SUMMARY

The Luvuvhu River is situated in the north eastern part of South Africa and its catchment area extends from near Louis Trichardt in the west to the Kruger National Park in the east. The proposed dam forms only a part of the Luvuvhu River Government Water Scheme (LRGWS), a R700 million project scheme which will supply water for domestic use, irrigation, forestry and ecosystem support. The harnessing of the river at Nandoni Dam will ensure sufficient water resources to meet the requirements of the area until at least 2020.

In addition to its primary function of water provision, the Nandoni Dam also offers the opportunity for water based recreation and tourism development, a resource that has not been exploited in the region. The dam is also expected to act as a catalyst for new developments and initiatives in the area.

The Minister, as the public trustee of the nation's water resources must ensure that the water resource that constitutes the Nandoni Dam is *inter alia* protected, used, developed, managed and controlled in a sustainable and appropriate manner, for the benefit of all persons and in accordance with its constitutional mandate (National Water Act, 1998, (Act 36 of 1998), Section 3).

In an effort to assist the Minister in attaining these objectives and so ensure that access to and use of the dam is equitable, the Department of Water Affairs and Forestry (DWA) commissioned the compilation of a Sustainable Utilisation Plan (SUP) for the Nandoni Dam.

An SUP aims to integrate the conservation, recreation and development in such a way as to ensure optimum utilisation of the dam by all, whilst not retarding the primary functions of the dam. In order to achieve this, the following objectives were set and met during the course of the study:

- An understanding of the SUP process as well as the principles, policies and legislation controlling this process was gained;
- An understanding of the natural, cultural historical and socio-economic environments (i.e. the environmental supply) was developed;
- An understanding of the various user requirements, taking into account all stakeholders and interested and affected parties was gained;

- The marriage of the environmental supply with the user demand so as to determine the environmental opportunities and constraints in terms of the planning and development requirement;
- The assessment of areas with specific combinations of environmental characteristics (i.e. land facets) in terms of their suitability for the determined planning and development requirement (i.e. conservation, agriculture and development);
- The generation of a zoning plan, which constitutes a broad based guideline according to which detailed planning may take place, based on the findings of the land facet evaluation;
- The development of an integrated environmental management plan, based on the recommendations of the zoning plan. Without a management plan it would be impossible to co-ordinate and manage the activities required to unlock the potential of the Nandoni Dam;
- A proposal for an institutional structure for the effective management and implementation of the SUP. As a planning tool, SUP will be used to guide the future utilisation and development the dam.

Public involvement through a community elected committee was followed throughout the SUP process so that information would be readily transferred between the SUP consultants, DWAF and any Interested and Affected Parties. This public participation process included the following objectives:

- The identification of all Interested and Affected Parties (I&AP's);
- The answering of questions and noting of concerns;
- The identification of important issues, problems and conflicts and the noting of alternatives;
- The elimination of false expectations and preconceptions.

This has aided in ensuring that all the proposals, the reasons for the proposals as well as the environmental consequences of the proposals have been related and understood by the various stakeholders.

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1 INTRODUCTION

1.1 BACKGROUND

Refer to Map 1.

The Nandoni Dam lies on the Luvuvhu River 16km southeast of Thohoyandou in the Northern Province; with the dam wall some 12km downstream near the village of Mutoti. The dam forms only a part of the Luvuvhu River Government Water Scheme (LRGWS), a R700 million water scheme also comprising two new water treatment plants, pumping stations, bulk water distribution pipelines and service reservoirs as well as an abstraction weir. The scheme will supply water for domestic use, irrigation, forestry and ecosystem sustentation.

The land required for Nandoni Dam is state owned under the custodianship of the Department of Land Affairs / Public Works Department and administered in a communal system of land tenure where the Territorial Councils exercise authority over the allocation of parcels of land for specific uses by individuals or organisations.

The dam basin falls within the area administered by the Mphaphuli Territorial Council under the leadership of Chief Mphaphuli (northern bank), the Mulenzhe Territorial Council under the leadership of Chief Ramovha (southern bank) and the Tshivhase Territorial Council under the leadership of Chief Tshivhase (far western reaches). The three Territorial Councils fall within an area under the jurisdiction of the Thulamela Municipality (formerly the Greater Thohoyandou Local Council). Refer to Map 1.

1.2 GOAL

The Minister, as the public trustee of the nation's water resources must ensure that the water resource that constitutes the Nandoni Dam is *inter alia* protected, used, developed, managed and controlled in a sustainable and appropriate manner, for the benefit of all persons and in accordance with its constitutional mandate (National Water Act, 1998, (Act 36 of 1998), Section 3).

In an effort to assist the Minister in attaining these objectives and so ensure that access to and use of the dam is equitable, the Department of Water Affairs and Forestry (DWAF) commissioned the compilation of a Sustainable Utilisation Plan (SUP) for the Nandoni Dam.

The purpose of the SUP is to warrant the attainment of the National Water Act, 1998 (Act No 36 of 1998) section 2 objectives, including that:

- Access to the water is equitable;
- Past gender and racial discrimination is redressed;
- The utilisation of the water is efficient, sustainable and beneficial;
- Social and economic development is facilitated;
- Provision is made for the growing demand for water use, in particular the use of water for recreational purposes;
- Both the aquatic and associated ecosystems, inclusive of their biodiversity is protected;
- Pollution and degradation of the water resource is reduced and prevented;
- International obligations can be met;
- Dam (public) safety is promoted.

The aim of the Nandoni Dam SUP is to provide a broad policy framework, setting out planning objectives, defining responsibilities and detailing operational guidelines for sustainable management, utilisation and development of the water resource and surrounding state owned land.

As part of the SUP, a suitable institution must be proposed that is equally representative of all stakeholder groups and in both racial and gender terms.

The institution responsible for managing the access and use of government waterworks will use the SUP as a planning tool during decision making, as well as an awareness tool for staff, neighbours and water users so that they may understand the vision, mission and operational guidelines for the dam.

Additionally, the Nandoni Dam SUP will guide the institution in managing general access to and use of the dam, while DWAF will be responsible and

accountable for specific approvals such as concessions and management contracts.

1.3 SCOPE AND JURISDICTION

The SUP for the Nandoni Dam is applicable to the area upstream of the dam wall, as identified by the State owned land or purchase line and limited to the point of influence of the backwater. The downstream extent is limited to the development area required around the dam wall for access, safety, security and operation.

This area of jurisdiction is not, however, to be considered in isolation of the surrounding catchment and land practises.

1.4 TIMING

Conventionally, the zoning and management planning of a dam does not take place until after the completion of construction work, so that the relevant issues are physically apparent, rather than theoretical. In this instance, however, the Project Steering Committee and the Community Action Committee of the Luvuvhu River Government Water Scheme, in conjunction with the relevant transitional and territorial councils in the area requested that the Nandoni Dam SUP be developed during the construction period of the dam, which was at that time scheduled for completion in November 2003.

The nature of the environmental and sociological conditions surrounding the construction of the new dam is complex and such an early planning exercise is believed to allow for the integration of the anticipated dam usage into the broader community planning. It may also be used by the public to inform other processes such as the development of Integrated Development Plans (IDP's) relevant to the area.

1.5 PROCESS

The study goal is to establish a SUP for the Nandoni Dam basin that integrates the conservation, recreation and development in such a way as to

ensure optimum utilisation of the dam by all, whilst not retarding the primary functions of the dam¹.

In order to achieve this goal, the following objectives are set:

- To develop an understanding of the SUP process as well as the principles and policies controlling this process;
- To develop an understanding of the natural, cultural historical and socio-economic environments (i.e. the environmental supply);
- To develop an understanding of the various user requirements, taking into account all stakeholders and interested and affected parties;
- To marry the environmental supply with the user demand and so determine the environmental opportunities and constraints in terms of the planning and development requirement;
- To assess areas with specific combinations of environmental characteristics (i.e. land facets) in terms of their suitability for the determined planning and development requirement (i.e. conservation, agriculture and development);
- To produce a zoning plan based on the findings of the land facet evaluation;
- To develop an integrated environmental management plan based on the zoning plan proposal;
- To propose an institutional structure for the effective management and implementation of the SUP;

¹ Department of Water Affairs and Forestry, South Africa. 1999. *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Unpublished report.

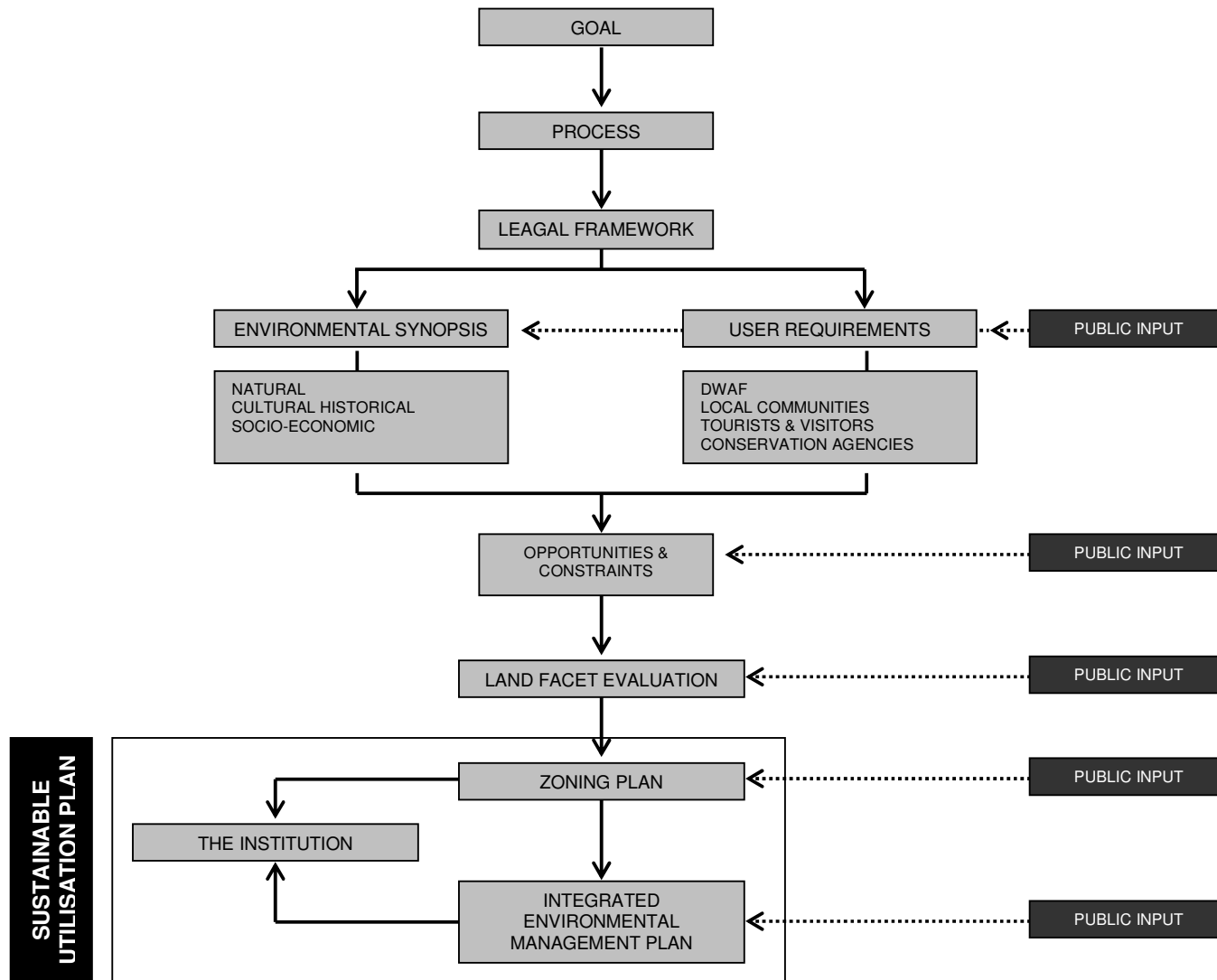


Figure 1: Sustainable Utilisation Planning Process for the Nandoni Dam

2 LEGAL FRAMEWORK

2.1 LEGISLATION

Within the South African context, ensuring compliance to relevant legislation is pivotal to the attainment of sustainability. At the Nandoni Dam, it is imperative that all actions are compliant with relevant legislation. In addition, the relevant provincial and local ordinances that will be taken into account. The Nandoni SUP will operate within the following mandatory legal framework:

- The National Water Act (Act No. 36 of 1998);
- The National Heritage Resources Act (Act No. 25 of 1999);
- Occupational Health and Safety Act (Act No. 85 of 1993);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998), in specific the principles as set out in section 2;
- The Environment Conservation Act, 1989 (Act No. 73 of 1989) and in particular sections 21, 26 and 28 with commensurate Regulations 1182 and 1183 of 5 September 1997. These regulations identify activities which may impact on water (including the constructional upgrading of recreational resorts), for which authorisation from the Provincial authority is required, prior to initiation of development;
- The Conservation of Agricultural Resources Act, 1983 and in particular Regulation 7 (3), which addresses erosion of soils;
- The Soil Conservation Act, 1969, Part IV in respect of erosion control;
- The National Forest Act, 1998 and the National Veld and Forest Fire Act, 1998 in respect of protection of forestry and particularly responsibilities associated with fires;
- Regulations framed in terms of paragraph (b), (c) and (j) of Section 70 of the Water Act, 1956 (Act No. 54 of 1956);
- The Public Finance Management Act (Act No. 1 of 1999);
- Department of Transport Proposed Model Inland Waters (Navigation) Regulations, Government Notice 1115 of 1997.

2.2 GOVERNMENT WHITE PAPERS

Government White Papers (which may be amended from time to time) will be acknowledged, in particular those of:

- The Department of Water Affairs and Forestry;
- The Department of Public Works;
- The Department of Land Affairs;
- The Department of Environmental Affairs and Tourism and
- The Department of Sport and Recreation.

2.3 INTERNATIONAL ENVIRONMENTAL LEGISLATION: CONVENTIONS

South Africa is a signatory to several conventions, which may have an influence on the format of a particular SUP. These conventions shall be respected and include *inter alia*:

- the Biological Diversity Convention: i.e. The commitment to the conservation of biological diversity, sustainable use of its components and the fair and equitable sharing of benefits stemming from its genetic resources;
- The Bonn Convention (on migratory species): i.e. the conservation of animals that migrate requiring protection of their habitat, migratory routes and feeding sites as well as the reconciliation of development and conservation interests;
- The RAMSAR Convention (on wetland protection): i.e. the protection of wetlands as regulators of water regimes and habitats;
- Agenda 21: i.e. a commitment towards sustainable development with associated actions in regards to conservation of biodiversity, freshwater resources, land and sustainable tourism;
- The Convention to Combat Desertification: i.e. desertification is not only caused by change in climate but also changes in biodiversity – thus by protecting pockets or islands of biodiversity, desertification can be combated.

2.4 CONTRAVENTION AND LEGAL RECOURSE

Not only do these Acts and Ordinances guide the specific decisions and actions, they also provide the framework for monitoring performance and compliance, and provide guidelines regarding contravention, offences and penalties.

3 ENVIRONMENTAL SYNOPSIS

3.1 NATURAL ENVIRONMENT

3.1.1 Climate

The region is generally hot and humid with a summer rainfall. The average summer temperature is 23°C, and the average winter temperature is 17°C.

The mean annual precipitation follows the same pattern as the topography ranging from 2000mm/annum in the mountainous areas of the northwest to 440mm/annum at the Limpopo River confluence, with a catchment average of 800mm/annum.

The prevailing wind direction is east to southeast in both the summer and the winter months. The average wind speed is 11km/h in the summer and 15km/hr in the winter.

3.1.2 Topography and Hydrology

The region is characterised by an undulating hilly landscape. Most of the area slopes gradually to moderately and is generally suitable for development and agriculture².

The Luvuvhu River flows in an easterly direction, beginning just east of Louis Trichardt, and ending at its confluence with the Limpopo River in the Kruger National Park. The river was once perennial, but since about 1946, has ceased to flow for several months during the year. The river valleys of the system are pronounced and drainage in the area is strongly dendritic.

The river catchment, excluding the Mutale River is approximately 3570km² in extent with elevations ranging from 1590m above sea level in the northwest (Soutpansberg Mountains) to about 230m at the Limpopo River confluence, over a distance of approximately 250km. The Nandoni Dam site falls in the flatter western and central area of the catchment area and consists of a 38m

² Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

high composite concrete spillway section with earth flanks³. The surface of the dam is expected to cover 1650 ha, with the full supply level following the 510m contour. The high flood level is estimated to be at the level of the 512,4m contour.

Once complete at the end of 2003, the dam could take up to two years to reach the expected full supply level. No abstraction will take place during this time.

Once the dam is 'full', water will begin to be abstracted at a rate of approximately 45 million m³ per year. For the next eight years of operation, the level of the dam may be expected to remain roughly at the full supply level. For the second decade of operation, the water level will begin to fluctuate, and after twenty years of operation, when the abstraction rate increases to a maximum of 93 million m³ per year, this fluctuation may be expected to be up to 15m from the said full supply level (i.e. between the levels of 510m and 495m).

During very dry periods, the level of the dam could drop very low. Water abstraction will be discontinued should the level of the dam ever drop below 487,0m.

3.1.3 Geology and Soils

The Luvuvhu River cuts through a mountainous area of the Soutpansberg group. Physiographically, the area underlain by the gneiss sequence comprises a low-lying, slightly undulating terrain. Fresh bedrock is sometimes visible within and adjacent to the river and stream courses.

In many areas the soil has been exhausted due to continuous cultivation and both sheet and gully erosion is evident. Erosion in the dam basin occurs generally in areas of flat topography where erodible material is available.

In certain areas such as the Madzhivhandila Agricultural College and environs and in areas immediately to the north and west of the dam wall, the soil is of a

³ Department of Water Affairs and Forestry, South Africa. 1997. *ROIP 1 of bulk water distribution infrastructure*.

very high quality. Although there are pockets of sheet and gully erosion, this soil is highly suited for commercial farming⁴.

3.1.4 Vegetation

The dam basin displays veld types typical of a seasonal river system, with riparian forests along the main river and tributaries and floodplain vegetation beyond.

Very few species grow in the river itself, while the sandy banks have many weeds, sedges and flowering plants and a few ferns. The steep river banks leading to the floodplains have more shrubs, lianes and herbaceous plants. Most big trees, species diversity and rare specimens occur in this riverine bush, steep banks and gullies where they have survived due to inaccessibility of the areas.

The floodplains have good stands of *Acacia*, *Combretum* and *Ficus* species (including the endemic *Ficus capreifolia*). The hilly and gravelly areas beyond the floodplains have healthy communities of *Acacia* and *Combretum* species, *Azelia*, *Adonsonia*, *Crossopteryx*, most of the lilies as well as some rare flowering shrubs.

The densest vegetation on the south bank is located in an area extending from the brickyard near the present bridge, to Mulenzhe village, and then in patches to Dididi village. Beyond Dididi village, the area is largely denuded.

On the northern bank, the densest vegetation and species diversity is to be found between Mutoti village and Budeli village. The only truly dense area, however, is to be found within the fenced property of the Agricultural College up to Tshilongoma. From here to Manini and Muledane, the area is severely disturbed and infested with invasive species.

There are many other severely disturbed areas in the dam basin, this due to overgrazing, deforestation, alien vegetation invasion and rural housing and associated infrastructure.

⁴ Department of Water Affairs and Forestry, South Africa. 1997. *Agricultural Development associated with a dam on the Luvuvhu River*.

Rare and protected plants like aloes, orchids, *Ruspolia*, all the lilies and ferns occur in a limited distribution (i.e. these are found in only a few spots in the area). The only Red Data species identified, mostly as uncertain are *Ruspolia*, *Xylopi*a, *Hippocratea parvifolia* and *Albizia amara*.

The most prominent invasives in the area are *Ricinus communis* (Castor oil plant), *Lantana camara* (Lantana), *Melia azedarach* (Syringa) and *Sesbania punicea* (Sesbania). Water lettuce has also been recorded in the Luvuvhu River. These weeds are not too widespread due to the limited rainfall, but may spread as soon a more water is available in these areas⁵.

3.1.5 Animal Life

No specialist studies on the fauna within the dam basin had been conducted at the time of the compilation of this report. It is therefore assumed that fauna indigenous to the area will be most abundant and most diverse in the protected, inaccessible stream gullies and riverine woods. These animals are assumed to include mostly small antelope, monkey and bird species indigenous to the area.

Reptiles such as snakes and lizards will most likely also be concentrated in the above-mentioned inaccessible riverine woods.

The invertebrate community of the Luvuvhu River has been recorded to be strikingly diverse despite seasonal flow patterns.

The river is populated by crocodiles for most of its length, constituting a potential danger to humans and livestock. No recent sightings of hippopotami have been recorded along the Luvuvhu River outside of the Kruger National Park, but the possibility of specimens occurring along this stretch of the river, especially after the completion of the new dam, is not disregarded.

3.1.6 Water Resource

Although there is a problem with the disposal of solid and liquid waste that has accumulated in the dam basin as a result of insufficient waste and sewage disposal systems within the rural villages, the water quality of the

⁵ Department of Water Affairs and Forestry, South Africa. 1997. *Botanical survey of the Mutoti Dam site*.

Luvuvhu River is relatively good⁶. These wastes may however impact negatively upon the water quality of the dam when these areas are inundated.

One of the major threats to the water quality of the Nandoni Dam is the general absence of buffer vegetation along inlets, streams and along the dam itself. This implies that no natural filter for surface runoff exists, and all impurities and pollution gathered up through surface flow of water will ultimately end up in the dam. Considering the population densities in the areas, this could become a serious water quality problem for the dam as a whole.

Another potential problem is unlimited access of livestock to the waters edge. Animal waste, combined with the denuding effect of constant use and the churning up of the bank could present water quality problems

No studies have been conducted regarding the impact of rotting vegetation on the quality of the water, but this issue is not considered to be serious. Inundated trees and brush do, however, provide ideal feeding spots for fish, although they may snag fishing lines.

A report on the *Health indicators associated with developing a dam in the Luvuvhu River* (1994) suggests that the water currently used by the people may be contaminated with various diseases. Bilharzia and malaria are endemic and most of the locals are infected with both. This is not considered to be a major problem for the local population, but may well be of concern to tourists and visitors to the area.

3.2 CULTURAL HISTORICAL ENVIRONMENT

3.2.1 Lifestyle

Women in the region make use of riffles and calm pools for washing clothes (and for socialising). These spots also serve as drinking places for cattle and car wash areas. Men women and children also wash themselves at certain

⁶ O'KEEFE, PALMER, HUGHES. 1997. *A study on the water quality of the Luvuvhu River.*

places (as many households do not have water on tap). The washing of cars (particularly minibus taxis) occurs along both river banks⁷.

Recreationally, children swim and play in the shallows and people fish and hunt cane rats, rabbits etc. to supplement their diets.

Where the right clay occurs, women remove it for making floors or baked clay pots (mostly as a tourist attraction nowadays). Some types of white and red clay are used for ceremonial purposes during initiation, but this practice is on the wane⁸.

Other than firewood, reeds, sedges and grass are harvested for screens, sleeping mats, basket weaving and thatching. Reeds are also used for ritual purposes (folding tables and flutes). Plants are harvested for food (teas; coffee, potherbs, sweets, fresh fruit, moulds for yeast, refreshing drinks and beer), cosmetics, medicinal plants, fuel, construction and fencing, carving and art, fish poisons, glue etc⁹.

3.2.2 Religion

The river has its ritual and religious uses for the people, such as various initiation ceremonies and rituals practiced in specific pools and various traditional remedies and baptisms in other pools. Some deep and quiet pools have spiritual and religious significance for the Venda people¹⁰.

3.2.3 Culture

Some evidence of medicinal plant collection has been found in the area, and traditional medicine is still widespread and popular¹¹.

⁷ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

⁸ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

⁹ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

¹⁰ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

¹¹ Confirmed by traditional healers at a meeting held to discuss the Harvesting of Natural Resources Policy (26/03/2003).

In addition, a number of the flowering plants that occur naturally can be utilised for food and medicinal purposes¹² (although very few are used at present).

Only 2 trees are of real economic significance, these being *Spirostachys africana* (Tambotie) and *Dalbergia melanoxylon* (Ebony). Both are used for sculpting and wood carving¹³.

3.2.4 Archaeology

Archaeologically, the dam basin is rich in evidence of Early Iron Age settlement (hence the name 'Nandoni', meaning the place of the iron smelters). Habitation from the Middle Stone Age to recent is evident in most of the basin and china dating at least 1000 years has been found.

Second phase archaeological exploration of 67 sites within the dam basin yielded four sites of particular archaeological significance. All four fall within the median level of the new dam and will undergo mitigation (as these sites will be inundated and destroyed once the dam has been completed).

The recommended mitigation strategy for archaeological sites of high importance¹⁴ is the excavation and recovery of the artefacts and their placement in safekeeping for later research. Once a technical report on the mitigation work has been submitted to the National Monuments Council, a permit may be issued for the destruction of the site. All mitigation will be complete before the basin is inundated¹⁵.

The recovered artefacts are currently housed at the University of Venda, but will ultimately be registered at the Louis Trichardt Museum or the Pietersburg Museum. A museum closer to the Nandoni Dam could function as a satellite display under the authority of the regional museum, but run by a local curator.

¹² Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River*.

¹³ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River*.

¹⁴ DEPARTMENT OF WATER AFFAIRS AND FORESTRY, SOUTH AFRICA. 2000. Relocation Action Plan for communities directly affected by the construction of the Nandoni Dam in the Luvuvhu River.

¹⁵ All mitigation relating to the construction of the new dam is handled as part of the Relocation Action Plan, and as such only has bearing in providing a background to this study.

3.3 SOCIO-ECONOMIC ENVIRONMENT

3.3.1 Regional Context

The upper third of the Luvuvhu River Catchment is mainly utilised for intensive agriculture. Forestry dominates the higher lying areas in the Soutpansberg mountain range.

The middle section of the catchment, comprising parts of the former independent territories of Venda and Gazankulu, is heavily populated with various urban and semi-urban settlements as well as numerous scattered rural villages. Land use in this area is predominantly subsistence farming.

The lower portion of the catchment comprises of protected areas in the Makuya and Kruger National Parks.

Three major dams (Albasini, Vondo and Damani) and three smaller dams (Mambedi, Tshakuma and Phiphidi) and a number of farm dams exist in the study area with a total capacity of about 95 million m³.

3.3.2 Population Distribution and Economic Dynamics

A typical population profile (using Budeli as an example)¹⁶ is as follows:

- Sex ratio: 76% female: 24% male
- Age groups: 55% over 40 yrs: 35% between 20 – 30 yrs
- Family size: Average 6 members
- Literacy: 52% illiterate: 24% std 6-9
- Income: 86% less than R500 per month

All areas reported during research on *Health indicators associated with developing a dam on the Luvuvhu River* (1994) reported Sexually Transmitted Disease (STD) as one of the major health problems. Correct and detailed Acquired Immune Deficiency Syndrome (AIDS) statistics are not available for the area.

The total population in the dam basin was determined to be 672 000 in 1995 and is projected to increase to 1 484 000 by the year 2020¹⁷.

¹⁶ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River*.

About 40% of the villagers are between 20 and 40 years old and form the active labour force. Family size is usually about 6 persons. The majority of the villagers (76%) own cattle or goats and the majority have only residential stands and work in communal or tribal fields¹⁸.

The villages represent mainly subsistence agricultural communities supplemented through some migrant labour or work in Thohoyandou. Only 5% of growers are recorded to sometimes sell surpluses¹⁹.

3.3.3 Local Land Use

3.3.3.1 Current Land Use

Refer to Map 2.

Mostly rural villages line the northern bank of the river. This land is mostly overgrazed and denuded, progressively from Mutoti village to Muledane as the floodplains are developed as maize fields and small vegetable gardens.

The area below Budeli is being expanded as fields. In addition, the gullies and ravines are fast being stripped of vegetation by people in search of firewood.

The south bank of the river comprises significant cultivated fields (especially maize). There are still some wooded areas, especially in the gullies, although the area is also generally overgrazed. No extensive irrigation schemes exist, except at the Agricultural College.

From Mulenzhe to the bridge giving access to Dididi, clearing is progressively taking place for new fields²⁰.

¹⁷ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

¹⁸ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

¹⁹ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River.*

²⁰ Department of Water Affairs and Forestry, South Africa. 1997. *Agricultural Development associated with a dam on the Luvuvhu River.*

All villages are dense, grid settlements with fenced yards and streets with communal taps. Most stands have space allocated to vegetable gardens and orchards. A few have boreholes²¹. Most of the farmers reported never to have been exposed to irrigation systems and wish to stick to existing crops and crop patterns. Although 60% of the land around the dam basin is suitable for agricultural purposes, the communities are unable and unprepared to take up commercial farming (although they are positive about such prospects).

The villages surrounding the dam appear to have developed without any environmental or town planning. Many environmental problems such as erosion and pollution are resultant from this ad-hoc settlement pattern, as villages have expanded over streams, inlets, and other sensitive landscapes.

3.3.3.2 Future Plans

Refer to Map 3.

The Mulezhe Community has established a representative Development Trust as a vehicle for the development of the 'Mulezhe Tourism Project'. This consists of a number of projects which it intends to develop using its own funds as well as grants and loans from various sources²². The projects may include a cultural museum, a picnic area with a theme park, an angling club, a boating club, a hotel and lodge, a conference centre with a game park and ferries and tour boats between Mphaphuli and Mulezhe. It is the intention that the projects be managed and operated by the Trust for the benefit of its beneficiaries. The Mulezhe Territorial Council has allocated an initial 100 ha of tribal land under its jurisdiction for the development of this project.

²¹ Department of Water Affairs and Forestry, South Africa. 1997. *Social impact of proposed dams in the Luvuvhu River and Lutanandwa River*.

²² It must be noted that all proposed developments and activities which require access to and utilisation of the dam and / or surrounding State Land will be subject to an evaluation process driven by the Nandoni Dam Management Body (see section 6 of this document). No proposals will be exempt from this process.

3.3.4 Infrastructure

Refer to Map 2.

Infrastructure of relevance to the new dam²³: is as follows:

- The P98-1 is a surfaced provincial road linking Louis Trichardt in the west with Punda Maria in the east. The road passes the new dam site approximately 3km to the north;
- The D3718 (Tswinga Road) and D3756 (Mavambe Road) are gravelled provincial roads that bypass the dam in a north-south direction on the eastern and western sides respectively;
- The D3717 and the D3740 are also gravel provincial roads that run in a north-south direction and cross through the dam site. These give access to Mulezhe via Budeli and to Dididi and Makovha via Tshilongoma and Muledane respectively.
- A multitude of other local dirt roads and pedestrian tracks run between the villages;
- The sewage works, which service Thohoyandou and surrounds, lie to the west of the new dam;
- A number of existing irrigation schemes are situated in the river basin. Most of these presently suffer from inadequate water supplies at certain times of the year. These schemes include Mhinga Xikundu Estate, Lambani, Tshaulu, Paswane, Tshikonelo, Malavule, Matsike and a number of small government assisted community development schemes.
- Temporary dam infrastructure (i.e. related to the construction phase) consists of a prefab office cluster with workshops and meeting rooms to the north east of the dam wall, single quarter accommodation for staff (with associated French drain and evaporation pond) and a mixer station and crusher plant downstream of the dam wall. Once construction has been completed, the Dam Officer's house will be located at the site office and workshop site.

²³ Department of Water Affairs and Forestry, South Africa. 2000. *Proposed solutions to mitigate the impact of the inundation of two Provincial Roads and Pedestrian Drift Crossings by the Nandoni Dam*. Unpublished Report.

3.3.5 Aesthetics

Much of the dam basin has been cultivated and there are large areas that have been denuded. Generally, however, the aesthetic value of the area is high, with attractive sections of riverine forest occurring in the river bends where the river forms pools and in inaccessible river valleys. The fenced grounds of the Agricultural College are an indication of how the unspoilt bush in the area may look under proper management.

3.3.6 The Relocation Action Plan

The construction of a dam such as Nandoni has a significant impact on a local, regional and national scale. Of particular concern is the need to relocate people to make way for the new development.

The Relocation Action Plan (RAP)²⁴ was drawn up as part of the LRGWS project preparation to plan, manage and implement the resettlement and compensation for all those directly affected by the new water scheme. Through this, the plan aimed to minimise negative social and socio-economic impacts on the communities directly affected by the development and to maximise the exploitation of benefits that can be gained from the project.

Through the RAP, all identified individuals and organisations impacted upon by the new dam will ultimately be compensated so that none is worse off than before the dam development²⁵.

The 4 components of the RAP include:

- Land and natural resources (co-ordinated by Womiwu);
- Graves (co-ordinated by Venda University);
- Archaeology and history (co-ordinated by Venda University);
- Housing and business (co-ordinated by BKS Consulting Engineers).

The new dam affects mainly rural settlements. Households from four villages bordering the dam were earmarked to be relocated, including approximately 300 stands and an old misanda in the Mulezhe village on the south bank,

²⁴ DEPARTMENT OF WATER AFFAIRS AND FORESTRY, SOUTH AFRICA. 2000. Relocation Action Plan for communities directly affected by the construction of the Nandoni Dam in the Luvuvhu River.

²⁵ It should be noted that it is not the mandate of the Nandoni Dam Management Body to redress the impact of the dam on the immediately affected communities. This is the mandate of the Relocation Action Plan alone. The RAP issues help to gain an understanding of the social climate and to assist in ascertaining the post construction land uses and the anticipated changes to the current lifestyles of the local people as a result of the new dam.

120 stands in Budeli village on the north bank and 45 households at Tshilongoma. In excess of 655ha of agricultural and grazing land belonging to these villages will eventually be inundated.

There are both ancestral (i.e. older than 50 years) and historical graves within the dam basin, which require relocation. The only acceptable form of mitigation of all graves is by means of 'compassionate relocation' which includes liaison with next of kin as well as the identification of new sites.

There have also been rumours that 3 initiation schools operate in the basin, but due to the culturally sensitive nature of these activities, the presence of the schools has never been confirmed nor is their location known.

The Madzhivhandila Agricultural College, situated to the west of Budeli on the northern side of the new dam will lose a substantial portion of land, as well as sheds and outbuildings, but the college itself will remain. A total of 238ha of land belonging to the Madzhivhandila Agricultural College will be inundated, including orchards, pastures and vegetable plots. In addition, various buildings with a floor area totalling 2025m² will be lost. At the time of compilation of this report, the issue of compensation for the College had not yet been addressed, although it is certain that this will be addressed in time.

Surveys indicate that the Nandoni Dam will have a substantial impact on current travel patterns due to the loss of a number of vehicular and pedestrian routes. Ideally, the status quo should be re-instated, but as this is not possible²⁶, the following will be implemented as part of the RAP:

- The D3740 between Dididi and Tshilongoma will be re-instated through construction of a new bridge over the Nandoni Dam;
- Approximately 3km of the existing D3740 will be re-gravelled;
- A pedestrian bridge will be built to re-instate access between Makovha and Tswinga.
- Although it has been requested that pedestrian bridges be built to re-instate access between Dididi and Tswinga and between Manini and Tswinga, the costs associated with the construction thereof make them doubtful prospects.

²⁶ Department of Water Affairs and Forestry, South Africa.2000. *Proposed solutions to mitigate the impact of the inundation of two Provincial Roads and Pedestrian Drift Crossings by the Nandoni Dam*. Unpublished Report.

4 SUSTAINABLE UTILISATION OF THE NANDONI DAM

4.1 APPROACH

Public involvement through a community elected committee has been followed throughout the SUP so that information would be readily transferred between the SUP consultants, DWAF and any Interested and Affected Parties. This public participation process has included the following objectives:

- The identification of all Interested and Affected Parties (I&AP's);
- The answering of questions and noting of concerns;
- The identification of important issues, problems and conflicts and the noting of alternatives;
- The elimination of false expectations and preconceptions.

This has aided in ensuring that the proposals, the reasons for the proposals as well as the environmental consequences of the proposals have been related and understood by the various stakeholders.

A complete record of this process of awareness building for the Interested and Affected Parties to date and the detailed minutes of the relevant meetings may be found in Appendix 2 included at the end of this report.

4.2 USER REQUIREMENTS

4.2.1 DWAF

The purpose of the National Water Act (Act 36 of 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors. The objectives thereof may be summarised as follows:

- a) Meeting the basic human needs of present and future generations;
- b) Promoting equitable access to water;
- c) Redressing the results of past racial and gender discrimination;
- d) Promoting the efficient, sustainable and beneficial use of water in the public interest;
- e) Facilitating social and economic development;
- f) Providing for growing demand for water use;

- g) Protecting aquatic and associated ecosystems and their biological diversity;
- h) Reducing and preventing pollution and degradation of water resources;
- i) Meeting international obligations;
- j) Promoting dam safety;
- k) Managing floods and droughts and
- l) For achieving this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

4.2.2 Stakeholders

The investigation into the requirements of local stakeholders was threefold. Some information was gleaned from the extensive literature and studies previously conducted within the dam basin. Information was also obtained through liaison with the social consultants, Mothopo Technologies as well as with Womiwu, co-ordinators of the land and natural resources section of the RAP.

Public consultation through public meetings constituted the last component. It should be noted that this process of public input will undoubtedly continue to reveal needs, expectations and issues, even beyond the approval of the SUP. Every effort should be made to ensure that these are acknowledged and addressed through the management structure wherever possible:

- Arable land for subsistence farming was identified as a primary need. As most of the villagers rely to some extent on agriculture for their continued livelihood, this item was marked as a priority.
- Everyday social and cultural practises require that the local people have access to the water and waterfront for:
 - The fulfilment of primary needs (such as laundry, car washing etc, especially in areas with no basic services);
 - Agricultural needs (i.e. water for crops and livestock watering points);
 - Food supplementation (such as fishing);
 - Social, cultural and recreational practises (such as baptism, initiation and general socialising);
 - Plants for fuel, construction and fencing;

- Materials for household items (clay, reeds, grasses etc);
- Plants for traditional medicinal use;
- The possibility of tourism and recreation associated with the new dam has sparked a definite interest in capitalising on opportunities and developing business initiatives (such as the Mulezhe Development Trust).
- Education programmes in commercial and irrigation farming could help subsistence farmers produce and sell surpluses, and so supplement their lifestyles.

4.2.3 Tourists and Visitors

The Kruger National Park is a major tourist destination, and many travellers pass through the region en route to the Park. In response to an ever growing demand for eco-tourism, game reserves and conservancies continue to be established throughout the province.

Other dams in the area, such as Albasini Dam are well used for boating and fishing, as is the Middle Letaba Dam near Giyani (which has a small commercial fishing camp). The Vondo and Damani Dams are mainly used for fishing.

4.3 OPPORTUNITIES AND CONSTRAINTS

The marriage of the environmental supply and the user demand may be interpreted as a summary of opportunities and constraints. These have been listed using the data categories used in Chapter three of this report and analysed in terms of broad user requirement categories. These categories, discussed in detail in Chapter four, may be summarised as:

- Water resource quality and safety;
- Agriculture and primary access;
- Recreation, development and tourism; and
- Conservation²⁷.

²⁷ Although this section was initially developed by Van Riet and Louw, it was presented to the Nandoni dam Zoning Committee who were in agreement that relevant issues had indeed been covered.

4.3.1 Opportunities

Data Category	Activity	Opportunities
Climate	recreation & development	Mild winters are desirable for visitors & tourists
		The presence of a large water body will moderate the microclimate in the immediate vicinity of the dam
Topography	agriculture	Shallow to moderate gradients are suitable for cultivation and grazing
		Impoundment will make water permanently available for agricultural use on a large scale
	recreation & development	Areas of easy access to the water and boat launching spots are desirable
	conservation	Some gullies and ravines have been preserved due to inaccessibility
Soils	agriculture	Excellent soils exist near the college and north of the dam wall
	recreation & development	Building materials such as sand and gravel are locally available
Vegetation	conservation	Habitats & species diversity have been preserved in inaccessible gullies and ravines
Wildlife	conservation	Habitats for local indigenous fauna will be found in inaccessible gullies and ravines
Limnology	recreation & development	The dam will be ideal habitat for fish species sought for angling
Land Use	recreation & development	Lack of fishing and other water based recreation facilities in the area implies a gap in the market.
Infrastructure	agriculture	Upgrading of existing irrigation schemes implies expanded opportunity for cultivation
	recreation & development	Good access from national & regional roads is desirable for visitors and tourists
Aesthetics	recreation & development	Remaining well wooded areas are desirable locations
User groups	recreation & development	Local arts and crafts (wood & clay) and local cuisine
Institutions	agriculture	Possible aid for prospective commercial farmers

4.3.2 Constraints

Data Category	Activity	Constraints
Climate	agriculture	Annual rainfall is insufficient for commercial agriculture; irrigation required
Topography	recreation & development	Very steep slopes cannot be developed due to cost
	agriculture	Steep slopes cannot be cultivated due to erosion risk
Soils	agriculture	Exhausted soils render areas useless for future use & cause erosion
Vegetation	recreation & development	Trees in the dam basin create hazards & snares under water
	agriculture	Denuded & overgrazed areas cannot easily be reclaimed
	conservation	Invader species in indigenous bush compromise habitats
Wildlife	recreation, development & agriculture	Crocodiles and hippo's represent a danger to human life and livestock
Water resource	tourism	Bilharzia & Malaria present a negative

		aspect for tourists & visitors
	Water quality	Pollution from inadequate sewage disposal could affect water quality
	Water quality	Unfiltered runoff from villages could affect water quality
	Water quality	Uncontrolled access of livestock to waters edge could affect water quality
Regional context	recreation & development	Poor economic base of the area does not lend itself to local initiatives
Land use	conservation	Bush clearing for cultivation & firewood represent a threat to habitats
	recreation & development	Settlement densities of communities represent a challenge when locating suitable locations for resorts
	recreation & development	Other tourist facilities (e.g. The fishing camp at Middle Letaba Dam) could compete with tourism development at Nandoni
Infrastructure	recreation & development	Condition & legibility of local roads is poor
User groups	recreation, development & conservation	Communities dependent on the dam for primary, secondary and cultural needs represent a conflict of interests
Population	agriculture	Very little commercial farming occurs & few people sell surpluses
Culture	conservation	Medicinal & edible plants harvested for use by locals represent a threat to habitats
Aesthetics	recreation & development	Denuded & overgrazed areas are not desirable locations

5 ZONING

5.1 LAND FACET EVALUATION

Land facets represent areas with specific combinations of biophysical, social and cultural characteristics²⁸. The following characteristics have been considered for the purpose of identifying the different land facets:

- Hydrology (drainage lines);
- Topography (gradient);
- Vegetation (type and condition);

The table hereunder describes the different conservation, agricultural, recreation and development values given to each characteristic and details reasons why such values have been allocated. Numerical values are linked to each as follows:

- Very High: 6
- High: 3
- Medium: 2
- Low: 1
- Very Low: 0

²⁸ This section too was initially developed by the consultant, and presented to the Nandoni dam Zoning Committee who were in agreement that relevant issues had indeed been covered.

Characteristic / Description		Conservation Value		Agricultural Value		Recreation & development	
Hydrology	Drainage lines: (25m buffers on both sides of all perennial & non-perennial streams).	<u>Very high:</u> There is little vegetation to filter surface runoff before it enters the dam. Conservation is critical.	6	<u>Very low:</u> The agricultural value is overridden by the conservation importance.	0	<u>Very low:</u> The development value is overridden by the conservation importance.	0
Topography	0%-8% slopes	<u>Medium:</u> There is no critical aspect of these slopes that highly motivates conservation.	2	<u>High:</u> These slopes are ideal for cultivation, are easy to irrigate & will not erode.	3	<u>Medium:</u> Desirable gradient for construction but marshes / mudflats may arise.	2
	8%-15% slopes	<u>Medium:</u> There is no critical aspect of these slopes that highly motivates conservation.	2	<u>High:</u> These slopes are ideal for cultivation, are easy to irrigate & will not erode.	3	<u>High:</u> Desirable gradient for construction & relief allows for elevated views.	3
	15%-100% slopes	<u>High:</u> These slopes are prone to erosion & gully formation if denuded or cultivated.	3	<u>Low:</u> These slopes are prone to erosion & gully formation if cultivated.	1	<u>Low:</u> These slopes are prone to erosion & are expensive to build on as they require cut and fill.	1
Vegetation	Agricultural area: (presently cultivated areas and pastures).	<u>Medium:</u> Species density & diversity are lacking. Conservation would entail rehabilitation.	2	<u>High:</u> No bush clearing is required, relative location is convenient & soils are yielding.	3	<u>Medium:</u> Aesthetics are lacking but farmlands do have some tourist and recreational appeal.	2
	Wooded area: (remaining indigenous bush in good condition).	<u>High:</u> Species density & diversity are highest here & pristine bush is in short supply in the area.	3	<u>Low:</u> These areas would require bush clearing to cultivate & pristine bush is in short supply in the area.	1	<u>High:</u> Desirable environment for tourism & recreation.	3
	Denuded area: (overgrazed areas, exhausted soils & previously developed areas).	<u>Low:</u> Species density & diversity are severely lacking. Conservation would entail rehabilitation.	1	<u>Medium:</u> The soils were once yielding & the grasslands adequate. Establishing crops & grazing would entail a fair bit of work.	2	<u>Low:</u> Undesirable environment for tourism and recreation.	1

Each possible combination of the above characteristics constitutes a land facet (with the exception of the drainage lines, which by virtue of their conservation importance represent a land facet on their own). By nature of the individual conservation, agricultural, recreational and development values, an overall conservation, agricultural, recreational or development value may be determined for each land facet. This is done by totalling up the values for each combination (refer to Map 4):

Facet	Characteristics	Cons. Value	Agric. value	Dev. value	Recommendations
1	Drainage lines	6	0	0	<i>Conservation</i>
2	0%-8% slope; agricultural area	2+2=4	3+3=6	2+2=4	<i>Agriculture</i>
3	8%-15% slope; agricultural area	2+2=4	3+3=6	3+2=5	<i>Agriculture</i>
4	15%-100% slope; agricultural area	3+2=5	1+3=4	1+2=3	<i>Conservation</i>
5	0%-8% slope; wooded area	2+3=5	3+1=4	2+3=5	<i>Conservation, Recreation & Development</i>
6	8%-15% slope; wooded area	2+3=5	3+1=4	3+3=6	<i>Recreation & development</i>
7	15%-100% slope; wooded area	3+3=6	1+1=2	1+3=4	<i>Conservation</i>
8	0%-8% slope; denuded area	2+1=3	3+2=5	2+1=3	<i>Agriculture</i>
9	8%-15% slope; denuded area	2+1=3	3+2=5	3+1=4	<i>Agriculture</i>
10	15%-100% slope; denuded area	3+1=4	1+2=3	1+1=2	<i>Conservation</i>

It follows that the highest total for each facet is the land use most suited in terms of the said hydrological, topographical and vegetation characteristics.

Because it is not necessarily desirable to allocate all facets suited to a particular land use as such, it is important to consider existing infrastructural, development and cultural data such as the proximity to regional roads, settlements and villages, existing developments, graves and sites of cultural significance when developing the zoning concept (refer to map 6).

5.2 THE ZONING PLAN

5.2.1 DWAF Guidelines

The principal requirement in terms of DWAF policy is the protection of the primary and operational requirements of the dam i.e. water quality and dam safety. Secondary uses of the dam must be accommodated in such a manner as not to compromise the primary function of the dam²⁹.

²⁹ Department of Water Affairs and Forestry, South Africa. 1999. *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Unpublished report.

Zoning must therefore be done in accordance with land rights according to DWAF policy and includes specific requirements and limitations on development. In this respect, the following definitions will apply (refer to figure 2 below):

- The **median level** is the normal operating water level of the dam.
- The **full supply level** is the level of the water when the dam is full.
- The **high flood level** is the level to which the last documented 1:100 year flood rose (or is expected to rise).
- The **buffer line** is a line no less than 0,6m vertically above, or 15m horizontally from the 100-year flood line (whichever is the greatest). The buffer zone is therefore the area between the 100-year flood line and the buffer line and covers uncertainties in the flood hydrology, possible changes in the catchment, which could increase floods, and to provide unhindered access to the water surface in the case of emergencies.
- The **purchase line** is the cadastral boundary of the State owned land. Significant developments below the purchase line (but still above the buffer line) may be allowed subject to approval by the Regional Director of DWAF.

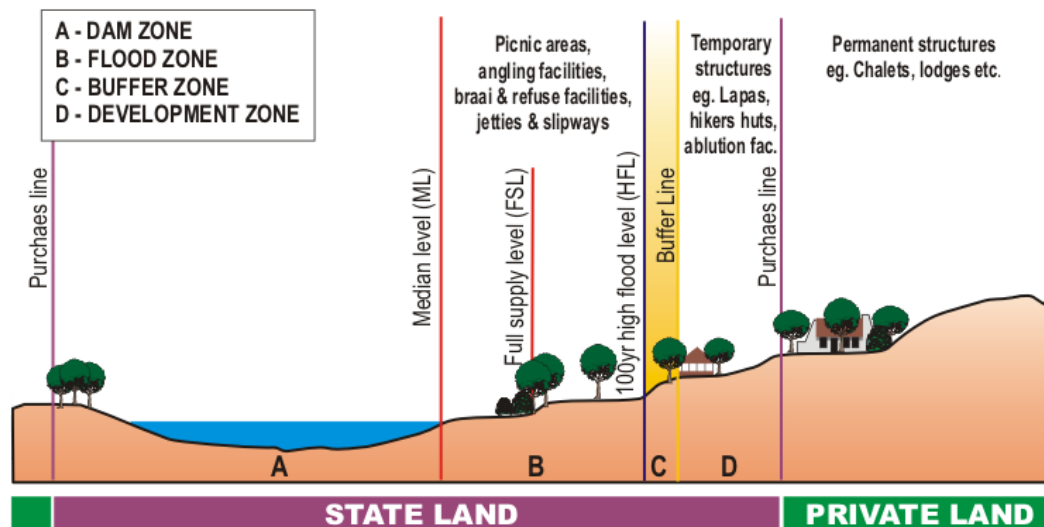


Figure 2: Typical cross section through a dam basin

DWAF's guidelines on the zoning of State owned dams ³⁰ include the following generic water surface zones (refer to figures 3 and 4 below):

- A **Conservation Zone** on water is as a rule to be located at inlets and other sensitive areas such as bays. Access to these areas is generally not allowed.
- A **Low Intensity Use Activity Zone** functions as a buffer between the conservation and high intensity use activity zone(s). Activities associated with little or no wake are allowed, e.g. rowing canoeing, angling etc.
- A **High Intensity Use Activity Zone** (usually located where the reservoir is at its deepest close to the dam wall) is associated with high speed, wake and noise activities, e.g.: motor boating, water skiing etc. Such zones need not necessarily be provided at all dams.

The following generic waterfront zones are recommended by DWAF³¹ (refer to figures 3 and 4 below):

- A **Conservation Zone** is usually allocated to ecologically sensitive areas on land allowing for little or no access, e.g. activities such as bird watching and hiking trails could be permitted.
- An **Access Zone** refers to the area within the buffer zone (area below the buffer line), within which no structural development is allowed.
- Three levels of development within defined **Development Zones** may be accommodated if the situation dictates and if there is land available above the buffer line and within the purchase line for development (Note that these development zones also relate to development activities adjoining the dam basin – with associated access across State Land).

A **safety and security zone** is the area surrounding the dam wall and outlet works. The extent of this zone is determined by the DWAF and may not be less than 100m from the spillway or outlet works.

³⁰ Department of Water Affairs and Forestry, South Africa. 1999. *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Unpublished report.

³¹ Department of Water Affairs and Forestry, South Africa. 1999. *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Unpublished report.

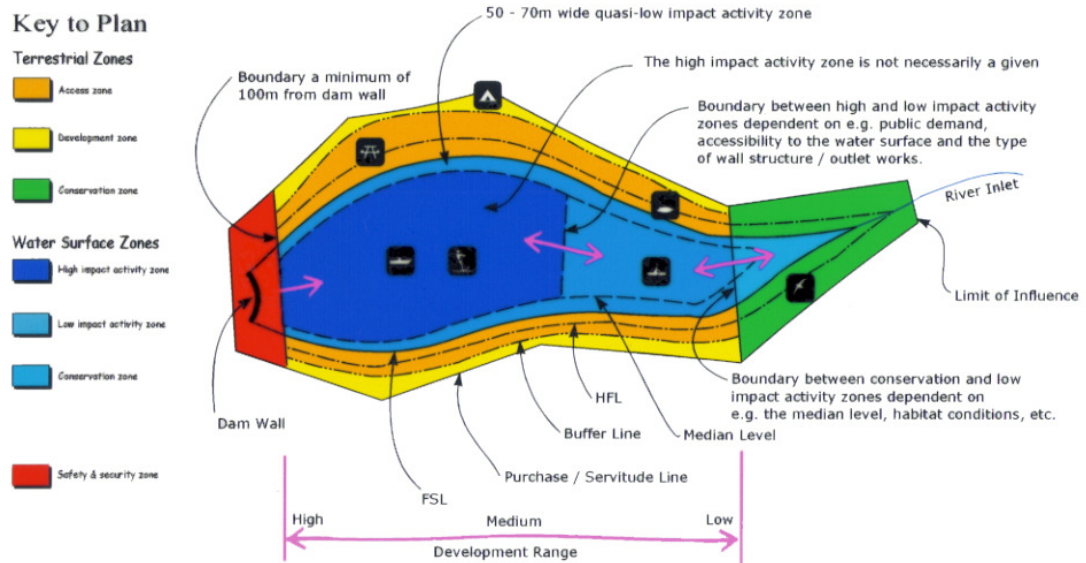


Figure 3: Generic Zoning Plan

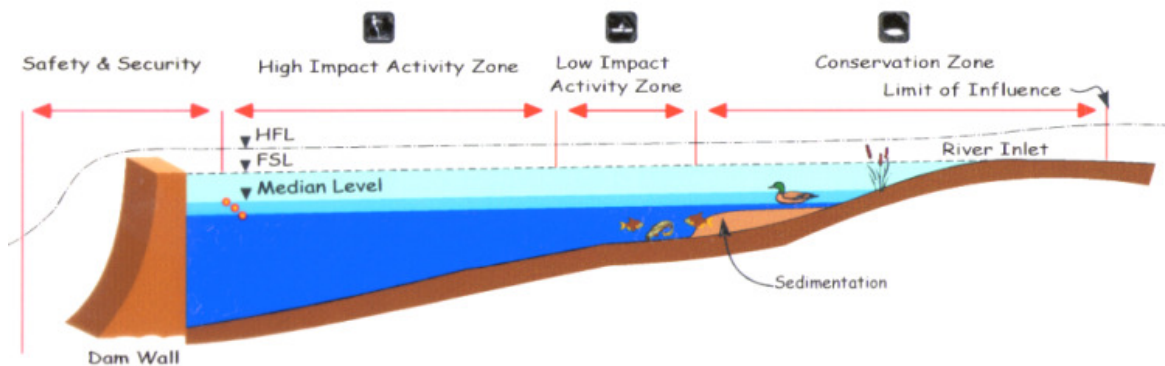


Figure 4: Long section through Generic Zoning Plan

5.2.2 Approach

The purpose of a zoning plan is ultimately the integration of access, use and development in such a way as to ensure optimum utilisation of the dam by all, whilst not retarding the primary functions of the dam³².

Priority is given to maximising the availability of arable land and current lifestyle trends and needs are acknowledged (such as the need for access to the water for primary, social and cultural use). Ecologically sensitive areas are

³² Department of Water Affairs and Forestry, South Africa. 1999. *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Unpublished report.

recognised, as are remaining natural areas, which are given protection. Lastly, the tourism potential of the dam is optimised and provision made for local incentives (refer to Map 5).

A zoning plan constitutes a broad based guideline according to which detailed planning may take place. The recommendations made below are not to be considered as development plans, but rather as land use opportunities within which private incentives may take place. The following zones have been recommended as a result of the zoning process³³:

5.2.3 Water Surface Zones

5.2.3.1 Conservation Zones

Objective: To protect the breeding, nesting and feeding habitats of amphibians, waterfowl and fish.

The numerous shallow inundated river valleys along the northern and southern banks, along with the western and southern legs of the dam constitute this zone. These inlets are inherently sensitive and are important breeding grounds for birds, fish and amphibians. They are therefore zoned as conservation zones and only non-motorised craft without keels and management and research craft are permitted within them.

5.2.3.2 Low Intensity Use Activity Zone

Objective: To allow safe low intensity use water sport activities without compromising the safety of the users and to act as a buffer between the conservation and high intensity use activity zone.

The presence of crocodiles and hippo in the river (and therefore potentially in the dam) render full contact water sports such as swimming and windsurfing unsafe in all areas. The central water body is, however suited to intermediate and non-contact passive water related activities such as fishing, canoeing,

³³ Although the zoning plan was originally drawn up by the consultant, the concept and detail thereof was explained to the Nandoni Dam zoning committee many times at a number of public meetings. This committee in turn carried the information back to the communities that they represent. It was ultimately communicated by the zoning committee that the local stakeholders were in support of the zoning plan and the manner in which it had been developed.

boating and sailing. These activities are also allowed all along the shoreline, except at inlets and bays, which qualify as conservation zones. Consequently, this zone is allocated the status of low intensity use activity zone and no motorised water sport is permitted.

The interface between the high and low intensity use activity zones is located between the headland at Mulenzhe and that at the Madzhivhandila Agricultural College near Budeli. These are recognisable points of reference beyond which, the dam becomes noticeably wider and deeper.

5.2.3.3 High Intensity Use Activity Zone

Objective: To attract a wide diversity of water surface users by allowing high intensity use water sport activities without compromising the safety of other users or the integrity of ecologically and socially sensitive areas.

The eastern water body is somewhat wider and deeper than the central body and is considered most suitable for motorised water sport such as motor boating.

5.2.3.4 Transitional Zone

Objective: To allow for easily accessible areas along the shoreline and to act as a buffer between the conservation and higher intensity use activity zone(s).

A low intensity use or transitional zone is proposed between the waters edge and the high intensity use area. No high intensity use activities may take place within this low wake zone, which is approximately 70m wide and follows the shoreline. Low intensity use activities are permitted in this zone.

5.2.4 Waterfront Zones

5.2.4.1 Conservation Zones

Objective: To protect existing breeding nesting and feeding habitats of birds, reptiles and mammals, to improve biological diversity and

to maintain natural systems by minimising the impact of development and human activity.

Conservation worthy land facets include drainage lines and steep slopes (in excess of 15%). Some steep areas are still well wooded, but many are under cultivation or denuded. These denuded slopes are ecologically sensitive and represent an erosion risk. They should be rehabilitated and protected as conservation areas, especially within the buffer line. Limited access is permitted to the conservation zones and activities such as hiking and bird watching are possible. Controlled harvesting of medicinal plants may be permissible.

5.2.4.2 Agricultural Zones

Objective: To allow cultivation and grazing as well as areas in which food and lifestyle supplementation activities may take place in an effort to promote and improve the sustainability of the local lifestyle.

Areas of medium to shallow slopes which are currently under cultivation are zoned as areas in which the land may be cultivated and / or grazed. These areas must, however be managed in such a way that overgrazing and erosion are avoided. Other activities which are permissible within the agricultural zones are fishing and the gathering of plants for medicinal and household use. The cultivation of medicinal and other plants for traditional use may also take place within these zones.

Many of the medium to shallow slopes are denuded, but are still zoned for agriculture by virtue of their ideal gradient. Some rehabilitation will most likely be necessary in these areas before crops and grazing can be established. State Land up to the high flood level of the new dam may be utilized for agriculture in designated areas.

5.2.4.3 Community Access Nodes

Objective: To allow for the controlled development of areas where access may be gained to the waters edge for the fulfilment of primary

needs as well as for local social, cultural, religious and recreational purposes.

Nodes have been indicated within the agricultural zones, adjacent to existing villages and future urban expansion areas, to function as access points for the fulfilment of primary social needs, such as laundry, car washing etc. Approximately one node for every kilometre of urban waterfront has been accommodated between headlands in the more protected bays³⁴.

These nodes could become important local destinations where picnicking, braaing and socialising can take place. Strategic nodes may develop into regional gathering places where parking areas and lookout points may be developed. Permissible structures include ablution buildings, lapas and laundry rooms above the buffer line. Braai and refuse amenities are allowed below the buffer line.

The requirement for initiation schools, places of worship, baptismal waters etc. is also recognised, but the physical and environmental requirements for these (and the number of each) are difficult to determine as these vary between cultural and religious groups as well as between villages. Therefore gathering places (nodes) for the purpose of cultural and religious expression are permissible anywhere, and in any number required, within the agricultural zones. In exceptional cases, these nodes may be permitted within the recreation zones, and even within the conservation zones.

Planning, design and architectural expression within community access nodes should respond to the individual needs of the relevant community rather than have a generic character.

Should the need for such access and recreation not exist, then these areas should be treated as agricultural zones.

³⁴ The number and locations of these may be revised once the dam basin has been inundated and the local population has settled into their new way of life

5.2.4.4 Recreation Zones

Objective: To accommodate medium to low intensity use recreational access and waterfront activity for the enjoyment of the regional community.

Recreation zones are areas comprising medium to shallow slopes in remaining wooded areas. Fishing and picnicking and structural development is limited to slipways, jetties, picnic, braai and refuse amenities below the buffer line, while camp sites, ablution buildings and lapas are permitted above (see figure 5 below). The controlled harvesting of medicinal plants may also take place within these zones, and under special circumstances some cultivation of selected species (i.e. should a species prove only able to grow under specific conditions encountered only within the area in question).

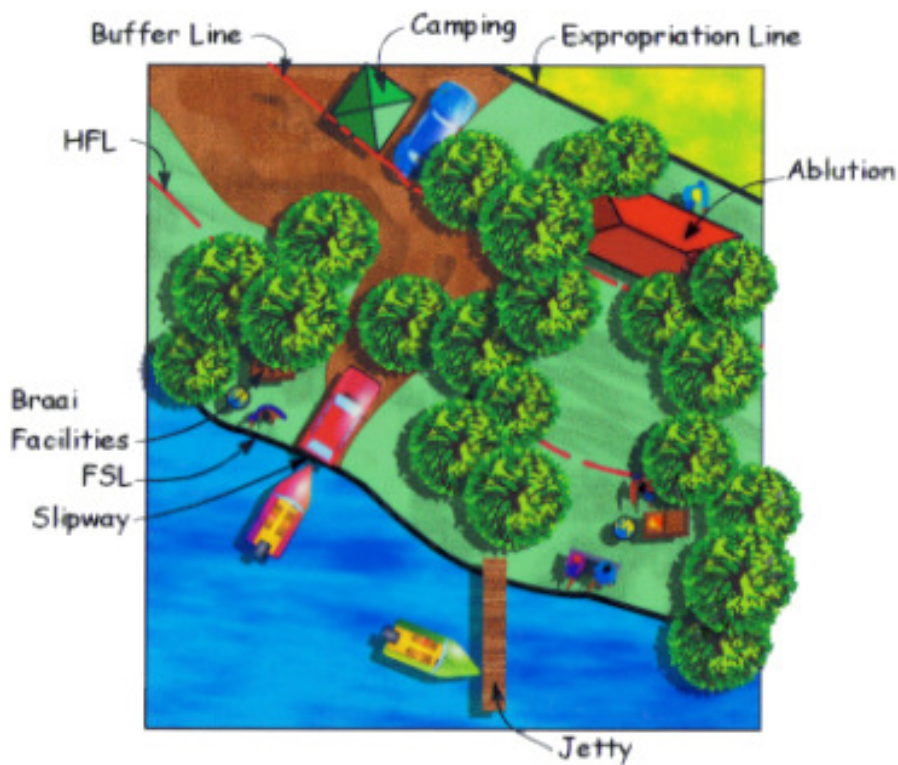


Figure 5: Typical Recreational Development

Due to the diverse and complex needs of users in the area, and the pressure by the population on the land, relatively limited space within the buffer line has been allocated conservation status. Therefore, should the need or means not exist to develop the recreation zones, or up until the time that an

approved development plan is implemented, these zones will be treated as conservation zones.

Because water based recreation is dependant on access to the dam, areas considered ideal for recreation development, but separated from the water by a conservation zone, will not be allocated recreation status, but rather be zoned as conservation. This scenario is most common at drainage lines and inlets.

5.2.4.5 Tourist Development Nodes

Objective: To accommodate low, medium and high intensity use recreational and tourist activities in suitable areas for the enjoyment of national and international visitors.

Tourist development nodes represent opportunities to set up low, medium or high intensity use developments such as holiday resorts (or other approved developments) within the recreation zones. These areas are identified as good locations due to their proximity to access routes and desirable aesthetic environments (i.e. wooded areas, from which existing urban developments are not visible or audible). Furthermore, these locations offer easy access to the main body of the dam (they are all located on headlands that reach beyond the bays).

Permissible structures and infrastructure include camping, chalets, hotels and sport facilities above the buffer line. Fishing and picnicking as well as slipways and jetties are allowed below the buffer line.

Should the need or means not exist to develop these nodes, or up until the time that an approved development plan is implemented, these zones will be treated as conservation zones.

5.2.4.6 Safety and Security Zones

Objective: To protect the dam wall and outlet works and to ensure the safety of the public in these and surrounding areas.

The safety and security zone constitutes an area 100m wide on either side of the dam wall and outlet works. This zone will be buoyed off on the water, preventing access.

5.2.5 Proposed Future Expansion

5.2.5.1 Regional Planning

In the interest of holistic environmental planning, it is important to look beyond the specific scope of study to ensure that the SUP compliments and supports Integrated Development Planning (IDP) initiatives within local and district municipalities and does not undermine the objectives thereof.

The inclusion of the SUP into these initiatives will ensure that the development of the dam and surrounding state land fits into the broader development plan of the region and that development undertaken at and around dam has the support of local government. This support is essential to co-ordinate development efforts, reduce duplication and increase efficiency of specific projects within the region.

5.2.5.2 Local Planning

As a planning and decision-making tool the SUP providing guidelines to development projects within the region adjacent to the dam. At this early stage of planning it is difficult to predict what impact the dam will have on development, settlement, agriculture and conservation in the context of this specific environment. What is certain is that the villages will expand (although the extent is not known) and that land will be claimed for agriculture. In order to avoid large scale environmental harm and to facilitate sustainable development, it is important to guide and control this expansion in a way that is both realistic and responsible.

Planning objectives for the purpose of future expansion must recognize the needs of the people, but must be based on good environmental practise if it is to be sustainable in the long term. In this respect the following basic principles should be followed:

- Existing agricultural land must not be compromised for the purpose of housing;
- Although agricultural land is a primary need, drainage lines and very steep slopes should not be cultivated, but rather rehabilitated as conservation areas to conserve and protect the greater water resource;
- Drainage lines and very steep slopes must not be utilised for housing;
- Drainage lines within existing settlements should be rehabilitated as conservation areas to conserve and protect the greater water resource;
- Expansion of settlements and agricultural land should be directed to fill gaps between isolated pockets of houses and crops;
- Expansion of settlements and agricultural land should be done with recognition of natural boundaries such as roads and rivers;
- Conservation areas (and recreation development which is reliant on the former) should be consolidated wherever possible.

Map 6 is a representation of proposed future expansion of the greater Nandoni Dam environment conducted according to the above guidelines. Although simple and conceptual, this proposed expansion plan aims to allow for the inevitable expansion of housing and agriculture in a way that is environmentally sustainable, while not compromising the obvious needs of the people.

6 INTEGRATED ENVIRONMENTAL MANAGEMENT PLAN

Without a management plan it will be impossible to co-ordinate and manage the activities required to unlock the potential of the Nandoni Dam. Only by measuring the performance of specific actions and operational guidelines against objectives will it be possible to effectively manage the resources of the dam and surrounds.

The structure of the management plan is based on key performance areas, namely:

- Resource Management;
- User Experience Management;
- Private Sector Involvement
- Infrastructure and amenities;
- Marketing;
- Community Participation and Beneficiation;
- Research Projects;
- Monitoring.

Within each of these Key Performance Areas, the following aspects are addressed:

- Goal;
- Objectives;
- Management Actions and
- Monitoring.

6.1 RESOURCE MANAGEMENT

This section recommends management of the natural, cultural historical and socio-economic environments, and aims ultimately to accomplish a balance between resource capability and the utilisation thereof to achieve long term sustainability within the system. In addition to appropriate resource management, this section also addresses areas which are no longer sustainable as purely natural systems and the application of appropriate

management interventions so that resource capability may be improved and sustained where this has deteriorated or been lost.

6.1.1 Natural Environment

6.1.1.1 Goals

- To conserve the soil resource by ensuring that accelerated erosion caused by the activities of man is attended to.
- To maintain a healthy and diverse cover of indigenous vegetation in natural areas, and to promote maximum recommended vegetation cover in agricultural and development areas as this is the best known means of covering the soil mantle.
- To establish a balance of indigenous and introduced animal species in such a way that the biodiversity of the area is maintained and improved, without compromising the livelihood of the local people.
- To conserve and protect the water resource, so that it may be of benefit to all stakeholders, without compromising the integrity of the resource.

6.1.1.2 Objectives

Soil

- To maintain the natural build-up of soil and stimulate the fertility thereof;
- To prevent areas from becoming denuded and in so doing to prevent the initiation of erosion;
- To implement surface erosion protection measures in actively eroding areas;
- To avoid the compaction, sterilisation and pollution of soil which leads to erosion.

Vegetation and Habitat

- To conserve the existing biodiversity of the area and to restore biodiversity through rehabilitation where this has deteriorated or been lost due to the activities of man;

- To curb the spread of alien and invasive plant species and to reclaim areas currently invaded;
- To conserve threatened and endangered plants and to promote the increased occurrence of these;
- To promote the sustainable use of plants for cultural and socio-economic purposes;
- To prevent the unsolicited harvesting, destruction and removal of plant material.

Animal life

- To manage domestic and natural animal life in terms of both consumption and utilisation;
- To respond to new environments and habitats by introducing new sustainable species appropriate to the area and circumstances at Nandoni Dam;
- To manage and control the impact of domestic animals and livestock on the environment in a sustainable manner;
- To manage and control problem animals in a manner that does not compromise the environment or the utilisation potential of the dam.

Water Resource

- To control the use of the dam and surrounds in order to ensure that the quality of the resource is sustained.

6.1.1.3 Strategy

- The body must understand the natural environment and be in state to make informed decisions in this regard;
- The body must understand the management guidelines outlined in this document and have a clear understanding of the necessary tasks to be fulfilled;
- Where necessary, the body must draw up management agreements for the fulfilment of identified tasks. This must be done with the aid of DWAF;
- Management agreements are to be formed between the relevant organisation and DWAF and are to take the form of contracts which

will draw from guidelines outlined in this document. This will ensure the sustained integrity of the natural environment.

6.1.1.4 Management Actions

Soil

A SOIL EROSION

- Enforce the zoning restrictions and allowances as recommended in this SUP;
- Make use of recommended carrying capacities for recreation, agricultural and conservation zones (refer to Appendix 3);
- Upgrade denuded areas constituting an erosion risk according to rehabilitation recommendations detailed in this SUP;
- Backfill erosion channels that develop and restore / rehabilitate these areas to a proper condition;
- Monitor the condition of the soil and the rate of erosion / rehabilitation closely and adapt actions accordingly. In severe or persistent cases the aid / advice of a suitably experienced or qualified institution or organisation may be sought.

B SOIL COMPACTION & STERILISATION

- Avoid the braiding of roads;
- Remove topsoil to a depth of 300 mm prior to construction in any area. This topsoil is to be reused during rehabilitation of the development area under construction;
- Stockpile topsoil in such a way and in such a place that it does not cause damming up of water or wash-aways, or wash away itself. Piles must not exceed a height of 2m and side gradients may not exceed 1:3;
- Topsoil stockpiles must be wetted or mulched to protect from wind erosion, and must be vegetated if the material is to be stored for longer than 1 season;
- Stockpile sites must be identified according to accepted environmental best practise (i.e. cognisance must be taken of topography, hydrology etc.). Spoiling may only take place in identified sites and topsoil must be removed ahead of any stockpiling.

C SOIL POLLUTION

- The maintenance of vehicles and equipment may only take place within designated maintenance yard area;
- All soil contaminated, for example by leaking machines, refuelling spills etc., is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and removed to an appropriate landfill site;
- Any accidental chemical / fuel spills to be corrected immediately.

Vegetation and Habitat

A CONSERVATION

- Enforce the zoning restrictions and allowances as recommended in this SUP;
- Make use of recommended carrying capacities for recreation, agricultural and conservation zones (refer to Appendix 3);
- Do not unnecessarily disturb vegetation in natural areas. All developments and disturbances should be confined within demarcated development areas wherever possible.

B REHABILITATION

- Rehabilitate all areas devoid of vegetation cover as well as areas in which the vegetation cover is insufficient to prevent erosion;
- The final levels of all disturbed areas, where feasible, must be consistent with the natural topography of the area, these slopes being contoured to prevent erosion. In cases where erosion is already evident and persistent, slopes should be terraced;
- Rip or plough compacted soil to a depth of 300 mm along the contour, then level and contour the area to facilitate drainage and seed penetration;
- Remove weeds;
- Wherever possible spread topsoil evenly over the area to its original depth or to a minimum depth of 100 mm. Do not compact;
- Fertilise if necessary (soil testing may be necessary);
- If insufficient topsoil is available, subsoil or similar material may be used after the addition of soil improving substances e.g. compost, pH rectifiers (lime or gypsum) etc. Soil testing will be required;
- Seed with a vegetation seed mix adapted to reflect the local indigenous flora. An ecologist's recommendation should be obtained

for both natural and agricultural areas. The mixture should contain both annual and perennial grasses, pioneer species, and all the grasses should not be palatable. Hand seeding methods should be favoured wherever possible;

- Seeding should be undertaken (as far as possible) in summer as germination and establishment of grasses is most effective;
- Seeding should not, however be delayed until summer, leaving denuded areas unattended for any length of time;
- Seeded areas (veld grass) must be watered for a minimum of 1 season or until 80% coverage of intended species has established;
- Monitor the rate of rehabilitation. If this does not manifest as a minimum of 50% cover of appropriate species, then a more intensive re-vegetation programme should be investigated;
- Where there is a possibility of neighbouring livestock grazing a rehabilitated site these should, as far as is practicable, be excluded for the first 3 months of re-grassing.

C FIRE MANAGEMENT

- Develop a controlled burning programme for natural areas in accordance with relevant legislation (i.e. the National Veld and Forest Fire Act of 1998). This must include specifications regarding the burning of fire breaks as well as the regularity and type of burning to take place (if any);
- Encourage dam users in recreation zones to only make fires in designated braai areas using facilities provided;
- Encourage all users of the Nandoni Dam basin not to leave fires unattended and to ensure that their fires have been extinguished before leaving an area;
- Institute a system of fire monitoring in conjunction with local residents and link this to the local fire brigade service.

D ALIEN PLANT CONTROL

- No alien vegetation (with the exception of approved crops) may be introduced anywhere within the purchase line, including resorts, staff quarters and administration development;
- Remove all alien vegetation currently existing within the purchase line based on a 5 year plan;

- Make use of the most effective and up to date methods of eradication;
- Preference should be given to non-chemical eradication methods wherever possible;
- Monitor the progress and efficiency of the eradication programme closely and adapt actions accordingly;
- All docking and launching water craft with must be cleaned of weeds and aquatic plants before being allowed to enter or exit the Nandoni Dam or surrounding State land.

E THREATENED AND ENDANGERED SPECIES

- Rare plant species or those found to be increasingly rare must be adequately protected in all zones. Habitats hosting these species should not be approved for high intensity use development or activities;
- Should rare and / or threatened species be encountered in areas where the removal or damage thereof is inevitable, then these should be transplanted to other suitable habitats. Transplanting can take place into conservation, agricultural or recreational zones, but it is important that the transplanted specimens be placed in areas where they may be adequately protected and not endangered in any way;
- Numbers of rare plants may be increased through propagation in local nurseries and then transplanted into suitable habitats;
- Institute a programme in which the status of rare, threatened and endangered plant species is monitored and adapt actions accordingly.

F TRANSPLANTS

- No protected or endangered species may be removed without a permit from Nature Conservation and the consent of the management body and from DWAF;
- All transplants must be done by a suitably qualified and experienced contractor using an appropriate and accepted method;
- Transplants should take place in the dormant season – the end of winter is the ideal time;
- The tree must be positioned as per its original orientation in a habitat similar to that from which it was removed;
- Trees that are ring-barked during the transplanting process must be treated according to accepted tree surgery methods;

- Transplanted specimens must be watered twice weekly for the first three months following the transplant;
- Transplants should be monitored for stability and progress on a regular basis for the first season following the transplant;
- Transplants that are deemed unsuccessful after 2 seasons should be removed if they become unstable and constitute a safety hazard.

G FIREWOOD, MEDICINAL PLANTS AND PLANTS OF CULTURAL SIGNIFICANCE

- The harvesting of natural resources by local communities to accommodate their needs (such as firewood) must be conducted in accordance with the zoning allowances;
- Plants for medicinal and other cultural use (including firewood) may be freely harvested throughout the agricultural zones;
- In all other zones, guidelines and procedures for the de-bushing and harvesting of natural resources within the dam basin must be followed³⁵. Essentially these principles and procedures state that natural resources within the dam zone may only be de-bushed after the approval by the Nandoni Dam management body, DWAF, the PSC, local traditional healers and the Sub-committee on Natural Resources.
- Under special circumstances (i.e. as when the plants grow only under particular conditions which are encountered nowhere else) then controlled harvesting of these plants may take place within conservation and recreation zones;
- No firewood may be collected within the recreation or conservation zones;
- Private cultivation of plants for medicinal or other significance must be done within agricultural zones – no cultivation of any land within the conservation or recreation zones is permitted;
- A permitting system must be developed for the harvesting and cultivation of natural resources within the purchase line and must be controlled by the management body through management agreements.

³⁵ This policy was drafted and adopted by CAC during (2001 and 2002) and approved by the PSC (2003).

Animal life

A WILDLIFE

- Determine various species carrying capacities and make recommendations on how to achieve ideal game and bird ratios;
- Monitor game numbers and veld conditions, and aim to maintain recommended carrying capacities;
- Introduce additional animals and / or species when numbers are low, and hunt, cull or capture and relocate animals when numbers are too high;
- Identify and bring in species that may be successfully introduced or re-introduced into the area for ecological or economic purposes;
- Initiate breeding programmes for ecologically viable species;
- No poaching is permitted anywhere on State Land. Discourage poaching within the dam basin and in surrounding areas;
- Regularly check surrounding natural areas for snares and traps. These are to be removed when discovered. This is particularly relevant in conservation and recreation zones;
- Institute strict penalties / fines for poaching in declared conservation and recreation zones.

B DOMESTIC ANIMALS / LIVESTOCK

- Determine ideal livestock carrying capacities for agricultural zones;
- Monitor the ecological state of pastures as well as livestock numbers and ensure that recommended carrying capacities are adhered to;
- Institute programmes of awareness building within the local communities. These programmes should include aspects such as pasture management which address recommended carrying capacities, rotational grazing / herding, the identification of pasture degradation, techniques for pasture rehabilitation;
- Institute programmes of awareness building in terms of livestock disease and pest control. Non-chemical method should be favoured wherever possible.

C FISH

- According to a report on the distribution of fish species within the Luvuvhu and Mutshundudi Rivers (Angliss: 1999), the construction of

a dam at Nandoni will create a habitat ideal for exotic fish species such as Carp;

- Tiger Fish may also be considered provided the dam water temperatures are recorded to have an average of 18 degrees and do not fall below 16 degrees;
- The dam should be stocked with indigenous fish naturally occurring in open water in the area. An ecologist should be consulted regarding species ratios and numbers;
- All exotic fish species introduced into the dam must be done so under controlled research conditions;
- Commercial fishery development should be done under controlled research conditions and the impacts / issues understood and evaluated before this is properly initiated in the dam;
- A monitoring programme for all of the above should be instituted to manage the aquatic ecosystem. The size, movement and migratory patterns of all fish populations should be monitored and the influence of the dam wall must be monitored. Appropriate measures must be taken to correct any problems and / or imbalances.

D PROBLEM ANIMALS

- Institute a monitoring programme for potentially dangerous animals such as crocodiles and hippo's, and ensure that recommended carrying capacities for these species are not exceeded. This should be done in partnership with the local communities and users;
- Vegetable gardens and crops under threat by hippos should be fenced in using a portable two-strand electrified cable powered by a solar panel;
- Problem animals should be eliminated should they become a danger to life in the dam basin or if they exceed recommended carrying capacities. This may be done by means of culling, darting and relocation, local hunts, trophy hunts, hunting concessions or private sector incentives. Such activities may only be carried out within a permit and licence system, controlled by the Nandoni Dam management body;
- Visitors and tourists should be informed of the presence and dangers of these animals, as well as what to do if they are encountered;

- Local residents, tourists and visitors should be encouraged not to harm animals perceived to be vermin (such as rats and snakes);
- Visitors and tourists will be made aware of the risks and problems associated with scavengers and will be discouraged from feeding any animals, even birds.

Water Resource

A WATER USE

- No water may be abstracted from the dam or any other natural water course for the purpose of construction without the prior approval of DWAF and the acquisition of the relevant authorisation;
- Water usage in terms of Schedule 1 of the Water Act (Act No. 36 of 1998) is permitted without a permit, provided that the prospective user has lawful access to the water resource. At Nandoni, all access to the dam will be over and / or onto State owned land, and as such permission must be acquired from DWAF before this may be done. This process must be facilitated by the Nandoni Dam management body and controlled through management agreements;
- Ensure that determined carrying capacities for water and land resources are adhered to (see Appendix 3).

B WATER QUALITY

- Ensure that no area below the high flood level is cultivated;
- Ensure that sufficient access and livestock watering points for permitted users are available and clearly demarcated. Users may only water livestock at designated points;
- Minimise the disturbance of the waters edge and the churning up of the water at livestock watering points. Exercise strict control of herds near the waters edge by minimising the extent of watering points and not permitting herds to linger. Control must be implemented by means of management agreements, facilitated by the Nandoni Dam management body;
- Monitor the ecological state of cultivated land and pastures and ensure that recommended carrying capacities are adhered to;
- Rehabilitate denuded areas according to rehabilitation measures detailed in this SUP to prevent erosion and the subsequent increase in silt levels of the dam. In severe or persistent cases the aid / advice of

a suitably experienced or qualified institution or organisation may be sought;

- Prohibit the use of herbicides and pesticides (especially those that are persistent in the soil) anywhere on State Land and discourage the use thereof within the dam basin;
- Use fertilisers with care and in moderation within the dam basin;
- Work in close collaboration with the Dam Operator to identify problems related to water quality as well as ways to alleviate and / or solve these.

6.1.1.5 Monitoring

For effective management of natural resources it is essential that performance be monitored utilising techniques and procedures based on:

- Assumptions regarding adaptive management;
- Cost efficiency and adaptability;
- Appropriateness to management objectives;
- Current ecological theory;
- Best proven environmental option;
- Consistency over time.

6.1.2 Cultural Historical Environment

6.1.2.1 Goals

- To identify, acknowledge and conserve sites and issues of cultural and religious significance, be they relic, current or required so that appropriate action may be taken;
 - To conserve all sites and finds of archaeological significance in an innovative adaptive manner in line with the National Heritage Resources Act (Act No. 25 of 1999).

6.1.2.2 Objectives

Cultural sites

- To identify and acknowledge the existence and importance of sites of cultural and religious significance within the dam basin;

- To develop a system of conserving appropriate cultural and religious resources;
- To ensure that the cultural and religious requirements of the local people within and around the dam basin are accommodated in a sustainable manner.

Archaeological sites

- To develop a system of identifying and conserving archaeological resources uncovered during construction and operation activities within the dam basin;
- To use the archaeological richness of the area to promote tourism, research and investment in the dam basin.

Other sites

- To investigate sites and structures which have been identified as a nuisance, a danger to the public or as being an inhibiting factor in terms of prospective development and land use.

6.1.2.3 Strategy

- The body must understand the cultural historical environment and be in state to make informed decisions in this regard;
- The body must understand the management guidelines outlined in this document and have a clear understanding of the necessary tasks to be fulfilled;
- Where necessary, the body must draw up management agreements for the fulfilment of identified tasks. This may be done with the aid of DWAF;
- Management agreements are to be formed between the relevant organisation and DWAF and are to take the form of contracts which will draw from guidelines outlined in this document. This will ensure the sustained integrity of the natural environment.

6.1.2.4 Management Actions

Cultural sites

- Institute an investigation programme into existing sites of cultural and religious significance in the dam basin. These sites include initiation schools, religious meeting places, baptism waters etc;
- Encourage the local population to volunteer appropriate information with regard to cultural, religious and archaeological sites;
- Initiate a database in which to document cultural, religious and archaeological resources and update this database on an ongoing basis;
- Document all new finds uncovered and discovered in the dam basin and ensure the database is updated to include these;
- Identify the requirement for new and additional sites to be used for cultural and / or religious activities and accommodate these requirements wherever possible;
- Although graves existing within the purchase line may be allowed to remain, no additional burials may take place there. All burials should take place within designated cemeteries as co-ordinated with the relevant municipal authority (according to their regional planning and land development objectives);
- Any graves encountered during construction activities are to be marked as such and treated as strict no-go areas;
- Should the disturbance and or moving of graves within the dam basin be unavoidable, then the approval of relevant authorities (SAHRA) is required before any works are initiated. The approval process should be driven by a suitably qualified professional;
- Make appropriate land use and utilisation decisions in accordance with the SUP wherever possible. The services of a suitably qualified professional to may be employed to recommend appropriate action in problem and / or conflict situations;

Archaeological sites

- Use the information available from the First and Second Phase Archaeological Surveys conducted in the Nandoni Dam Basin by

Archeo-Info to set up a cultural historical database for the Nandoni Dam;

- Encourage the local population to volunteer appropriate information with regard to cultural, religious and archaeological sites;
- Initiate a database in which to document cultural, religious and archaeological resources and update this database on an ongoing basis;
- Document all new finds uncovered and discovered in the dam basin and ensure the database is updated to include these;
- The information in the archaeological database must be considered when evaluating recreation, tourism and commercial development proposals, and must be included in the EIA's;
- Construction supervisors and crews must be trained to recognise 'chance' archaeological and cultural finds during construction;
- Employees must be instructed not to disturb, damage or remove any 'finds' encountered during operation;
- Employ the services of a suitably qualified professional to recommend appropriate action whenever a find is uncovered or discovered;
- No conservation or mitigation work on any archaeological find may be undertaken without the authorization of SAHRA;
- Establish links with relevant institutions and organisations for assistance in promoting the archaeological resources. An exchange programme with these institutions may also be set up.
- Recommendations have been made during the course of the public participation process by various stakeholders to establish an archaeological museum / info centre / educational facility describing the history of the people and the area, and specifically the dam basin.

Other sites

- All deserted buildings and structures representing a nuisance, an environmental hazard or a danger to the public or to livestock must be removed, including all foundations and the rubble removed to an appropriate landfill site;
- These areas are then to be rehabilitated according to rehabilitation recommendations.

6.1.2.5 Monitoring

As an essential step in the management of cultural historical resources, it is imperative that the performance of management interventions be monitored, based on aspects such as:

- Attainment of management objectives;
- Compliance with legislative guidelines;
- Current monitoring theory;
- Cost efficiency;
- Effectiveness.

6.1.3 Land Expansion and Incorporation

6.1.3.1 Goals

- To allow for the incorporation of the agricultural, conservation and recreation initiatives of the dam into the region by the consolidation and incorporation of suitable land adjacent to the dam basin to allow for the optimising of development, agricultural, conservation and recreational potential.

6.1.3.2 Objectives

- To establish policies regarding land expansion and incorporation based on needs and requirements of land owners and stakeholders in this regard;
- To enhance business objectives in the dam basin;
- To enhance the tourist and user experience in the dam basin;
- To increase the biodiversity of the dam basin;
- To improve the agricultural potential and capacity in the dam basin;
- To generate awareness in terms of the value of consolidation and integration, specifically relating to environmental management, heritage management and community beneficiation.
- To ensure that environmentally sustainable principles are followed on a broad scale.

6.1.3.3 Strategy

- A management institution for the Nandoni Dam must be created, with its own dedicated management team. Once this institution has been created and clarity provided regarding the operational guidelines for the water surface and surrounding state land, discussions can focus on the encumbrances regarding incorporation and consolidation within the region, with the Nandoni Dam as the catalyst.
- Ensure that it is within the capacity of the Management Body to efficiently monitor and manage the land expansion and incorporation areas according to their responsibility;
- It is critical that all development projects proposed within the dam basin are registered in the local / regional IDP office to ensure alignment with any Economic Development Objectives of available Integrated Development Plans.

6.1.3.4 Management Actions

- Owners and / or developers of private land outside of the purchase line that wish to link their land with the State owner land of the Nandoni Dam and so increase the value and potential of both the dam and of their own land, may be allowed to do so, subject to certain conditions. All such land incorporation and expansion of the Nandoni Dam resource base must be handled through management agreements³⁶, facilitated by the Nandoni Dam management body;
- Critically evaluate potential land expansion and incorporation options and ensure that these will be of benefit and not to the detriment of existing zones;
- Ensure that environmentally sustainable and sound principles as outlined in this document are followed on a broad scale;
- Development of private land outside of the Nandoni Dam purchase line by private land owners and developers will all be subject to EIA's as per required legislation;
- Development of private land outside of the Nandoni Dam purchase line by private land owners and developers must comply with the

³⁶ Such as Community Public Private Partnerships (CPPP's) and Public Private Partnerships (PPP's)

applicable town planning ordinances. Authorisations and accreditation must be sought from local authorities as is required.

6.1.3.5 Monitoring

A record of all management agreements must be kept, as well as a record of annual reports regarding the conditions of the agreement, as well as compliance with the conditions and objectives.

6.2 USER EXPERIENCE MANAGEMENT

6.2.1 Water Surface and Waterfront Zones

6.2.1.1 Goals

- To create and maintain an environment that caters for as many user needs as possible, in a safe, efficient and effective manner, without compromising the integrity of that environment or the users' enjoyment of the experience or needs;
- To provide a safe and comfortable user experience and allowing for peace of mind.

6.2.1.2 Objectives

- To ensure that designated / permitted activities take place within the zones allocated in the SUP;
- To allow for spatial utilisation and development that optimises the potential of the resource and by ensuring that no areas are over-allocated or under-utilised.
- To ensure that carrying capacities determined for various land and water use zones are complied with;
- To develop a code of conduct that employees, users, visitors and tourists should follow when making use of the facilities and zones.
- To minimise criminal activity in the dam basin;
- To ensure the implementation of security measures;
- To market the area as a safe and secure user experience.

6.2.1.3 Strategy

- To allocate specific requirements and restrictions in terms of numbers and types of developments in waterfront zones and in terms of utilisation in water surface zones;
- To encourage private sector involvement, especially in tourism and recreation based activities and to guide the operators in terms of the objectives of the Nandoni Dam;
- To ally the local chiefs and tribal authorities in accomplishing the objectives of the Nandoni Dam.

6.2.1.4 Management Actions

Conservation Zones (Water Surface)

- No recreational activity is permitted in aquatic Conservation Zones;
- Authorised research, security and management water craft are permitted under special circumstances;
- Penalties and fines will be given out to any unauthorised people found inside this zone.

Low Intensity Use Activity Zone (Water Surface)

- Passive water related activities are permitted, including fishing from non-motorised craft, canoeing, sailing etc.;
- House boats are permitted, but with speed restrictions;
- Non-motorised craft may be launched anywhere along the bank, provided the area is serviced by a vehicular track or road;
- Docking and launching of motorised craft may only take place at slipways and jetties;
- Do not exceed the recommended carrying capacity for the relevant zone (refer to Appendix 3).

High Intensity Use Activity Zone (Water Surface)

- Motorised water related activities such as motor boating are permitted in this zone. In the absence of a market and support infrastructure to support these high intensity use activities, this zone will also be allocated low intensity use activity zone status;

- Should high intensity use activities begin to take place at Nandoni Dam, then low intensity users should be made well aware of the fact to avoid injury and damage to property;
- Non-motorised craft may be launched anywhere along the bank, provided the area is serviced by a vehicular track or road;
- Docking and launching of motorised craft may only take place at slipways and jetties;
- Do not exceed the recommended carrying capacity for the relevant zone (refer to Appendix 3).

Transitional Zone (Water Surface)

- Angling is permitted in this 70-100m wide zone along the shoreline of the dam, except for conservation areas. Motorised craft are permitted access, but it is a no-wake zone;
- Non-motorised craft may be launched anywhere along the bank of the dam, provided the area is serviced by a vehicular track or road;
- Docking and launching of motorised craft may only take place at slipways and jetties;
- Do not exceed the recommended carrying capacity for the relevant zone (refer to Appendix 3).

Safety and Security Zone (Water Surface)

- This zone will be buoyed in at a distance of at least 100m from the dam wall. No access is permitted into this zone.

Conservation Zones (Waterfront)

- Access into conservation zones (i.e. along the purchase line, along agricultural zone boundaries and up to the flood line) will be controlled through management agreements, facilitated by the Nandoni Dam management body by means of a permitting system;
- No access except through designated entrance and exit points will be permitted;
- Permitted activities include hiking and bird-watching. The harvesting of medicinal and cultural plants is only permitted by people with special permission to do so;
- Boards will be posted at all entrance and exit points to conservation areas detailing that no public thoroughfare, no overnight stay, no

fishing, no littering, no livestock and no gathering of plants is permitted.

Agricultural Zones (Waterfront)

- Access into agricultural zones will be controlled through management agreements, facilitated by the Nandoni Dam management body by means of a permitting system;
- Should a requirement for tourist access arise within the Agricultural Zones, then access control will have to be implemented as per the requirements of the Recreational Zones. An access fee will be charged at entrance points and users will have access to the public facilities along the shoreline (above the 1:100 year flood line);
- Permitted activities include cultivation of the land for food, medicinal plants etc. up to the full supply level, controlled grazing, fishing (except for gill netting) and the harvesting of medicinal and cultural plants;
- No utilisation of State Land for commercial agriculture of any nature is permitted.

Community Access Nodes (Waterfront)

- Only limited numbers of community access nodes (i.e. the number of nodes in the positions as indicated on Map 5) are permitted as part of the initial development initiative for Nandoni Dam;
- Proposed community access nodes in excess of the numbers and in positions differing from those indicated on Map 5 will be treated as unsolicited bids and the proposals evaluated accordingly;
- Permitted developments include designated parking areas, lapas and other approved structures for social gatherings, ablutions (above the buffer line) and laundry rooms (above the buffer line). Activities such as fishing, picnicking, socializing informal sports and games etc are permitted. No commercial activity or associated development is permitted;
- Any person found to be engaging in an 'illegal' activity will be expelled from the area and / or receive a fine, depending on the transgression;
- Any 'illegal' building or structure will be demolished and removed;
- Do not exceed the recommended carrying capacity (refer to Appendix 3).

Recreation Zones (Waterfront)

- Access into recreation zones (i.e. along the purchase line, along agricultural zone boundaries and up to the flood line) will be controlled through management agreements, facilitated by the Nandoni Dam management body by means of a permitting system;
- No access except through designated entrance and exit points will be permitted;
- An access fee will be charged at entrance points and users will have access to the public facilities along the shoreline (above the 1:100 year flood line);
- The purchase line fence may be removed in areas where developments outside of the purchase line require access to the water. This may only take place with the approval of the management body and DWAF;
- Permitted activities include fishing, picnicking, hiking and bird-watching. The harvesting of medicinal and cultural plants is only permitted by people with special permission to do so;
- Structural development is limited to slipways, jetties, braai and refuse facilities below the buffer line and camp sites, ablution buildings and lapas are permitted above the buffer line;
- Recreational and tourist developments such as resorts, guest houses, chalets, caravan parks etc. are only permitted within designated tourist development nodes as indicated on Map 5;
- Until such time that the tourism and / or development potential of the recreational zones is realised through management agreements and concessions, these areas will remain natural, and as such will be treated as conservation zones and the same restrictions and guidelines as outlined for conservation zones will apply;
- Boards will be posted at all entrance and exit points to conservation areas detailing that no public thoroughfare, no littering, no livestock and no gathering of plants is permitted;
- Do not exceed the recommended carrying capacity for the relevant zone (refer to Appendix 3).

Tourist Development Nodes (Waterfront)

- Only limited numbers of tourist development nodes (i.e. the number of nodes in the positions as indicated on Map 5) are permitted as part of the initial development initiative for Nandoni Dam;
- Proposed tourist developments in excess of the nodes indicated and differing in position from those indicated on Map 5 will be treated as unsolicited bids and the proposals evaluated accordingly;
- Access control at the tourist development nodes will be according to the requirements of the operator;
- Permitted developments include water-based resorts which may comprise of chalets, hotels, camping and sport facilities above the buffer line and fishing, picnicking and boat launches (slipways and jetties) below;
- No informal business or commercial activity or associated development is permitted;
- Do not exceed the recommended carrying capacity for the relevant zone (refer to Appendix 3);

Safety and Security Zone (Waterfront)

- Access into this zone will be controlled through management agreements, facilitated by the Nandoni Dam management body by means of a permitting system;
- Boards will be posted at all entrance and exit points indicating that no access is permitted;
- Penalties and fines will be given out to any unauthorised people found inside this zone or found to be cutting or traversing the fences.

Civil Emergency Procedure

- The operator of each tourist / recreational facility must develop a fire plan and a flood plan;
- Fire extinguishers will be placed at appropriate locations, and checked regularly;
- The operator must also implement a staff medical plan that complies with the Occupational Health and Safety Act of 1993.

Indemnity

- The concessionaires and operators offering access to the water are accountable for the safety of their visitors;
- Anybody offering visitors illicit access to the water (i.e. not through official access points) assumes responsibility for that user and will be held accountable for any injury, damage to property or death occurring as a result of that access;
- Members of the public with legal access to the dam and surrounding State land under management agreements are to be made aware of factors such as hippo's, crocodiles which are potentially dangerous animals as well as ways in which associated risks may be averted;
- Farmers making use of state land under management agreements take responsibility for their own crops and livestock. These farmers are to be made aware of factors such as hippo's, crocodiles, flood lines etc, as well as ways in which problems and dangers may be avoided and are further responsible for taking their own measures to protect their livelihood;
- All management agreements will include a disclaimer by the prospective user / developer / concessionaire indemnifying DWAF from any liability for injury, loss of property and loss of life as a result of potentially dangerous and damaging factors such as hippo's crocodiles and floods;
- All buildings, vehicles, machinery and other structures (including their operation) will comply with relevant South African legislation and standards;
- A valid indemnity form must be signed by all guests upon arrival. All guests and staff must be made aware of safety precautions and protocols in operation;
- An emergency register containing current contact details for all emergency services in the region must be at hand at all operations as well as at all gates.

Illegal Use

- Right of admission into State Land at the Nandoni Dam is reserved;
- Any person found to be cutting, removing or traversing a fence without authorisation will be charged with trespassing and fined accordingly.

- An 'illegal' activity constitutes any activity in contravention of the zoning and carrying capacity restrictions detailed in this SUP. Any person found to be engaging in such an 'illegal' activity will be expelled from the area and / or receive a fine, depending on the offence;
- Any person found to be disturbing the peace in any way, or engaging in activities deemed not legal in the Republic of South Africa will be expelled and reported to the relevant local law enforcement agency.

Security

- Implement strict access control measures, allowing access into the basin only at designated points;
- Consult with and employ the co-operation of local communities in the appropriate action necessary for implementation of management and control mechanisms in all zones as detailed in this document. Use these suggestions as a basis according to which management agreements are drawn up;
- Institute a monitoring programme in which the dam basin is patrolled on an ongoing basis to monitor the security situation. Take appropriate action wherever necessary;
- Ensure that fences and gates are specified, designed and installed according to the security requirements for the area;
- Ensure that all fences and gates are maintained in good working order;
- Provide incentives for efficient and honest access control personnel;
- Employ the co-operation and advice of local law enforcement agencies to accomplish the above.
- Any contractor, operator, concessionaire or researcher operating in breach of their contract will be warned, fined and / or expelled from State Land, depending on the severity of the offence³⁷.

³⁷ Note: The activity, conduct and safety of users and visitors is the responsibility of the relevant operator, concessionaire or authorised person permitting access to the water. It is the responsibility of the management body to ensure that all operators and concessionaires understand this responsibility, as the management body will be held accountable should this not be understood.

6.2.1.5 Monitoring

By maintaining a record of incidents regarding users, either positive or negative, as well as complaints, compliments and concerns, the Nandoni Dam Management team will be able to monitor user satisfaction levels, and therefore manage all concessions, service contracts and lease agreements appropriately.

6.3 PRIVATE SECTOR INVOLVEMENT

Permission for development within a dam basin should not be given in the absence of an approved Sustainable Utilisation Plan and must be endorsed by DWAF. State Land within a dam basin cannot be sold – to meet the demand, tender and lease agreements can be negotiated in certain specific cases.

State Land along the waterfront may be incorporated in some development plans only if the said development is compatible with the SUP provisions and all other site specific requirements. An approved Environmental Impact Assessment (EIA) in accordance with the Department of Environmental Affairs and Tourism regulations 1182-1184 would be required for certain developments.

6.3.1.1 Goals

- To encourage private sector involvement in tourism related and economic development activities that can be implemented in a cost effective, socially responsible and environmentally acceptable manner;
- To maximise local employment, skills development and local economic development through development, investment and management.

6.3.1.2 Objectives

- To ensure that all activities are authorised in terms of relevant legislation and are compliant with the objectives of the NWA;

- To optimise tourism and economic development opportunities in an equitable manner based on the opportunities and constraints posed by the dam environment;
- To ensure that private sector involvement is equitable, and that market related fees are paid for the use of the water and state land, compliant with the policy as developed by DWAF and the Department of Finance.

6.3.1.3 Strategy

- To carry out the various tourism and economic development management aspects through a process of Concession Planning and Management³⁸.
- To outsource tourism and economic development opportunities at the Nandoni Dam through tenders, management agreements, service agreements or concessions;
- To focus on local people and business wherever possible.

6.3.1.4 Management Actions

- All concessions and operations within the dam basin will be subject to lease or service contracts;
- Leases and contracts will be awarded to companies and individuals with proven track records in the industry, however, smaller contracts or lease opportunities could be given to smaller emerging companies or individuals. Priority will be given to local people where equity, efficiency and standards are commensurate to the needs of the Nandoni Dam;
- Operators, developers and concessionaires must operate within defined codes of conduct and rules as provided by the Nandoni Dam Management, and amended as required;
- All developments and operations within the purchase line must be authorised in terms of the ECA and NWA and other relevant legislation;

³⁸ DEPARTMENT OF WATER AFFAIRS AND FORESTRY: DIRECTORATE SOCIAL AND ECOLOGICAL SERVICES. Concession Management Policy: Access, Utilisation and Development of Water Resources and State Land adjoining Government Waterworks for Recreational Purposes. July 2002.

- All concession agreements and management contracts will have clearly defined limits placed on sizes, numbers and levels of development, as informed by the relevant zone and site specific EIA (where applicable). Concessionaires are responsible for compliance;
- The cost of concessions will be commensurate with its rights, impacts and benefits in terms of the zoning of the dam and must be market related;
- Once awarded, the contracts will be administered by the management body;
- DWAF will limit the term of all contracts based on the amount of investment required from the concessionaire.
- Concession fees will be levied for the rights to operate commercial activities at the Nandoni Dam. Concession Fees will be collected by the Nandoni Dam management body on behalf of DWAF, based on DWAF policy;
- Fees levied will be based on the following:
 - Catchment management fees;
 - Development and operational costs of infrastructure;
 - Development and management costs of conservation;
 - Contribution to community beneficiation projects and programmes.
- Requests for proposals will be issued by the management body to actively solicit and invite offers from interested parties based on this SUP for the Nandoni Dam;
- Due diligence will be undertaken and DWAF will award concession contracts on a competitive basis in the following cases:
 - Where concession opportunities have been identified in the SUP;
 - Where new concession opportunities are identified over and above the SUP Plan recommendations;
 - When existing contracts and concessions expire;
 - When concessionaires default, and are expelled from concessions;
 - When concessionaires express intent to sell their operation.
- In the event of unsolicited bids being received, these would have to be evaluated against concession opportunities and objectives of the

Nandoni Dam as described in this SUP. The management body will make a recommendation in this regard.

6.3.1.5 Monitoring

A record of all concessions, concessionaires, contracts and contractors as well as all contractual conditions must be kept in order to monitor compliance and performance.

The body must monitor all active projects, be they in the construction or operational phase to ensure that contractors / operators / concessionaires are operating according to their contractual obligations. In addition, the management body must set up a programme of land monitoring and be in state to identify opportunities and needs in terms of access, development and utilisation.

6.4 INFRASTRUCTURE AND AMENITIES

6.4.1 Water Surface and Waterfront Zones

6.4.1.1 Goals

- To ensure that all development takes place in an environmentally responsible manner and that none of the above compromises or threatens the integrity of the natural or cultural resources existing in the Nandoni Dam basin;
- To unlock the potential of the dam basin and surrounds through suitable infrastructure that will efficiently service identified developments, activities and facilities in a manageable way.

6.4.1.2 Objectives

- To exploit the potential of the various zones in a responsible manner which will not compromise their ecological integrity, inherent character and future prospects of the dam basin;
- To limit the extent of disturbance due to development by employing sound ecological planning and environmental best practice;

- To appropriately mitigate and manage unavoidable damage, destruction and disturbance;
- To ensure that all development is authorised, planned, designed, built and maintained in an environmentally responsible manner and in accordance with relevant environmental legislations (i.e. including the ECA, the NWA and the NEMA).

6.4.1.3 Strategy

- The management team will check and recommend all plans for development and will ensure that all relevant legislation has been complied with and that the necessary authorisations have been obtained prior to any development taking place.

6.4.1.4 Management Actions

Conservation Zones

A PATHS AND ROUTES

- Hiking paths must be properly planned and laid out to avoid the development of haphazard trails;
- Very steep sections of the trail should be stabilised for safety purposes and to avoid erosion and wash-aways;
- Lookout points and rest stops must be properly planned and constructed.

B SERVICE INFRASTRUCTURE

- No bulk service infrastructure may be installed.

C WASTE MANAGEMENT

- Waste receptacles will be placed at entrance and exit points. No waste receptacle may be placed within conservation areas;
- Boards will be posted advising hikers not to litter;
- The bins will be provided with lids and an external closing mechanism to prevent their contents blowing out and must be scavenger-proof;
- Waste will be removed from receptacles on a regular basis as required and disposed of at suitable waste disposal sites;

- Only hikers' ablutions (such as composting toilets) may be built at selected locations.

D STRUCTURES

- All structures are to be approved by DWAF and the management body;
- No structures except bird hides are permitted within conservation areas. These should be properly designed to blend in with the natural environment and so that minimal impacts are associated with their construction / assembly.
- All architecture and structures should be in sympathy with the environment in terms of materials, colours etc.
- All structures must be erected without the use of large construction equipment and machinery;
- All street furniture such as benches, dustbins signposts and braai structures must be designed in an attractive, robust and environmentally friendly manner;
- Consider the selective trimming of branches before opting to remove trees;
- Avoid the placement of structures over drainage channels.

E SPORTS FIELDS AND LANDSCAPED AREAS

- No sports fields or landscaped areas are permitted in the conservation areas.

Agricultural Zones and Community Access Nodes

A SERVICE INFRASTRUCTURE

- Services in agricultural zones should be limited to electricity and water supply to community access nodes. These should follow roads and be laid underground wherever possible;
- All above ground services must be positioned above the 1:100 year flood line and must not be visually intrusive in any way;
- All services are to be maintained in a good working order by the relevant operator / concessionaire;
- The design, installation and operation of all services will conform to the National Water Act and other relevant legislation and DWAF requirements.

B WASTE MANAGEMENT

- Waste receptacles will be placed at strategic locations within the Agricultural Zones, at Community Access Nodes, along pedestrian routes and wherever people tend to congregate;
- Boards will be posted advising users / visitors not to litter;
- The bins will be provided with lids and an external closing mechanism to prevent their contents blowing out and must be scavenger-proof;
- No wild animals may be fed and people should be discouraged from any act that causes humans to be associated with the source of food;
- Waste will be removed from receptacles on a regular basis as required and disposed of at suitable waste disposal sites;
- No waste may be buried or burned on site;
- Adequate ablution facilities must be provided at the Community Access Nodes;
- All ablution facilities must comply with applicable legislation.

C STRUCTURES

- All structures are to be approved by DWAF and the management body;
- Activities listed in the Guideline Document: EIA Regulations (*Environmental Impact Management: Department of Environmental Affairs and Tourism, April 1998*) are subject to an EIA;
- All buildings and developments must comply with the applicable town planning ordinances. Authorisations and accreditation must be sought from local authorities as is required;
- Buildings and structures will be limited to community access nodes;
- The placement of buildings and structures should be such that they do not constitute a visual intrusion to neighbouring developments, either during the day, or at night (i.e. lights from the development);
- No building or structure may be placed within the 1:100 year flood line of any natural drainage line;
- The placement of buildings and structures should not necessitate the removal of natural vegetation wherever possible. Large trees with a diameter of 300mm or more should not be removed and the site design should be amended accordingly;

- All architecture and structures should be in sympathy with the environment in terms of materials, colours etc.
- All buildings and structures must be maintained on an ongoing basis.
- Ad hoc amendments to buildings and structures are not permitted;
- The visual character of all buildings and structures will be monitored on an ongoing basis. Dilapidated structures and structures in disrepair will be removed;
- An efficient storm-water management system and runoff containment system must be designed simultaneously with any building, structure or service.
- Polluted water from developments must not be permitted to enter the dam or any water course directly.
- Energy dissipaters must be installed where concentrated runoff constitutes an erosion risk;
- Consider the selective trimming of branches before opting to remove trees.

D SPORTS FIELDS AND LANDSCAPED AREAS

- No extensive landscaped areas or formal sports facilities are permitted in the agricultural zone, although some informal sporting and recreational activity may take place at community access nodes. These must be maintained and will be disallowed should they become denuded and derelict.

Recreation Zones and Tourist Development Nodes

A PATHS AND ROUTES

- Hiking paths must be properly planned and laid out to avoid the development of haphazard trails;
- Very steep sections of the trail should be stabilised for safety purposes and to avoid erosion and wash-aways;
- Lookout points and rest stops must be properly planned and constructed.

B SERVICE INFRASTRUCTURE

- Wherever possible, services such as telephone lines, electricity and water should follow the alignment of roads and be laid underground;

- All above ground services must be positioned above the 1:100 year flood line and must not be a physical hazard or be visually intrusive in any way;
- All services are to be maintained in a good working order by the relevant operator / concessionaire;
- The design, installation and operation of all services will conform to the National Water Act and other relevant legislation.

C WASTE MANAGEMENT

- Waste receptacles will be placed at strategic locations within the Recreation Zones (i.e. at picnic sites, lookouts, launches, slipways etc.), as well as at Tourist Development Nodes as required;
- Boards will be posted advising visitors and tourists not to litter;
- The bins will be provided with lids and an external closing mechanism to prevent their contents blowing out and shall be scavenger-proof;
- No wild animals may be fed and people should be discouraged from any act that causes humans to be associated with the source of food;
- Waste will be removed from receptacles on a regular basis as required and disposed of at suitable waste disposal sites;
- No waste may be buried or burned on site;
- Adequate ablution facilities must be provided at all facilities and Tourist Development Nodes;
- All ablution facilities must comply with applicable legislation.

D STRUCTURES

- All structures are to be approved by DWAF and the management body;
- Activities listed in the Guideline Document: EIA Regulations (*Environmental Impact Management: Department of Environmental Affairs and Tourism, April 1998*) are subject to an EIA;
- All buildings and developments must comply with the applicable town planning ordinances. Authorisations and accreditation must be sought from local authorities as is required;
- Buildings and structures must be limited to designated Tourist Development Nodes and must be limited to those permitted within the recreational zones;

- The placement of buildings and structures should be such that they do not constitute a visual intrusion to neighbouring developments, either during the day, or at night (i.e. lights from the development);
- No building or structure may be placed within the 1:100 year flood line of any natural drainage line;
- The placement of buildings and structures should not necessitate the removal of natural vegetation wherever possible. Large trees with a diameter of 300mm or more should not be removed and the site design should be amended accordingly;
- All architecture and structures should be in sympathy with the environment in terms of materials, colours etc.
- All buildings and structures must be maintained on an ongoing basis.
- Ad hoc amendments to buildings and structures are not permitted;
- The visual character of all buildings and structures will be monitored on an ongoing basis. Dilapidated structures and structures in disrepair will be removed;
- An efficient storm-water management system and runoff containment system must be designed simultaneously with any building, structure or service.
- Polluted water from developments must not be permitted to enter the dam or any water course directly.
- Energy dissipaters must be installed where concentrated runoff constitutes an erosion risk;
- Consider the selective trimming of branches before opting to remove trees.

E SPORTS FIELDS AND LANDSCAPED AREAS

- Designs and proposals for all extensive landscaped areas must be approved by the management body;
- All approved landscaped areas must be kept neat and well maintained;
- Decommissioned landscapes may not simply be left, but must be properly rehabilitated;
- Avoid the use of pesticides and herbicides within the dam basin;
- Fertilisers should be used with caution and in moderation and in accordance with manufacturer's guidelines.

Safety and Security Zone

A SERVICE INFRASTRUCTURE

- No bulk service infrastructure or tourist facilities may be installed.
- Here necessary for security or maintenance reasons infrastructure such as roads may be built.

B WASTE MANAGEMENT

- Waste receptacles will be placed at entrance and exit points. No waste receptacle will be placed within the zone;
- The bins will be provided with lids and an external closing mechanism to prevent their contents blowing out and shall be scavenger-proof;
- No wild animals may be fed by staff on site and staff should be discouraged from any act that causes humans to be associated with the source of food;
- Waste will be removed from receptacles on a regular basis as required and disposed of at suitable waste disposal sites.

C STRUCTURES

- No structures of any kind are permitted within the safety and security zone.

D SPORTS FIELDS AND LANDSCAPED AREAS

- No sports fields or landscaped areas are permitted in the safety and security zone.

6.4.1.5 Monitoring

By maintaining a database of all authorised developments it will be possible to monitor compliance and performance regarding the provision and maintenance of all development and related infrastructure. The format, updating and auditing of the infrastructure and development should form part of the management team's function.

6.4.2 Roads and Infrastructure

6.4.2.1 Goals

- To unlock the potential of the dam basin and surrounds through suitable infrastructure that will efficiently service identified developments, activities and facilities in a manageable way.
- To ensure that the development of infrastructure takes place in an environmentally responsible manner and that none of the above compromises or threatens the integrity of the natural or cultural resources existing in the Nandoni Dam basin;

6.4.2.2 Objectives

- To ensure that required infrastructure is planned, designed, built and maintained in an environmentally responsible manner and in accordance with relevant environmental legislations (i.e. including the ECA, the NWA and the NEMA);
- To ensure that all proposed access routes and access points are necessary, practical and manageable as well as relevant in a regional context;
- To plan current and future roads and access routes in the Nandoni Dam basin in conjunction with the relevant authorities (such as local municipalities, the Department of Transport, etc.) and stakeholders;
- To upgrade temporary and construction roads where appropriate for utilisation as permanent access routes.

6.4.2.3 Strategy

- All land agreements regarding developments for which infrastructure (such as roads) is required will include the provision of such infrastructure within the purchase line as a part of the proposed development. The provision of regional services and infrastructure outside the purchase line will fall under the jurisdiction of the local municipality or the Department of Public Works;
- The management team will check and recommend all plans for infrastructure and will ensure that all relevant legislation has been

complied with and that the necessary authorisations have been obtained prior to any development taking place.

6.4.2.4 Management Actions

- Only authorized research, monitoring and security personnel are permitted vehicular access into the Conservation Zones;
- Vehicular access must be kept to a minimum in Agricultural Zones – roads should be built only where vehicular access is deemed necessary for agricultural access and access to Community Access Nodes;
- Vehicular access must be kept to a minimum in Recreation Zones – roads should be built only where vehicular access is required for recreational activities and facilities and Tourist Development Nodes;
- Only authorized research, monitoring and security personnel are permitted vehicular access into the Safety and Security Zone;
- Vehicles must stay on the designated tracks / roads – no off-road driving is allowed;
- Road layouts must be designed in accordance with the topography; avoid unnecessary cut and fill;
- No roads through marshy areas, wetlands or pans will be permitted;
- No vehicle access between the high water mark and the water's edge is permitted in any zone, except in designated launch areas;
- DWAF approval is required for all river and stream crossings, regardless of the nature of the crossing. In some cases hydrological studies, Scoping Reports and / or EIA's may be necessary;
- Winding roads are often preferable to straight. This is especially true for access through Recreation Zones and on scenic routes;
- Roads should be designed to run parallel rather than perpendicular to the contours wherever possible;
- Roads should not traverse steep slopes wherever possible;
- All roads are to be contoured and provided with spillways and adequate drainage;
- All roads will be maintained in a satisfactory condition to avoid dust, rusting and potholes;
- All public vehicular access points onto State land must be serviced by suitable parking areas designed and constructed in an

environmentally and aesthetically suitable manner. User carrying capacities for the relevant zone (refer 4.4.4) should be used as a guide to the number of bays;

- All parking areas are to be contoured and provided with spillways and adequate drainage;
- All parking areas will be maintained in a satisfactory condition to avoid dust, rusting and potholes;
- Signposting and information boards must be placed at all access points to the dam. These should indicate permitted and disallowed activities, indemnity and code of conduct;
- The design, installation and operation of all roads will conform to the National Water Act and other relevant legislation.

6.4.2.5 Monitoring

By maintaining a database of all authorised infrastructure, it will be possible to monitor compliance and performance regarding the provision and maintenance of all development and related infrastructure. The format, updating and auditing of the infrastructure and development should form part of the management team's function.

6.4.3 Construction

6.4.3.1 Goals

- To conserve the natural, cultural, socio-economic and existing built environments during the construction phases of any development within the dam basin.

6.4.3.2 Objectives

- To ensure that pre-construction, construction and post construction (rehabilitation) phases are executed according to the specifications and requirements set out in the Department of Water Affairs and Forestry's *Environmental Site Management and Rehabilitation Specifications* (2002).

6.4.3.3 Strategy

- To compel contractors to comply with the objectives of the Nandoni Dam through contractual obligations for the duration of their presence within the jurisdiction of the management body.

6.4.3.4 Management Actions

- No construction work may commence prior to the necessary approval of the development / facility by DWAF. First Phase Archaeological Surveys, Scoping Reports, EIA's, management plans and any other necessary procedure must be followed as required.
- At the start of any construction activities, all skilled and semi-skilled staff should be made aware of the environmental requirements/constraints on construction activities within the relevant area³⁹.
- The Developer/Contractor must take into account limitations pertaining to the zone within which construction activities are to take place, in particular the location of access routes, and site establishment layout;
- All site establishment components, as well as equipment, must be positioned to limit visual intrusion to neighbours and to the region;
- Fence off construction areas, and do not permit employees access outside of designated construction areas (of particular concern in recreation zones during the construction of tourist development nodes);
- Construction workers may not be housed on-site. Accommodation must be arranged outside of the purchase line in nearby villages or facilities. This is of particular relevance in Recreation Zones.
- Leave gates that are encountered open or closed in the same state as they were found;
- Do not cut or disturb any fences without authorization from the relevant authority;
- Maintain roads used during construction in a satisfactory condition and in such a way that air pollution, erosion, potholes and rutting are limited;

³⁹ DWAF is currently in the process of drafting an Environmental Awareness and Training protocol that will be applicable

- Ensure that reasonable vehicle speeds are maintained, especially in populated areas and areas where livestock is likely to be encountered on roads;
- Keep travelling on access roads to reasonable working hours.

6.4.3.5 Monitoring

Compliance with management actions within the relevant zone may be used as a performance monitoring tool by the management body.

6.5 MARKETING

6.5.1.1 Goals

- For the Nandoni Dam to obtain recognition, both locally and regionally as a tourism and economic development catalyst as well as a centre for agricultural opportunity and growth;
- For the Nandoni Dam to be known for its success in applying innovative and adaptive management principles, including sustainable use of resources, community involvement and participation, private sector commitment and participation.

6.5.1.2 Objectives

- To create awareness regarding the management and importance of the Nandoni Dam through ethical marketing;
- To maximise economic and other benefits for the region through the establishment of awareness regarding the dam, its products, programmes and opportunities.

6.5.1.3 Strategy

- Those who stand to benefit directly from the marketing of the product are responsible for carrying the costs associated with the marketing;
- No marketing will be permitted if it conflicts with the operations, policy or management actions of the Nandoni Dam.

6.5.1.4 Management Actions

- The management body is responsible for the promotion of the concept of the Nandoni Dam as an integrated part of the region as well as the promotion of the concept of concessions and developments;
- The management body will endeavour to ensure that local and provincial government who promote the region as a destination include the Nandoni Dam in their strategies and campaigns;
- The promotion of products and programmes will be undertaken by individual operators and / or concessionaires;
- All marketing material of any format (i.e. printed or electronic) concerning the Nandoni Dam must be screened by the management body in order to avoid the creation of false impressions.

6.5.1.5 Monitoring

Effective relations with operators, visitors, users, neighbours and stakeholders are vital for successful and sustainable environmental management. Constant liaison with these role players will allow the Management Body to understand the changing needs and expectations of role players within the area, which in turn allows for informed decisions to be taken in the best interest of all involved.

Changing needs and expectations should be monitored and documented.

6.6 COMMUNITY PARTICIPATION AND BENEFICIATION

6.6.1.1 Goals

- To promote the flow of benefits emanating from the utilisation of the dam and surrounding land into the local community in an equitable manner.

6.6.1.2 Objectives

- To establish a development trust allocated solely for the purpose of beneficiation and upliftment within the local communities to oversee the benefit flow from the Nandoni Dam;

- To illustrate and highlight the benefits of integrated planning, management and utilisation to the local communities and so create a mechanism for their equitable participation;
- To stimulate conservation, recreation and tourism and economic development related projects within the local communities through training, capacitating and empowering individuals with proven interest and entrepreneurial skills.

6.6.1.3 Strategy

- To participate in local fora that are concerned with community beneficiation in the region (if any);
- To compile and facilitate awareness programmes and related activities aimed at upliftment within the local communities;
- To develop guidelines for the selection and utilisation of local entrepreneurs and service providers;
- To compile a database utilisation of local entrepreneurs and service providers.

6.6.1.4 Management Actions

- Set up an independent Development Trust with representatives from the neighbouring communities, the management team and selected independent individuals to manage benefits flowing from the utilisation of the dam. These benefits will be determined through the business plan as a percentage of the income after operational costs have been settled;
- The Development Trust must be properly constituted and institutionalised, with clear mandates, so that it can operate as a Section 21 Company, or as a Foundation;
- Establish and retain formal relations with neighbours and local communities through existing fora, working groups and other formal institutions (should these exist);
- Develop awareness building and education programmes that will be of benefit to local stakeholders. These may include but are not limited to the following:
 - Problem animal control;

- Fire fighting;
- Floods;
- Boating and fishing;
- Nature conservation;
- Water management;
- Sewage management;
- Waste management and recycling;
- Archaeological and cultural heritage appreciation.
- Investigate beneficiation opportunities for local stakeholders. These may include but are not limited to the following:
 - Pasture management and carrying capacity;
 - Livestock management (disease control, breeding);
 - Irrigation farming techniques and management;
 - Aquaculture;
 - Dry land farming techniques and management;
 - Commercial farming development;
 - Game farm management;
 - General tourism and recreation development.
 - The development of new irrigation schemes and the rejuvenation of existing schemes would support the introduction, promotion and expansion of commercial farming on a local and regional level.

6.6.1.5 Monitoring

Through regular two-way communication with recognised community institutions and structures, it will be possible to monitor community perceptions and attitudes, as well as expose entrepreneurs in these communities to the regional opportunities and initiatives that are available.

By establishing a database of local suppliers and service providers and updating this on a regular basis, it will be possible to remain abreast of needs and measurable criteria and so ensure ongoing benefit flow in the long term.

6.7 RESEARCH PROJECTS

6.7.1.1 Goals

- To initiate, encourage and support any research and projects that may benefit the various environments of the Nandoni Dam basin and ultimately be of benefit to its users and management.

6.7.1.2 Objectives

- To identify opportunities to better the environment, user experience and management and initiate and support research projects in this regard;
- To support research aimed at attaining sustainability regarding the utilisation of the Nandoni Dam.

6.7.1.3 Strategy

- To continuously cross reference auditing and monitoring logs of key performance areas so that needs and opportunities are always current and relevant;
- To screen research project proposals and to approve these before commencement;
- To approach appropriate research institutes to assist where management lacks expertise, experience or manpower.

6.7.1.4 Management Actions

- The management body may ally the aid of DWAF and / or any other appropriate organisation, body or institute for the fulfilment of identified research tasks and projects. Programmes that could be supported and / or initiated include, but are not limited to the following:
 - The transplanting of endemic tree groves into suitable habitats conservation areas;
 - Medicinal and traditional plant propagation programmes.
 - Commercial fishery development (cage aquaculture and off-stream channel aquaculture only – no gill netting is permitted);
 - Game fishing development;

- Crocodile farming.
- All projects and programmes must be subjected to an approval process, based on the research project's objective, contribution to sound management, available budget and staff requirements;
- No project may commence without the approval of the management team and submission of the project implementation schedule;
- Conditions, specifications and environmental management guidelines to be followed will be provided by the management body. These will be contractually binding to the researcher;
- Access will be awarded to specified areas only for the implementation of approved research projects.

6.7.1.5 Monitoring

The management body must monitor all active research projects to ensure that researchers are carrying out the operations as agreed. In addition, time frames, impacts and budgets must be monitored. This will aid in decision making regarding the authorisation of new projects and the continuation of existing ones.

6.8 MONITORING

6.8.1.1 Goals

- To subject all activities undertaken within the purchase line of the Nandoni Dam to performance monitoring and to undertake an overall audit to ensure the integration of all management activities within key performance areas.

6.8.1.2 Objectives

- To ensure that all key performance areas addressed in this SUP are integrated;
- To develop an overall performance audit that facilitates internal and external review;

6.8.1.3 Strategy

- To design a monitoring system that is dynamic and responds to local environmental changes and other unforeseen issues that may arise. This will help promote the opportunities while minimising potential negative impacts of development and utilisation;
- Regular monitoring and auditing creates flexibility, detecting undesirable environmental impacts and providing the data for updating of policies, strategies and guidelines.

6.8.1.4 Management Actions

- Environmental monitoring and auditing is to be systematic and conducted according to agreed and documented practices (which the Management Body will develop, initially according to the guidelines outlined in this document);
- Environmental performance is to be evaluated according to the agreed criteria and standards for each Key Performance Area;
- In-house monitoring will be ongoing at all times and should be reported by exception on items of non-compliance.

7 THE INSTITUTION

7.1 INTRODUCTION

An institutional structure is required to take charge of the management of the dam. This management body must be represented by all stakeholders, both governmental and non-governmental, and the formation thereof must be preceded by a process of awareness building of both the SUP process and of the management of the dam on a day to day basis according to the SUP.

The management body will operate on a restricted local level and consist of a co-operative association of individual water users. It is the management structure preferred and promoted by DWAF, and in the case of Nandoni Dam, also the structure preferred by the local public. Essentially such a management body is a delegation of power to local stakeholders. Figure 6 hereunder is a graphic representation of the structure of the management body:

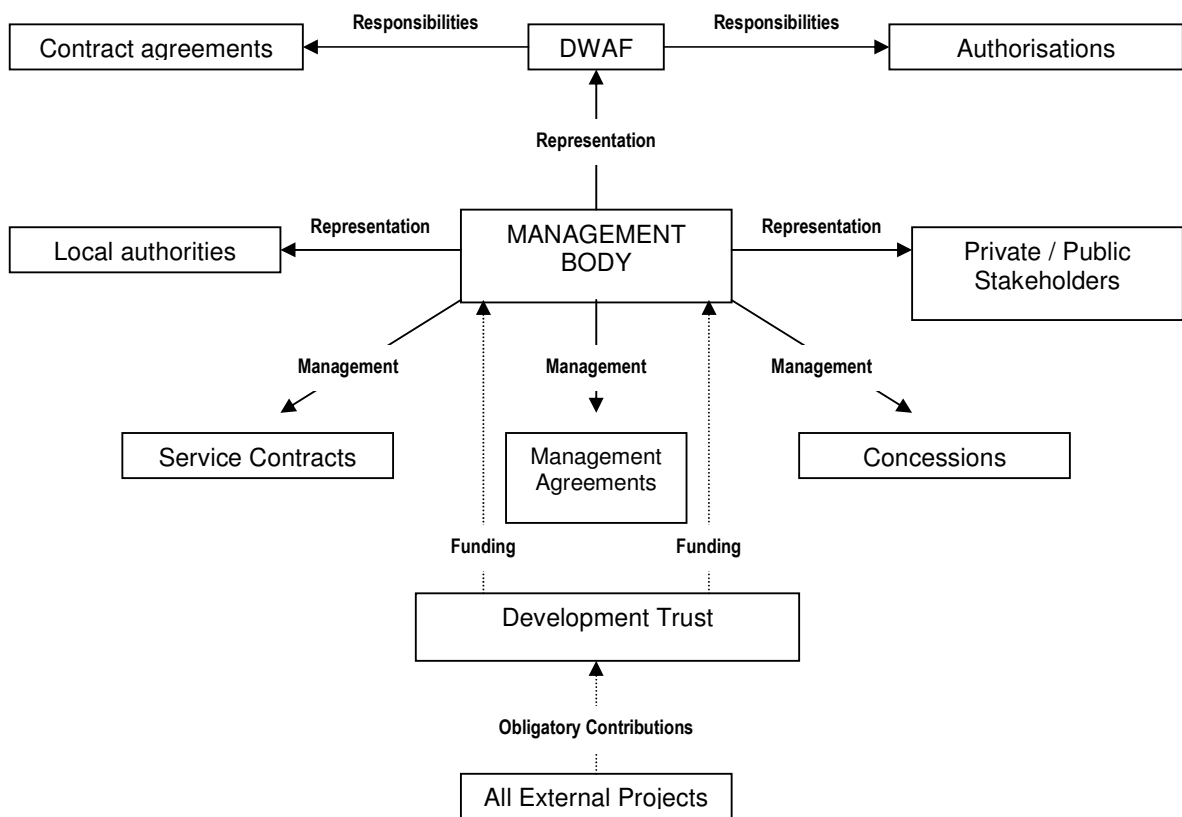


Figure 6: Graphic representation of the structure of the management body

7.2 OBJECTIVES

- To assemble a fully representational management team of suitably motivated members who are committed to the sound and sustainable management of the natural, cultural and built environments;
- To strive towards a sustainable whole by following sound and meaningful ecological, social and economic principles as outlined in the SUP as well as in this document;
- To make use of aid, advice, experience, manpower and equipment made available to the management team and to use this to the maximum advantage of the natural, cultural and built environments.

7.3 STRATEGY

- To work within the constraints of the environment and in co-operation with the stakeholders;
- To liaise regularly with all role players to understand their future plans and expansion requirements / expectations;
- To plan in co-operation with role players, and ensure that nobody is marginalised in the process;
- To evaluate all proposals and recommendations with objectivity;
- To address conflict situations with objectivity;
- To make recommendations that are logical to understand and simple to explain and easy to implement;
- To encourage participation, empowerment and education at all times;
- To keep budgetary and logistical capabilities in mind at all times.
- To optimise income and other benefits from both consumptive and non-consumptive utilisation of the resource without compromising the integrity of the natural, cultural historical, man-made or socio-economic environments;

7.4 ADMINISTRATION

7.4.1 General

Ultimately, the success of the Nandoni Dam Management Body relies on good administration, for which it is solely responsible.

The body is responsible for the general administration of Nandoni Dam, including telephonic reception, information and secretarial tasks. The body is responsible for the election of members and the allocation of tasks within its own structure.

The fulfilment of general administration would require a base office from which general secretarial work and reception could be conducted. This would be the base from which all administrative tasks will be conducted (i.e. to which information will be sent and from which information will be distributed).

Documentation such as the SUP and the various environmental databases as discussed in this document would be accessed and updated from this base office. Records of meetings, annual reports, reviews and other management related documentation would also have to be available for reference as would any marketing material developed to promote the Nandoni Dam.

Information of interest to potential investors, developers, operators and researchers would also have to be obtainable and would include general environmental information of the area (including the natural, cultural historic, socio-economic and man-made environments) and well as information regarding management, development and conservation goals, objectives, policies and strategies.

Informed management personnel in a position to take decisions and answer pertinent questions would have to be available by telephone (if not in person) during office hours. Emergency contact personnel would have to be available at all hours of the day.

7.4.2 Financial management

7.4.2.1 Income

Income for the management and administration of the Nandoni Dam will be obtained primarily from concessions and contractual leases. Concessionaires will charge users for entrance to the dam as well as for facilities offered. These charges will be determined by the concessionaires and based on

market trends, but controlled and regulated by DWAF and the management body.

An estimate of the anticipated start up costs based on 2002 rates has been included as an appendix to this report. Funding for such incentives is available from DWAF following certain application procedure. The conditions of such loans and / or subsidies will vary from situation to situation.

7.4.2.2 Expenditure

The following annual expenditure may be expected and should be allowed for based on market related estimates at the time of operation:

- Management team salaries (based on equivalent remuneration packages and advised by DWAF);
- Water, electricity, telephone, consumables (for administration activities – adequate records must be kept);
- Building maintenance (of the administration building – adequate records must be kept);
- Quarterly meeting costs;
- Maintenance and rehabilitation of land not yet under concession or contract;
- Rehabilitation and maintenance of mismanaged land reclaimed from concession or contract;
- Repayment of DWAF for start up costs (as per the relevant agreement with DWAF).

7.4.2.3 Annual Report

The management body is responsible for the submission of annual reports and will meet four times a year to submit annual reports to DWAF in the following categories:

- Trust report (status, allocation of funds, progress of projects)
- Environmental report
- Tourism report
- Financial report

Successful projects and programmes are to be highlighted, problem areas are to be detailed and future objectives in each of the above categories are to be guided by recommendations made in the annual reports.

8 CONCLUSION

The Sustainable Utilisation Plan as presented in this document aims not only to conserve the natural and cultural environment, but also to enhance the development, tourism, and agricultural potential of the Nandoni Dam basin and optimise beneficiation for stakeholders.

- Activities listed for the management of the various items as discussed in this document should commence as soon as is practically possible.
- This document should not be viewed as final and should be adapted, amended and updated as circumstances require according to the process formulated in this SUP.
- Once the programme has been implemented, a need may arise for amendments to be made to the original policies, objectives and programmes, and this should be carried out accordingly.

Undertaken in this integrated and synergistic manner the SUP will become an important regional development tool, achieving local, regional, national and international objectives through sound resource management, effective community involvement and the creation of viable and attractive business opportunities based on clear policies and operational guidelines

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APPENDIX 1:

REPRESENTATIVES OF THE NANDONI DAM ZONING COMMITTEE.

A number of people were involved during the Nandoni Dam SUP process to a greater or lesser degree, and may be of value during the establishment of Nandoni Dam Management Body. These people represent the following organisations and institutions:

- The Department of Water Affairs and Forestry (representatives of the national and provincial office);
- Municipal and regional authorities (such as the Malamulele and Makhado Municipalities);
- Non government Organisations (such as Soutpansberg Tourism);
- Local communities under leadership of the tribal authorities, and represented by the Community Action Committee (CAC) executives;
- Representatives of the relevant tribal authorities (the Mphaphuli Territorial Council and the Mulenzhe Territorial Council);
- Independent development groups (such as the Mulenzhe Development Trust);
- Prospective tourism operators (as yet none);
- Research and development institutions (such as the Venda University).

The shaded blocks represent people who have volunteered to become involved in the formation of a task team, responsible for the formation of a Water User Association, and the fulfilment of some initial obligations of the Management Body until the permanent Management Body is formed.

Name	Organisation	Tel	Fax	Cell	e-mail	Address
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Prof Musyoki	Univ of Venda, Env. Science & Geology	(015) 962 8000				
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E N Nevari	Headman					
T P Mathiva	Headman Mphego					
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APPENDIX 2:
RECORD OF MEETINGS AND PUBLIC PARTICIPATION.

Minutes of the Nandoni Dam Zoning Meeting #1
DWAF offices at the Nandoni Dam wall construction site
21 April 2001

Attendance:

P Velcich	VRL
M vd Westhuizen	VRL
P Ackerman	DWAF
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M I Mabannda	CAC
T Tshiololi	CAC EXCO
N Masidwal	CAC
Musetsho	CAC
S Mphaphuli	CAC
M B Raymorha	CAC
Ona Masiklisa	Musandon
D J Budeli	CAC EXCO
M E Tswikemba	ALNR sub committee
Evan Painting	Mothopo Technologies
T P Kutama	Mothopo / Segodolo
K D Ralitsela	Mothopo / Segodolo
E Munyai	ALNR sub committee
N Ramouna	ALNR sub committee
M S Maluleke	CAC EXCO
Rusty Milne	Womiu
T S Mbecki	CAC EXCO
A Mamilasigidi	CAC EXCO
T R Rasiwela	ALNR sub committee
M E Rambuwani	ALNR sub committee
A E Nbedzi	CAC relocation
Chief Mphaphuli	Mphaphuli TC
Khosi Tshikovha TG	Mphaphuli TC

Absent:

K Tshikolomo	Madzhivhandila Agricultural College
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Proceedings:

1. Pieter Ackerman welcomed all the attendees and introduced the consultants from Van Riet and Louw Landscape Architects who would be dealing with the zoning of Nandoni Dam.
2. Peter Velcich explained what a zoning plan is, why dams are zoned and how dams are zoned. He also touched on some of the special considerations at Nandoni Dam such as the demand for arable land as well as the importance of the archaeological finds.
3. It was recommended that traditional leaders be recognised as a separate group.
4. It was stated that people were inclined to protect and respect that which they benefited from.
5. It was asked whether the community will have control over State owned land which that occupied.
6. Pieter Ackermann answered that the land within the purchase line would be State owned land under the control of the Department of Water Affairs and Forestry.
7. It was asked whether a mechanism existed by which people could use the dam for tourist activities and leisure.

8. Pieter Ackerman answered that this was possible, through the correct channels.
9. It was asked how the local communities could benefit from tourism.
10. It was answered that land has been leased from the State in the past and developed by communities. Also, the communities would benefit from spin-offs from other developments. Any outside organisation willing to set up a tourist development would have to work closely with and through the relevant communities.
11. Rusty Milne of Womiwu gave a quick breakdown of the status quo of the relocation action plan and highlighted the severe shortage of arable land.
12. Pieter Ackerman reiterated that all the needs of interested and affected parties must be known for dam zoning to take place properly and therefore called for the co-operation of the CAC. He asked that the CAC start thinking of issues for discussion at the next zoning meeting. He also requested that the CAC produce a list of names of people to form a Dam Zoning Committee.
13. Peter Velcich stated that there was no limit to the number of people that from part of the Dam Zoning Committee, and that these people should be fully representative so that nobody is excluded from the process.
14. Pieter Ackerman thanked the CAC, VR&L and the RAP team for attending and closed the meeting.

Minutes of the Nandoni Dam Zoning Meeting #2
DWAF offices at the Nandoni Dam wall construction site
10 June 2001

Attendance:

No attendance register was circulated at the meeting.

Proceedings:

1. Peter Velcich welcomed the attendees and showed a computer generated model of the new dams, and pointed out where the villages, the sewage works and the agricultural college are.
2. Peter explained that the consultant's job is to zone everything within the purchase line for conservation, development or recreation.
3. It was asked if the Agricultural College would be under threat.
4. Peter answered that the main buildings were outside the purchase line, but some of the fields would be flooded.
5. Peter stated that in light of the need for arable land, due consideration would be given to agriculture in the buffer zone.
6. Peter stated that the next step would be the production of an inception report, which would be circulated to the members of the Dam Zoning Committee. Thereafter a scoping meeting would be arranged where comments could be passed regarding the inception report. This scoping meeting would be very important in establishing the needs of the interested and affected parties.
7. Pieter Ackerman requested that Mr. Mabanda draw up a list of Zoning Committee members.
8. Peter Velcich thanked the attendees for coming and closed the meeting.

Minutes of the Nandoni Dam Zoning Meeting #3
DWAF offices at the Nandoni Dam wall construction site
28 August 2001

Attendance:

Peter Velcich	Van Riet and Louw
Mandy vd Westhuizen	Van Riet and Louw
P Ackermann	DWAF (SES)
I J Msiza	DWAF (SES)
W Tunha	DWAF (PTG)
T C Ndou	DWAF IFM
M A Munzhedzi	DWAF
N E Netswinga	DWAF
A H Malepfane	Department of Agriculture
N R Mudau	Environmental Affairs
K D Ralitsela	Mothopo Technologies
P Kutama	Mothopo Technologies
E Painting	Mothopo Technologies
L R Wood	Womiwu Rural Development
Rusty Milne	Womiwu Rural Development
J Human	Makhado Municipality
D J Budeli	CAC EXCO
M S Maluleke	CAC EXCO
J Mabasa	CAC EXCO
Shibambohr	CAC EXCO
M I Mabannda	CAC EXCO
Tshiwandalour	Territorial Council
E T Ndongyane	Territorial Council
E N Raidimi	Madzivhandila Agricultural College
K Tshikolomo	Madzivhandila Agricultural College

Apologies:

T Tshiololi	CAC EXCO
T S Mbecki	CAC EXCO
A Mamilasigidi	CAC EXCO
N Masidwal	CAC
Musetsho	CAC
S Mphaphuli	CAC
M B Raymorha	CAC
M E Tswikemba	ALNR sub committee
E Munyai	ALNR sub committee
N Ramouna	ALNR sub committee
T R Rasiwela	ALNR sub committee
M E Rambuwani	ALNR sub committee
Chief Mphaphuli	Territorial Council
Chief Ramovha	Territorial Council
Chief Tshivazhi	Territorial Council
Chief Xikundu	Territorial Council
T M Mitileni	PSC
A P Mphaphuli	PSC
V Viljoen	Makhado Municipality
M Mathiva	Malamulele Municipality
J Thupane	Dept Land Affairs, Pietersburg
M Nekhudzhiga	DWAF ISD

Proceedings:

1. Pieter Ackermann welcomed everyone to the meeting and introduced Peter Velcich.
2. Peter Velcich presented the Inception Report visually, and summarised each section, highlighting the opportunities and constraints for the biophysical, physical and socio-economic environments. A list of user requirements as determined by Van Riet and Louw was also presented, as well as two Concept Zoning Options. One showed only agriculture and conservation, while the other showed opportunity for development for each of the villages bordering on the dam.
3. Peter reiterated that the two options were more of an opportunity plan which reflected the findings of the Inception Report, and that it should not be seen as a final zoning plan.
4. Peter ended off by saying that the institutional planning of a dam was as important as the physical planning, and stated that there were two options for managing a dam, namely a Catchment Management Agency and a Water Users Association.
5. Pieter Ackermann then explained what a Water Users Association is. He also stated that he felt that this was the correct route to follow for the management of Nandoni Dam. He concluded by asking the CAC and the Dam Zoning Committee to look into starting a Water Users Association.
6. The floor was then opened for questions.
7. Mr. Tshikolomo stated that there was little reference to the loss of land and buildings at the Agricultural College, and that the RAP should look at this area more closely.
8. Rusty Milne said that the RAP had already been submitted.
9. Mr. Tshikolomo asked what recommendations had been made for the Agricultural College.
10. Rusty admitted that he did not know.
11. Mr. Tshikolomo recommended that this fact be brought to the attention of the relevant people.
12. Rusty Milne said that he liked the concept option with development options, but was concerned that this might not always be possible.
13. Mandy vd Westhuizen stated that areas zoned for development could be used for agriculture, should the need be such. The zoning allows for development, but does not only restrict use to only that.
14. Jurie Human asked if any tourist offices were involved yet.
15. Peter Velcich said not yet, but that both governmental and non-governmental agencies would certainly be invited to the final public meeting.
16. Mr. Tshikolomo stated that he was happy with the two zoning concepts, and corrected the direction of flow of the Luvuvhu River as stated in the Inception Report.
17. Rusty Milne asked if a WUA is mandatory.
18. Pieter Ackermann said no, but that Water Affairs preferred it.
19. Mr. Mabasa asked what the Water Act says in terms of a WUA.
20. Jean Msiza answered that DWAF is currently busy with guidelines and that they focus on equity.
21. Washington Tunha stated that a WUA has various tasks or delegations as handed out by the minister. Sub-associations for different areas and for different activities are possible.
22. Mr. Ndou asked if all water users need to affiliate to the WUA.
23. Washington Tunha answered that the WUA is formed through a consultative and representative process and that all water users need to work through the WUA.
24. Mr. Mabanda asked how people's primary needs would be met.

25. Peter Velcich said that the zoning plan would allow for the fulfilment of all primary needs.
26. Mr. Mabanda asked what the development must comply with, and how the land would be accessed.
27. Peter Velcich said that all proposals must be submitted to DWAF for approval, and that an Environmental Impact Assessment would be necessary. He also stated that DWAF often leases land for development.
28. Jurie Human suggested that any development proposals be done through a tourist office of sorts.
29. Mr Mudau asked whether de-bushing and cutting down trees within the purchase line would impact on the potential of the areas.
30. Peter Velcich said that it certainly would.
31. Evan Painting stated that the de-bushing policy only deals with areas that will be inundated, and not with areas above the FSL. No de-bushing may occur above the FSL without the relevant approvals.
32. Pieter Ackermann thanked everyone for their attendance and input.
33. A date for the next meeting was not set, but it was indicated that it should take place within the next four weeks.

Minutes of the Nandoni Dam Zoning Meeting #4

Single Quarters Recreation Centre at the Nandoni Dam wall construction site
30 October 2001

Attendance:

Peter Velcich	Van Riet and Louw
Mandy vd Westhuizen	Van Riet and Louw
P Ackermann	DWAF (SES)
NE Maphaha	DWAF Thohoyandou
Munzheof	DWAF WRM
NE Netswinga	DWAF WRM
NJ du Buisson	DWAF Construction
MLB Nemaconde	DWAF NP
EM Kganyago	Dept Agriculture
M Angliss	NP Environmental Affairs
SE Moeti	Vhembe District Municipality
S Matodzi	Vhembe District Municipality
W Botha	Soutpansberg Tourism
AE Maisha	Finance Economic Affairs and Tourism
TG Tshikovha	Mphaphuli TC
MA Tshishonga	Tswinga Village
D Masindi	Tswinga Village
P Raulinga	Tswinga Village
J Makhado	Tswinga Village
NS Muthivhithivhi	Dididi Village
NC Ndou	Khakhanwe Village
T Malemei	Khakhanwe Village
E Munyai	Tshitomboni
NS Sithago	Tambaulate
MA Netshitungulwana	Tambaulate
M Mabulenga	Tambaulate
PN Ntshauba	Tshilongoma Village
G Masemola	Tshilongoma Village
TF Munyai	Makovha Village
F Munyai	Makovha Village
MI Mabannda	CAC EXCO
TS Mbedzi	CAC EXCO
N Ramovha	CAC EXCO
H Muhpana	CAC
ME Rambuwani	CAC
ND Maimela	CAC (Tshikovha)
NR Mphaphuli	CAC
TJ Balohi	CAC
J Musetsho	CAC
N Rabonda	CAC (Tshilongoma)
RN Tshishonga	CAC
RM Muphwaya	CAC
E Mulaudai	CAC
TL Mamali	Arable Land sub committee
RE Vhirunu	Arable land sub committee
KA Tshikolomo	Madzivhandila College
KD Maude	Makumeke
ER Bila	Headman Makutsule
RL Makhubele	Headman Makhubele
SN Sonnyboy	Mulenzhe Development trust

TF Mudau
ER Painting
KD Ralitsela
TP Kutama
EN Mathoho
R Milne

BKS Consulting
Mothopo Technologies
Mothopo Technologies
Mothopo Technologies
Archeo-info
Womiwu

Apologies:

W Tunha
S Freitag-Donaldson
F Venter
V Viljoen
Bob Pullen
Tuli Fakunde
Ben vd Waal

DWAF NP
KNP Conservation
KNP Aquatic Systems
Makhado Municipality
BKS
DBSA
Venda University

Proceedings:

1. Pieter Ackermann welcomed everyone to the meeting and Innocent Mabannda opened with a prayer.
2. Pieter Ackermann introduced Peter Velcich who then proceeded to present the zoning process and the Draft Zoning Plan.
3. Innocent Mabannda briefly reported back on the status of a water user association for Nandoni Dam. He reported that the dam zoning committee definitely wanted to make use of such a structure. DWAF Regional office is currently assisting the dam zoning committee in the establishment process. Thus process will begin as soon as the blessing of the PSC has been obtained.
4. Pieter Ackermann suggested that until the water user association was established, the dam zoning committee should fulfil necessary management functions.
5. The floor was then opened for comments and questions.
6. Rusty Milne asked if recreational water users would be represented within a WUA.
7. Pieter Ackermann replied that they would, as required.
8. Evan Painting commented that discussion had already taken place regarding the use of conservation areas at inlets for the gathering of traditional medicines and that this should not be forgotten.
9. A request from the floor was made that the proposal and presentation be made available to the people in printed form so that they could comment.
10. Peter Velcich responded that the draft zoning document would be circulated as follows:
 - One copy for each village for public use;
 - One copy at the dam site office for public use;
 - One copy at the DWAF Regional Office in Pietersburg for public use;He also added that the document would be posted on the Van Riet and Louw Website and that a hard copy could be emailed or posted on request.
11. A question from the floor: would there be another meeting at which comments could be passed?
12. Peter Velcich answered that this would depend on the feedback and response from the draft zoning document. If another meeting were required, then this would take place in January 2002 to give people time to respond properly.
13. A question from the department of Agriculture: Would all the agricultural land lost by the dam be reclaimed.
14. Peter Velcich answered that within the purchase line, all existing agricultural land was left as agricultural. In terms of the overall compensation, Peter asked Rusty Milne to comment.

15. Rusty said that every effort was being made to minimise the impact of the loss of agricultural land by the new dam, both within and outside of the purchase line.
16. A request was made to translate the presentation onto Venda and Shangaan for the benefit of those that did not understand English.
17. Peter said that the relevant information would be translated and circulated along with the draft zoning document.
18. Mr Kutamo asked if there were any questions that needed asking in Venda and Shangaan.
19. Erik Mathoho asked if there was a proposal for the retrieved relics in the areas to be displayed.
20. Pieter Ackermann replied that the establishment of a museum had been proposed to the CAC and the PSC and that people would like to see such a thing.
21. Neels du Buisson suggested that this be investigated in conjunction with SAHRA.
22. Mick Angliss commented that a clear vision from the communities regarding the use of the dam was lacking and that this needed to be workshopped. He added that this vision needed to be driven by an active group from early on in the process (i.e. now) in order for it to be of use to the people when the dam was filled. For example, a strategy was necessary to move cattle out of the dam basin now, if clear and attractive water was a requirement for tourism.
23. Peter Velcich said that the management plan would begin to address such issues.
24. Pieter Ackermann added that the responsibility of DWAF ends at the purchase line, and if such policy were to work effectively in the region, then co-operation would be required with DEAT and other agencies.
25. Peter Velcich added that some initiatives have already been sparked by a vision for the dam, such as that of the Mulenzhe Development Trust's proposal for a resort on the south bank of the new dam.
26. A comment from the floor: the people have many ideas and needs, but they don't know what to do to get things started to achieve them.
27. Innocent Mabannda responded that a Dam Zoning Committee is in place and operational, consisting of the CAC executives, as well as the relevant chiefs in the area. Their function is to ensure that issues, requests, etc are noted and included.
28. Another response from the floor was that people need to know what is going on around the dam. Activities and proposals need to be co-ordinated through the proper channels for them to make sense and be effective. Workshopping ideas would help to generate ideas that would benefit all.
29. Pieter Ackermann said that the workshop idea would be considered.
30. A representative of the Tourism Committee of Tswinga said that they has proposals and business plan ready, and just needed to know where to submit them and gain funds.
31. Pieter Ackermann suggested the DBSA or even the DEAT.
32. Neels du Buisson warned that there should be no confusion – DWAF would not be building or developing any resorts. The zoning plan is a framework, giving the individual opportunity to develop in certain areas, but that this development would be at his / her own expense. The zoning plan just makes provision for activities, but does not specify how to implement developments, or even what developments should take place.
33. Peter Velcich added that a Zoning Plan does not deal with specifics, but only with broad and general zones within which certain activities may take place.
34. A suggestion from the floor was for all people with comments, suggestions and ideas regarding the zoning plan to channel them through the secretary of the CAC, Mr. Mabannda.
35. Pieter Ackermann assured the meeting that all comments would be taken seriously, and that the Zoning Plan proposal would be adapted until a product was reached that suited everybody's needs.

36. Jurie Human suggested that local incentives and business plans may be presented to local municipalities. Budgets may be available for such activities and developments.
37. Innocent Mabannda asked if the people would be able to fish.
38. Pieter Ackermann answered that the whole shoreline, except for conservation areas may be fished.
39. Peter Velcich added that there would also be formal and informal access points where fishing could take place.
40. A question from the floor: would there be opportunity for the people to do washing?
41. Peter Velcich answered that each village on the dam would have a number of community access nodes where washing, bathing, car washing and social activities etc could take place. Some community infrastructure would be permissible here.
42. Evan Painting suggested a broader approach to agriculture in the area – that it be integrated with other government department's policies.
43. Mick Angliss responded that the mandate for such integration lay with the local municipalities rather than the different departments. Integration should be facilitated by the municipalities.
44. The way forward: Pieter Ackermann said that the draft zoning report would be circulated as discussed, along with the translated summary. The next step would be for everybody to give their comments to Innocent Mabannda, who would pass them on the consultants. The zoning plan would then be adapted to suit all needs and requirements. A cut-off date for comment would be clearly indicated on the report and translated summary.
45. General: Neels du Buisson stated that the CAC had a special Box number to which comments could be posted as well.
46. Pieter Ackermann then closed the meeting.

Report back on comments received on the Draft Zoning Plan Report

Circulated on 28 January 2002

A draft report of the Nandoni Dam Zoning Plan and / or a summary thereof (available in English, Venda and Shangaan) was circulated in November 2001 to all the above institutions and organisations for comment by the Interested and Affected Parties. A follow up letter was circulated early in December calling for comments on the plan by Friday 25 January 2002.

The following comments were received:

1. Comments received from the Mulenzhe Development Trust through correspondence with Mr. Innocent Mabannda (fax dated 17 January 2002):
 - The Mulenzhe Community has established a representative Development Trust, as a vehicle for the development of the Mulenzhe tourism project.
 - The Mulenzhe Territorial Council has allocated 100 ha of land for the development of the Mulenzhe Project to Mulenzhe Development Trust, situated between the Thohoyandou – Malamulele road in the north, the Mahebe River in the east and the new relocation site in the west. The area will be increased on request after zoning has been finalised.
 - The Mulenzhe Development Trust, as provided in its deed of trust, intends to develop the following projects using its own funds and / or grants / loans from DBSA, DEAT, TUSK Resorts and various other sources: Cultural Museum, picnic area with theme park, angling club, boating club, accommodation establishment (hotel and lodge), conference centre with game park, operate ferries and tour boats between Mphaphuli and Mulenzhe communities etc. The construction and services to the project will be provided by beneficiaries.
 - The projects will be managed and operated by the Trust for the benefit of its beneficiaries.
The document and plans will be amended to incorporate this information and cognisance will be taken of the anticipated water access requirements in the zoning plan.

2. Comments received from the Mulenzhe Village through correspondence with Innocent Mabannda (fax dated 18 January 2002):
 - Page 10: spelling of Levuvhu River (not Luvuvhu River).
 - Page 10: spelling of Mphaphuli Council (not Mphapuli).
 - Page 10: Greater Thohoyandou Local Council is now known as the Thulamela Municipality.
 - Page 15: spelling of Mutshundudi (not Mutshindudi).
 - Page 20: spelling of Dumasi (not Dumasie).
 - Page 39: spelling of Tshivhase (not Tshivazi).
 - Map 2: spelling of Makovha (not Makhova).
The document will be amended accordingly.
 - Some questions were raised regarding the flexibility of the zoning plan.
A zoning plan is designed to be a dynamic document and is flexible in that it may come up for review every five years, should this be necessary.

3. Comments received from Ben van der Waal, Department of Biological Sciences, University of Venda (email received on 18 January 2002):
 - Concern that bilharzia and crocs would compromise water sports.

This is an issue which will be addressed in the management plan of the dam under User Experience Management. The drafting of this management plan for Nandoni Dam will commence shortly.

- Tiger fish may be able to breed in the dam, but little research has been done in this regard, so there is no certainty.
A policy for tourism and fishery development (and the associated research as required) will be addressed in the management plan jointly under Utilisation, Natural Resource Management and Community Participation and Beneficiation.
- Limited bird watching will be possible with the limited protected shoreline.
Acknowledged. The document will be amended to make mention of this fact.
- There is potential for fishery development (hundreds of tons), but this implies research, monitoring and proper control (especially of illegal netting).
A policy for tourism and fishery development (and the associated research as required) will be addressed in the management plan jointly under Utilisation, Natural Resource Management and Community Participation and Beneficiation.
- The environment is not all that attractive, but may be developed for tourism with the help of other activities such as hiking etc.
Acknowledged. The potential of the area to be developed for tourism has been covered in the document, and the zoning plan allows for such development.
- The areas complicated social and political structure may limit many possible development plans. If the dam is not absolutely safe and pleasant and unique, then tourism won't develop.
Again, the issue of safety and security will be addressed in the management plan under Utilisation as well as User Experience Management.
- Proper sites for anglers (both from the shore and by boat) are necessary. Anglers prefer not to mix with day visitors and holiday makers.
The zoning plan makes allowance for fishing along the entire shoreline (with the exception of the inlets and other conservation zones). Formal angling resorts may be developed within the recreation zones in areas designated as Tourist development nodes. The detail of how these function (i.e. day visitors vs. anglers) will be covered in the specific design of the resort as required.
- Recommendation that the whole dam perimeter is fenced in and managed by one authority.
This will be addressed in the management plan.
- One small fishing camp exists at Middle Letaba Dam – a direct competitor with Nandoni for visitors.
Noted. The document will be amended to make mention of this.
- Recommendation that the conservation areas include all river inlets and riverine sections, consolidated into one.
All inlets have been allocated conservation status, but the consolidation of all conservation areas is neither feasible nor practical considering the diversity and complexity of user needs in the area.
- Recommendation that the recreation zones have controlled access – security may be one of the aspects that can cause the failure of any tourist operation.

Again, the issue of safety and security will be addressed in the management plan under Utilisation as well as User Experience Management.

- Recommendation that two or three bays be dedicated for fisheries only with no other surface use allowed – this is to simplify control.

Fishery development and all associated management requirements will be addressed in the management plan.

- Recommendation that five (or even more) permanent fishermen could be accommodated on the lake fishing with prescribed and controlled gill nets in prescribed areas. All other gill netting should be illegal and fishing equipment confiscated on site.

Acknowledged. This issue will be included in the management plan under Natural Resource Management as well as Community Participation and Beneficiation.

- The dam can be developed as an angling tourist attraction where fish such as tiger fish, rednose mudfish, and largescale yellowfish are stocked and maintained at good population levels. Serious research, especially from the inception of filling would be required to realise this detail.

A policy for tourism and fishery development (and the associated research as required) will be addressed in the management plan jointly under Utilisation, Natural Resource Management and Community Participation and Beneficiation.

- The Venda University, Department of Biological Sciences is able and interested to become involved in the fisheries and angling aspects of the management as well as water quality and algal development. The proximity of the University to the dam makes them ideally situated to conduct regular monitoring on the dam.

The contributions of the Venda University are important and their continued participation through the development of the management plan is valued.

4. Comments received from Pieter Ackermann, DWAF (SES) (personal communication 18 January 2002):

- Allow for a parking area and lookout on the northern bank of the dam, adjacent to the D3740 adjacent to the new bridge.

A community access node is already located here. The document will be amended to make mention of this potential development.

5. Comments received from Evan Painting, Mothopo Technologies (personal communication 18 January 2002):

- The policy on Red Data species in the area (specifically the endemic *Ficus capreifolis* groves encountered along this particular section of the river) is that they should be transplanted so that they are not all lost when the dam is filled.

The document will be amended to make mention of the transplanting of trees and other plants for conservation purposes. This should be into areas with suitable environmental conditions (i.e. similar to those in which they were found to be growing). This can take place in conservation, agricultural or recreation zones. It is important that the transplanted species be adequately protected and cared for in their new locations.

- Much discussion has been held on the establishment of a nursery for the propagation of medicinal plants which occur in the region. Over and above this, there is also a need for the propagation of these plants

by individuals, outside of the proposed nursery as well as the collection of certain plants from areas in which they occur naturally.

The document will be amended to acknowledge the need for the nursery, although it need not be located within the purchase line. The individual cultivation of medicinal plants should take place within the agricultural zones as far as possible. In special cases (i.e. if a plant proves only to grow under specific conditions which are not available within the agricultural zone), then these may be propagated in recreation or even conservation zones. The gathering of medicinal plants has been addressed in 6.2.2 of the document.

4. Comments received from the Rector: Madzivhandila College of Agriculture (fax dated 21 Jan 2002):

- Appreciation for the fact that the report does acknowledge the college and the fact that a lot of land and buildings will be submerged when the dam is filled.
- Concern that the report reflects an undecided future for the College. The Rector reports that the future of the College has never been a subject for decision. The College has overhauled their curriculum and are admitting students for the 2002 academic year.
The document will be amended to report that presently, the College will continue as before. If or when opportunities arise to change the function or focus of the College, then negotiations between the relevant parties will be entered into as required.
- Concern that the report is lacking regarding the question of compensation for the loss of property.
The Relocation Action Plan prepared by BKS does not address the issue of compensation for the college, although it is certain that it will be addressed in time. Should this be a current issue of concern, Rusty Milne of Womiwu should be contacted directly.

Minutes of the Nandoni Dam Management Meeting #1
DWAF offices at the Nandoni Dam wall construction site
16 April 2002

Attendance:

P Velcich	VRL	(012) 3461289
M vd Westhuizen	VRL	
P Ackerman	DWAF	(012) 3368678
N J du Buisson	DWAF: Construction	(015) 962 1764
M A Munzhedzi	DWAF	(015) 962 4481
T W Mphego	Headman	c/o I Mabandda
E N Nevari	Headman	c/o I Mabandda
T P Mathivha	Headman (Mphego)	c/o I Mabandda
Netshitungalwane	Headman	c/o I Mabandda
K E Mphaphuli	Mphaphuli Royal	c/o Me Mabandda
T G Tshikovha	Mphaphuli T A	c/o I Mabandda
T Tshiololi	CAC EXCO	(015) 962 6196
M S Maluleke	CAC EXCO	c/o I Mabandda
M I Mabandda	CAC EXCO	(015) 962 1764
M T Mboweni	CAC EXCO	c/o I Mabandda
T S Mbedzi	CAC EXCO	c/o I Mabandda
E Painting	Mothopo Technologies	(012) 9989674
P Kutama	Mothopo Technologies	
K D Ralitsela	Mothopo Technologies	
M Hatten	Archeo-Info	(015) 9626067
W Botha	Soutpansberg Tourism	(015) 5160400
B C W vd Waal	Univen	(015) 9628648
S N Sitholimela	Madzivhandila College	(015) 9621320
V R Tshikovha	Thulamela Municipality	(015) 9624020
A L Tshinetise	Thulamela Municipality	
N P Muladi	Makhado Municipality	(015) 5165002

Absent:

SE Moeti	Vhembe District Municipality	(015) 9620904
S Matodzi	Vhembe District Municipality	(015) 9624347
T J Ramovha	Mulenzhe Development Trust	(015) 9624216

Proceedings:

1. Peter Velcich of Van Riet and Louw gave a summary of the Draft Nandoni Dam Environmental Management Plan document. He continued by saying that copies of this draft document were available to attendees for comment, and that additional copies would be made available on request. He added that the document was a first draft, incorporating a lot of information, and was meant to elicit response and criticism so that Van Riet and Louw could be sure that they were on the right track in this regard.
2. Peter Velcich then stated that a focus group was necessary to work on the finalisation of the Environmental Management Plan as well as on the formation of a preliminary Management Body for the Nandoni Dam. He indicated a list, and asked those interested in volunteering for the focus group to submit their names after the meeting. He stated that these volunteers would be the key people to be involved in the process in the future.

3. The floor was then opened for questions regarding the presentation:

Q Is the management body referred to and the Water User Association spoken of in the Zoning Plan the same thing?

A Yes, the Management Body of the Nandoni Dam will perform the functions of a Water User Association. The reason that it is not referred to as such, is that the Management Body will also have additional functions, which do not necessarily fall within the scope of a Water User Association.

Q To what area does the Environmental Management Plan as presented apply?

A The jurisdiction of the Environmental Management Plan will include the water and waterfront areas within the purchase line (i.e. the owned State Land). It is, however, important to consider the area beyond these specific boundaries as a part of the greater environment, which must also be managed in an environmentally responsible manner.

Q Do the local people understand the potential and opportunities of the Nandoni Dam?

A Near the end of 2001, a public meeting was held to present the Draft Zoning Plan for Nandoni Dam to stakeholders and Interested and Affected Parties. One comment at this meeting was that there was a gap in communication between the consultants and some of the local people, who did not understand much of the presentation. For this reason, Van Riet and Louw undertook to translate a summary of the Zoning Plan document and the final zoning map into Venda and Shangaan, and made these available to the people in the area through the CAC. In addition, it was agreed that the consultants would arrange to visit the 8 villages adjacent to the dam at a later stage to answer specific questions and to ensure that they understood the concept of zoning as well as the decisions taken in that regard. Due to various constraints, these meetings have not yet taken place. Peter Velcich did, however, commit to contact Mr. Tshiololi and Mr Mabannda of the CAC shortly regarding a time and procedure for these meetings to take place.

Q The local people will also need to be educated with regards to the opportunities offered.

A Yes, and it will have to be one of the functions of the Management Body to investigate the upliftment of the local community both through beneficiation and educations. This has been included as an important responsibility of the Management Body.

Q Will those that volunteer to participate in the Environmental Management Plan focus group be forming the Water User Association / Management Body as such, or will this group be a task team dealing with the obligations of the Management Body on an interim level?

A The group will be a task team, initiating the formation of the Water User Association, and fulfilling the initial obligations of the Management Body on an interim level until the permanent Management Body for Nandoni Dam is formalised and becomes operational.

Q How many people would be required or permitted to participate in the Management Body?

A There is no specified number of people required or permitted. The only requirement is a commitment on the part of the individual members to actively participate and contribute to the process. It would, however be preferable that the group remain as small, yet as representational as possible.

Peter Velcich concluded the session by saying that the names of the volunteers for the Management Body would be forwarded to a relevant representative from DWAF (Northern Province), who would then assist in the formation, organisation and initiation of duties for the interim Management Body for the Nandoni Dam.

He added that the volunteer list was not exclusive, and that additional people would be welcome to participate, should they want to form part of the interim Management Body. These additional people may contact Van Riet and Louw Landscape Architects to be included.

4. There were no issues to be dealt with under General.
5. No date for a following meeting was set. This will be scheduled as required.
6. Peter Velcich thanked the attendees for their attendance and input, and closed the meeting.
7. The following people volunteered their names for inclusion in the interim Management Body for Nandoni Dam:

*T P Mathivha
S N Sitholimela
K E Mphaphuli
M Hatten
A L Tshinetise
V R Tshikovha
M A Munzhedzi
M I Mabannnda
W Botha
T Tshiololi
B C W vd Waal*

*Headman (Mphego)
Madzivhandila College
Mphaphuli Royal
Archeo-Info
Thulamela Municipality
Thulamela Municipality
DWAF
CAC EXCO
Soutpansberg Tourism
CAC EXCO
Univen*

Report back on the Zoning Plan 'Road Show'

Conducted on 18 and 19 May 2002.

On 18 and 19 May 2002, van Riet and Louw, in conjunction with Innocent Mabannda of the CAC, Eddie Mashau of BKS Pietersburg and Philemon Kutama of Mothopo Technologies undertook to visit eight villages that will be directly affected by the Nandoni Dam.

The meetings were very well arranged and co-ordinated and were extremely well attended. Only the village of Budeli was a no-show situation, where notification of the meeting failed to reach the village residents.

All the villagers appeared to understand the concept of zoning, the proposed zoning plan as well as management planning and the way forward in terms of the formation of a Water User Association. Some questions were raised at each village. The following is a summary of the issues raised:

- To whom would the agricultural land within the purchase line be allocated?
The existing agricultural lands within the purchase line have been retained. Additional agricultural lands will be allocated by the relevant territorial council, as has been practise in the past.

- Where would the money for the development of tourist facilities come from?
The local villages may approach investors or institutions such as the Development Bank for funding. Alternatively, partnerships with tourism developers and / or operators can be established with the local people.

- How could the community access nodes be developed? Are there any examples of such nodes? (Issue raised by Makovha Village).
Certainly examples of such developments exist, but DWAF would have to help with exactly where these are to be seen. This matter will be referred to Piet Ackermann of DWAF, who will be able to arrange a visit, or at least show some photographs of what such a node may include.

- How would dangerous animals such as crocodiles and hippopotami be controlled?
It can be expected that these animals will occur in the new dam as they occur naturally in the river. Crops and vegetable gardens can be fenced with a simple hippo-proof solution. Should these animals continue to be a problem, then they can be darted and relocated, culled, or local or tourist hunts can be organised.

- Would farmers within the purchase line be allowed to use water from the dam for agricultural purposes?

A water abstraction permit will have to be obtained before abstraction can take place. Such a permit will be granted by DWAF through the Water User Association.

Mutoti



Mphego



Tshilongoma



Mulenzhe



Dididi



Makovha



Tswinga



APPENDIX 3:
USER CARRYING CAPACITIES DETERMINED FOR THE NANDONI DAM

The determination of user carrying capacity for the identified water surface and waterfront zones is based on a method recommended by Ecotourism Afrika in their *Methodology for Recreational Carrying Capacity Assessment and Determination*, a document compiled for DWAF.

According to the above document, it is necessary to undertake a three step calculation in order to realistically determine the user carrying capacity of an area, be it water surface or waterfront. These steps are as follows:

- The determination of the Physical Carrying Capacity (PCC), which is simply the maximum number of users that can physically fit into a defined area in one day;
- The determination of Real Carrying Capacity (RCC), which is the maximum number of users that the area can sustain, once limiting biophysical, environmental, ecological and social factors have been taken into account. These factors are expressed as a percentage and subtracted from the Physical Carrying Capacity value determined during step 1;
- Effective Carrying Capacity (ECC), which is the recommended number of users that the area can sustain, once infrastructure and management capacity have been taken into account. These factors are expressed as a permitted proportion of the Real Carrying Capacity determined during step 2.

The carrying capacities determined pertain to the dam as a whole. Exceeding recommended use densities in one area will no doubt have to be balanced by reducing development densities in other areas (of the same zone). Variable scenarios such as these may be considered on merit at the time at which motivations are put forward for higher use densities than those recommended for the zone in question.

Tender specifications must include detailed anticipated and / or permitted user carrying capacities and all tenders must be evaluated in this regard to ensure that the recommended carrying capacities determined below are not exceeded.

Note that these calculations are preliminary, based on environmental assumptions and existing infrastructural and limitations. As additional and / or different information regarding environmental and management considerations is acquired, then the relevant Real and Effective Carrying Capacities should be amended accordingly.

Water Surface zones

A. CONSERVATION ZONES

- Not applicable. No recreational and / or development activity is permitted.

B. LOW INTENSITY USE ACTIVITY ZONE

Permitted Activity	Required operational area	Area	No of visits	Physical Carrying Capacity
Fishing (non-motorised craft)	3 ha per boat*	572 ha	1	191 boats permitted
Canoeing	0,3 ha per boat*		1	1907 canoes permitted
Sailing	6 ha per boat*		1	95 boats permitted
House boating	6 ha per boat		1	95 boats permitted

* Recommended values as per *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Department of Water Affairs and Forestry. August 1999.

Permitted Activity	Environmental variables	Corrective factor (%)	Real Carrying Capacity
Fishing (non-motorised craft)	Heat, wind, rain	30% of 191 = 57 boats	134 boats
	Submerged vegetation	10% of 134 = 13 boats	121 boats
	Water quality	20% of 121 = 24 boats	97 boats
	Shallows vegetation, mud	10% of 97 = 10 boats	87 boats permitted
Canoeing	Heat, wind, rain	30% of 1907 = 572 canoes	1335 canoes
	Submerged vegetation	10% of 1335 = 134 canoes	1201 canoes
	Water quality	20% of 1201 = 240 canoes	961 canoes
	Shallows vegetation, mud	10% of 961 = 96 canoes	865 canoes permitted
Sailing	Heat, wind, rain	30% of 95 = 29 boats	66 boats
	Submerged vegetation	10% of 66 = 7 boats	59 boats
	Water quality	20% of 59 = 12 boats	47 boats
	Shallows vegetation, mud	10% of 47 = 5 boats	42 boats permitted
House boating	Heat, wind, rain	30% of 95 = 29 boats	66 boats
	Submerged vegetation	10% of 66 = 7 boats	59 boats
	Water quality	20% of 59 = 12 boats	47 boats
	Shallows vegetation, mud	10% of 47 = 5 boats	42 boats permitted

Permitted Activity	Management variables	Corrective factor	Effective Carrying Capacity
Fishing (non-motorised craft)	Access roads / informal launch sites (3)	5 boats per site	15 boats per day permitted
	Comm. access nodes / informal launch sites (7)	5 boats per site	35 boats per day permitted
	Jetties and slipways (0)	15 boats per site	0 boats per day permitted
Canoeing	Access roads / informal launch sites (3)	5 canoes per site	15 canoes per day permitted
	Jetties and slipways (0)	15 canoes per site	0 boats per day permitted
Sailing	Access roads / informal launch sites (3)	5 boats per site	15 boats per day permitted
	Jetties and slipways (0)	15 boats per site	0 boats per day permitted
House boating	Jetties and slipways (0)	15 boats per site	0 boats per day permitted

C. HIGH INTENSITY USE ACTIVITY ZONE

Permitted Activity	Required operational area	Area	No of visits	Physical Carrying Capacity
Fishing (motorised and non-motorised)	3 ha per boat*	658,5 ha	1	220 boats permitted

* Recommended values as per *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Department of Water Affairs and Forestry. August 1999.

craft)			
Canoeing	0,3 ha per boat*		1 2195 canoes permitted
Sailing	6 ha per boat*		1 110 boats permitted
House boating	6 ha per boat		1 110 boats permitted
Motor boating	6 ha per boat*		1 110 boats permitted

Permitted Activity	Environmental variables	Corrective factor (%)	Real Carrying Capacity
Fishing (motorised and non-motorised craft)	Heat, wind, rain	30% of 220 = 66 boats	154 boats
	Submerged vegetation	10% of 154 = 15 boats	139 boats
	Water quality	20% of 139 = 28 boats	111 boats permitted
Canoeing	Heat, wind, rain	30% of 2195 = 659 canoes	1536 canoes
	Submerged vegetation	10% of 1536 = 154 canoes	1382 canoes
	Water quality	20% of 1382 = 276 canoes	1106 canoes permitted
Sailing	Heat, wind, rain	30% of 110 = 33 boats	77 boats
	Submerged vegetation	10% of 77 = 8 boats	69 boats
	Water quality	20% of 69 = 14 boats	55 boats permitted
House boating	Heat, wind, rain	30% of 110 = 33 boats	77 boats
	Submerged vegetation	10% of 77 = 8 boats	69 boats
	Water quality	20% of 69 = 14 boats	55 boats permitted
Motor boating	Heat, wind, rain	30% of 110 = 33 boats	77 boats
	Submerged vegetation	10% of 77 = 8 boats	69 boats
	Water quality	20% of 69 = 14 boats	55 boats permitted

Permitted Activity	Management variables	Corrective factor	Effective Carrying Capacity
Fishing (motorised & non-motorised craft)	Access roads / informal launch sites (4)	5 boats per site	20 boats per day permitted
	Comm. access nodes / informal launch sites (5)	5 boats per site	25 boats per day permitted
	Jetties and slipways (0)	15 boats per site	0 boats per day permitted
Canoeing	Access roads / informal launch sites (4)	5 canoes per site	20 canoes per day permitted
	Jetties and slipways (0)	15 canoes per site	0 boats per day permitted
Sailing	Access roads / informal launch sites (4)	5 boats per site	20 boats per day permitted
	Jetties and slipways (0)	15 boats per site	0 boats per day permitted
House boating	Jetties and slipways (0)	15 boats per site	0 boats per day permitted
Motor boating	Jetties and slipways (0)	15 boats per site	0 boats per day permitted

D. TRANSITIONAL ZONE

Permitted Activity	Required operational area	Area	No of visits	Physical Carrying Capacity
Fishing (non-motorised craft)	3 ha per boat	167,5 ha	1	As per high intensity use zone allowance
Canoeing	0,3 ha per boat		1	As per high intensity use zone allowance
Sailing	6 ha per boat		1	As per high intensity use zone allowance
Docking & launching of motorised & non-motorised craft	Not applicable		Not applicable	As per high intensity use zone allowance

Waterfront zones

A. CONSERVATION ZONES

Permitted Activity	Required operational area	Area	No of visits	Physical Carrying Capacity
Hiking	No specified requirement.	509,5 ha	Any(daytime)	As dictated by the difficulty of the trail
Bird watching	No specified requirement		Any(daytime)	As dictated by the environment

B. AGRICULTURAL ZONES

Permitted Activity	Required operational area	Area	No of visits	Physical Carrying Capacity
Shore fishing	10m of shore per fisherman ⁴⁰	34893 m	1	3489 fishermen permitted
Cultivation	No specified requirement	445,5 ha	Not applicable	To be determined on site & monitored
Grazing	To be determined by ecologist		Not applicable	To be determined by ecologist & monitored
Picnics	400m ² per picnic area (for 4) ⁴¹		1	11138 picnic areas permitted
Sport and games	8000m ² per rec. group (of 30) ⁴²		1	557 games areas permitted
Primary needs	12m ² per family (of 6)		1	371250 families permitted
Social gatherings	200m ² per group (of 100)		1	22275 groups permitted

⁴⁰ Recommended values as per *Guidelines for the Compilation of Zoning Plans for Government Waterworks*. Department of Water Affairs and Forestry. August 1999.

⁴¹ Based on recommended areas for picnic sites including buffer areas. *Timesaver Standards for Landscape Architecture*. Harris & Dines. 1988.

⁴² Based on high school soccer field with spectator area included. *Timesaver Standards for Landscape Architecture*. Harris & Dines. 1988.

Permitted Activity	Environmental variables	Corrective factor (%)	Real Carrying Capacity
Shore fishing	Heat, wind, rain	30% of 3489 = 1047	2442 fishermen
	Water quality	10% of 2442 = 244	2198 fishermen
	Shallows vegetation, mud	35% of 2198 = 769	1429 fishermen permitted
Picnics	Heat, wind, rain	30% of 11138 = 3341	7797 picnic areas
	Cultivated land / grazing	80% of 7797 = 6238	1559 picnic areas
	Denuded land under rehabilitation	50% of 1559 = 780	780 picnic areas
	Visual intrusion / undesirable aesthetics	50% of 780 = 390	390 picnic areas permitted
Sport and games	Heat, wind, rain	30% of 557 = 167	390 games areas
	Cultivated land / grazing	80% of 390 = 312	78 games areas
	Denuded land under rehabilitation	50% of 78 = 39	39 games areas
	Visual intrusion / undesirable aesthetics	50% of 39 = 20	20 games areas permitted
Primary needs	Heat, wind, rain	30% of 371250 = 111375	259875 families
	Cultivated land / grazing	80% of 259875 = 207900	51975 families
	Denuded land under rehabilitation	50% of 51975 = 25988	25988 families
	Visual intrusion / undesirable aesthetics	50% of 25988 = 12994	12994 families permitted
Social gatherings	Heat, wind, rain	30% of 22275 = 6683	15592 groups
	Cultivated land / grazing	80% of 15592 = 12474	3118 groups
	Denuded land under rehabilitation	50% of 3118 = 1559	1559 groups
	Visual intrusion / undesirable aesthetics	50% of 1559 = 780	780 groups permitted

Permitted Activity	Management variables	Corrective factor	Effective Carrying Capacity
Shore fishing	Comm. access nodes / informal fishing sites (12)	100 fishermen per site	1200 fishermen per day
Picnics	Comm. access nodes / recreation sites (12)	20 picnic areas per site	240 picnic areas with an average of 4 picnickers per area (960 picnickers) per day
Sport and games	Comm. access nodes / recreation sites (12)	1 games area per site	12 games areas with an average of 30 users per area (360 users) per day
Primary needs	Comm. access nodes (12)	100 families per site	1200 families with an average of 6

			members (7200 users) per day
Social gatherings	Comm. Access nodes (12)	2 groups per site	24 groups with an average of 100 members (2400 users) per day

C. RECREATION ZONES

Permitted Activity	Required operational area	Area	No of visits	Physical Carrying Capacity
Shore fishing	10m of shore per fisherman	9787m	1	979 fishermen
Hiking	No specified requirement.	124,3 ha	Any(daytime)	As dictated by the environment
Bird watching	No specified requirement		Any(daytime)	As dictated by the environment
Picnics	400m ² per picnic area (for 4)		1	3108 picnic areas
Camping	1200m ² per camp (for 6) ⁴³		1	1035 camp areas
Guest houses	100 beds		1	100 guests
Holiday resorts / hotels	200 beds		1	200 guests

Permitted Activity	Environmental variables	Corrective factor (%)	Real Carrying Capacity
Shore fishing	Heat, wind, rain	30% of 979 = 294	685 fishermen
	Water quality	10% of 685 = 69	616 fishermen
	Shallows vegetation, mud	35% of 616 = 216	400 fishermen permitted
Picnics	Heat, wind, rain	30% of 3108 = 932	2176 picnic areas
	Denuded land under rehabilitation	50% of 2176 = 1088	1088 picnic areas
	Visual intrusion / undesirable aesthetics	50% of 1088 = 544	544 picnic areas permitted
Camping	Heat, wind, rain	30% of 1035 = 311	724 camp areas
	Denuded land under rehabilitation	50% of 724 = 362	362 camp areas
	Visual intrusion / undesirable aesthetics	50% of 362 = 181	181 camp areas permitted
Guest houses	Not applicable	Not applicable	100 guests
Holiday resorts / hotels	Not applicable	Not applicable	200 guests

Permitted Activity	Management variables	Corrective factor	Effective Carrying Capacity
Shore fishing	Access roads / informal recreation sites (3)	50 fishermen per site	150 fishermen per day

⁴³ Based on recommended areas for camp sites including buffer areas. *Timesaver Standards for Landscape Architecture*. Harris & Dines. 1988.

	Tourist development nodes with infrastructure (0)	50 fishermen per site	0 fishermen per day
Picnics	Access roads / informal recreation sites (3)	20 picnic areas per site	60 picnic areas with an average of 4 picnickers per area (240 picnickers) per day
	Tourist development nodes with infrastructure (0)	20 picnic areas per site	0 picnic areas with an average of 4 picnickers per area (0 picnickers) per day
Camping	Access roads / informal recreation sites (3)	10 camp areas per site	30 camp areas with an average of 6 campers per area (180 campers) per day
	Tourist development nodes with infrastructure (0)	10 camp areas per site	0 camp areas with an average of 6 campers per area (0 campers) per day
Guest houses	Tourist development nodes with infrastructure (0)	10 beds per development node	0 beds per development node
Holiday resorts / hotels	Tourist development nodes with infrastructure (0)	50 beds per development node	0 beds per development node

D. SAFETY AND SECURITY ZONES

- Not applicable. No recreational and / or development activity is permitted.

APPENDIX 4:
ESTIMATE OF CAPITAL EXPENDITURE TO BRING THE MANAGEMENT BODY
INTO OPERATION.

The Nandoni Dam Sustainable Utilisation Plan concluded that in order to conserve the natural environment and to enhance the development, tourism, and agricultural potential of the Nandoni Dam basin, activities listed for the management of the various items as discussed in this document should commence as soon as is practically possible. In order to accomplish this, a task team will be put into action to set up a Water User Association (Appendix 1 contains a list of people who have volunteered to become involved in this task team).

For the task team to begin fulfilling some initial environmental management tasks and actions as set out in the above-mentioned document, a degree of support infrastructure in the form of an administrative base is necessary. Ideally, this base should take the form of an office and should be located close to the dam in a position of easy and legible access. Should the office be located within the purchase line, then cognisance must be taken of the Zoning Plan recommendations and the necessary environmental management actions as recommended in the Environmental Management Plan must be followed.

The cost of setting up such a base office, excluding the cost of setting up a Water User Association, can be determined according to the following accommodation list:⁴⁴

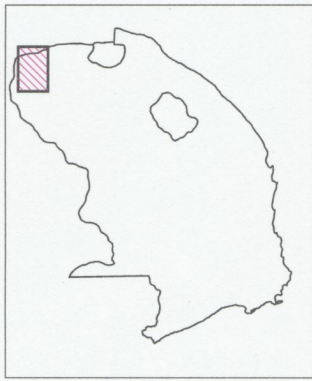
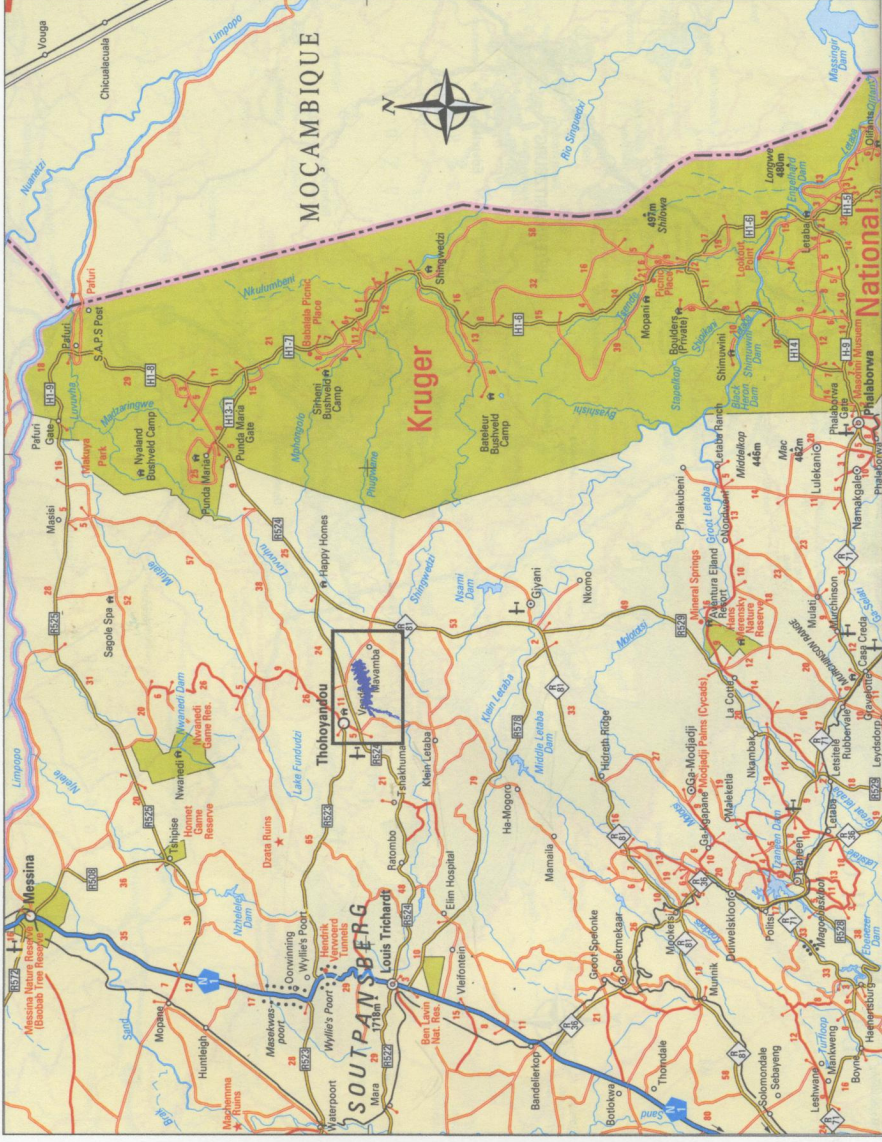
- Building costs (approximately 120m² with a bathroom and kitchenette including finishes);
- Surfaced parking area with shade structure (4 cars)
- Signposting from the nearest main road;
- Telephone, water, electricity and sewage connections;
- Security system (as is appropriate for the area);
- Small office safe;
- Office furniture (including desks, chairs, boardroom table with chairs – at least 10, filing cabinets, bookshelves, display racks);
- Office décor (including blinds and curtains);
- Office equipment (including telephones, computers with appropriate programmes, printer, scanner, fax machine, photocopier, staff cellphones, field radio's);
- Office consumables (such as paper, stationery);
- Office kitchenette (including a bar fridge, kettle, microwave, coffee and tea set, drinking glasses, consumables);
- Other (such as e-mail and internet subscriptions, advertising, the cost of setting up a trust fund).

These initial start-up costs should make allowance for the first few years of operation, or until reliable sources of income for the dam have been established.

The running costs of the base office can be determined according to the following monthly expenses list:

- Staff salaries (allowing for pensions, personal tax, allowances and subsidies);
- Taxes;
- Water and electricity costs and refuse removal;
- Security system (if relevant);
- Telephone (including land lines and cellphones);
- Office consumables (such as paper, stationery);
- Printing and photocopying costs;
- IT support;
- Building, equipment and furniture upkeep and maintenance.

⁴⁴ Note: no rates or prices have been included as these may be dated by the time this base office is built / set up. The items should be based on time-relevant rates and prices.



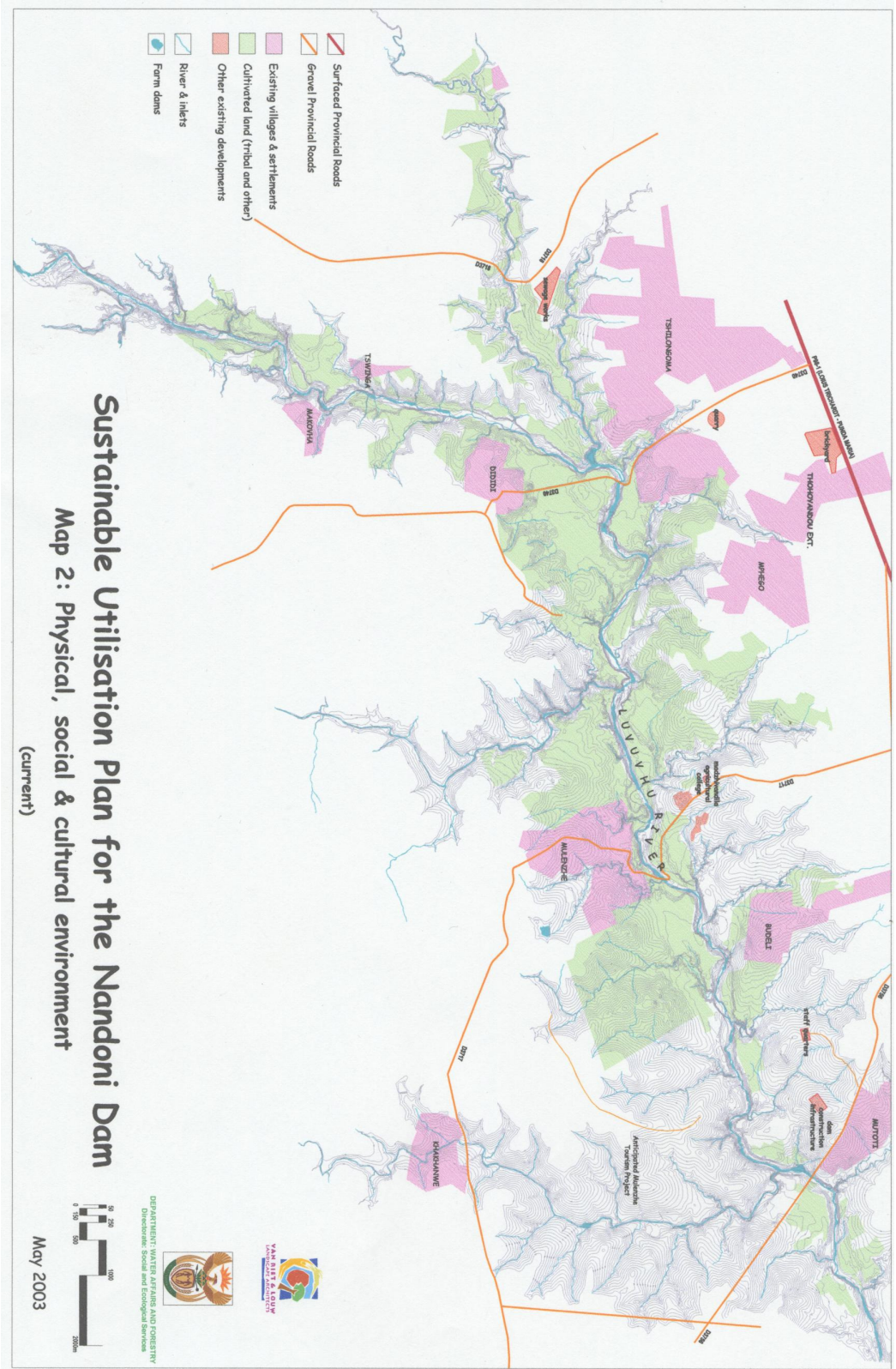
Sustainable Utilisation Plan for the Nandoni Dam

Map 1: Orientation



DEPARTMENT OF WATER AFFAIRS AND FORESTRY
 NATIONAL WATER RESEARCH INSTITUTE

Mar. 2003



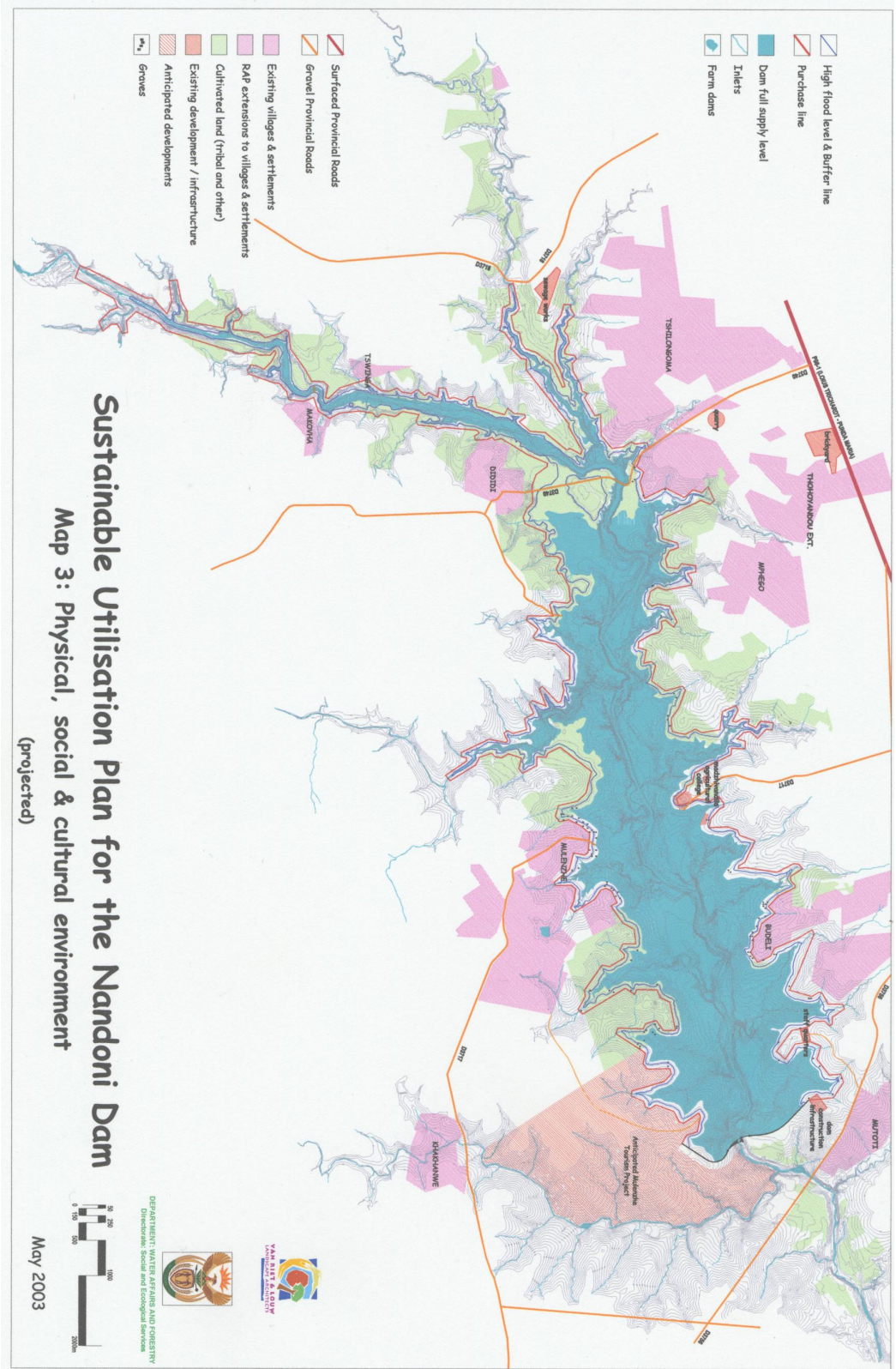
Sustainable Utilisation Plan for the Nandoni Dam

Map 2: Physical, social & cultural environment (current)




DEPARTMENT OF WATER AFFAIRS AND FORESTRY
 Directorate: Social and Ecological Services

May 2003



- High flood level & Buffer line
- Purchase line
- Dam full supply level
- Inlets
- Farm dams

- Surfaced Provincial Roads
- Gravel Provincial Roads
- Existing villages & settlements
- RAP extensions to villages & settlements
- Cultivated land (tribal and other)
- Existing development / infrastructure
- Anticipated developments
- Groves

Sustainable Utilisation Plan for the Nandoni Dam

Map 3: Physical, social & cultural environment

(projected)



May 2003


DEPARTMENT OF WATER AFFAIRS AND FORESTRY
 Directorate: Social and Ecological Services


VAN HEES & LOUW
 CONSULTANTS

