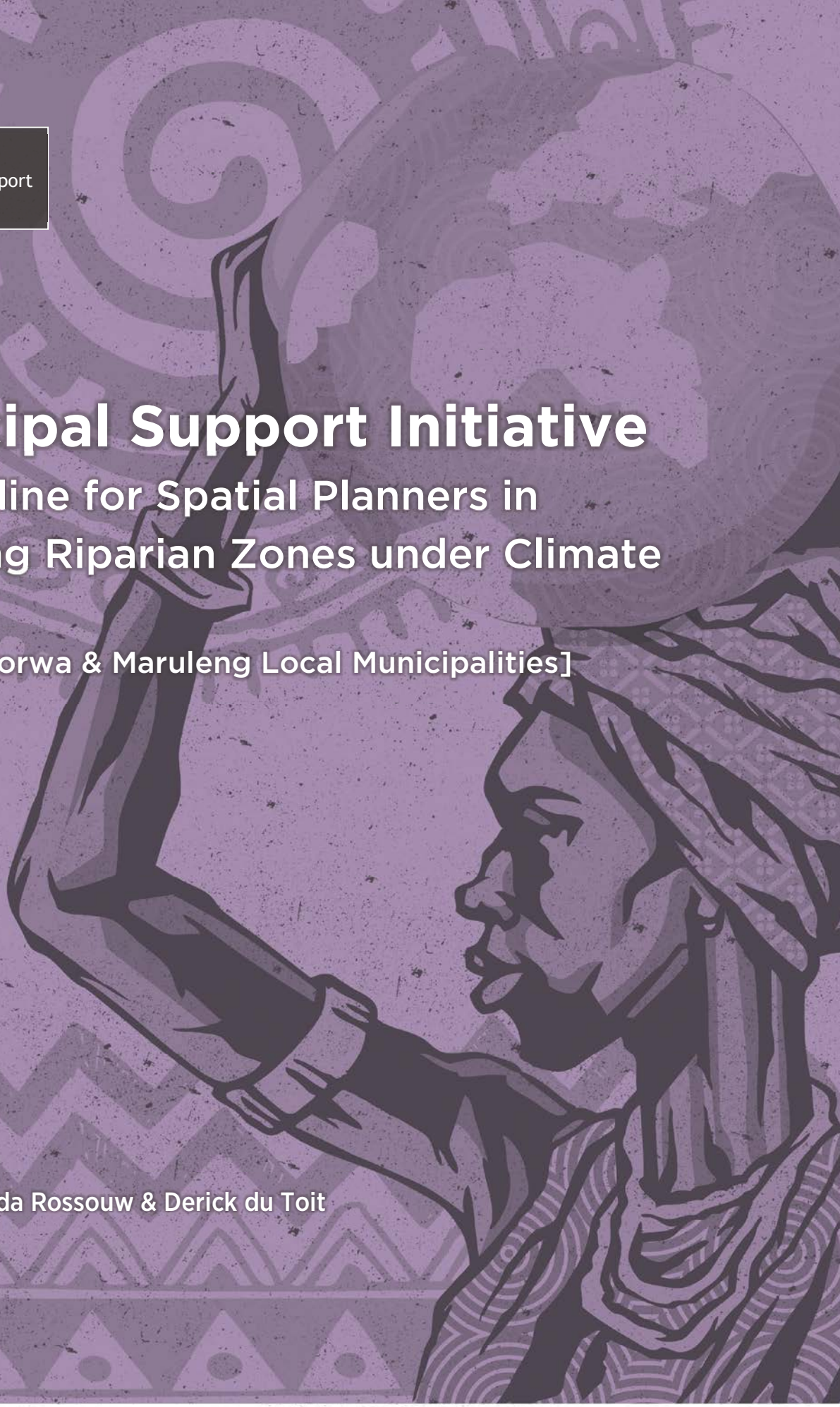
35 AWARD Tech Report Series

Municipal Support Initiative

A Guideline for Spatial Planners in Managing Riparian Zones under Climate Change

[Ba-Phalaborwa & Maruleng Local Municipalities]



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USAID: RESILIENCE IN THE LIMPOPO BASIN PROGRAM (RESILIM) – OLIFANTS

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Abbreviations

AR4	Fourth Assessment Report of the IPCC
CEO	Chief Executive Officer
CMA	Catchment Management Agency
DEA	Department of Environmental Affairs
DM	District municipality
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
INR	Institute for Natural Resources
IPCC	International Panel on Climate Change
IRHI	Index of Reservoir Habitat Impairment
IUA	Integrated Unit of Analysis
LTAS	Long-term Adaptation Scenarios
RDP	Reconstruction and Development Plan
RQOs	Resource Quality Objectives
RWQOs	Resource Water Quality Objectives
SDF	Spatial Development Framework
SUDS	Sustainable Urban Drainage Systems
VIP	Ventilated Improved Pit latrine
WMS	Water Management System
WTW	Water Treatment Works
WUDS	Water Sensitive Urban Design
WWTW	Wastewater Treatment Works

1 Introduction

In terms of the Constitution (Schedule 4, Part B), Local Governments are responsible for landuse planning and management. As landuse activities directly impact on the environment, Local Government must consider the impacts of the landuses on environment, including the resultant runoff water quantity and quality. The consequences of non- or poor management are impacts on our riverine systems and potential negative impacts on human settlements downstream. Land use planning is also set to have an impact on whether climate change scenarios will be experienced as server or not.

Since municipalities span the full surface area of river catchments it is important that they are able to understand the importance of land use decisions on the catchment as a system. Furthermore it is upon them to plan and monitor so that the system is not adversely affected by poor land use decisions. For example, Local Governments are responsible for stormwater management, as such they are responsible to ensure the quality of the stormwater resulting from the landuse activities, and reaching the rivers or water resource body, does not degrade the quality of the resource.

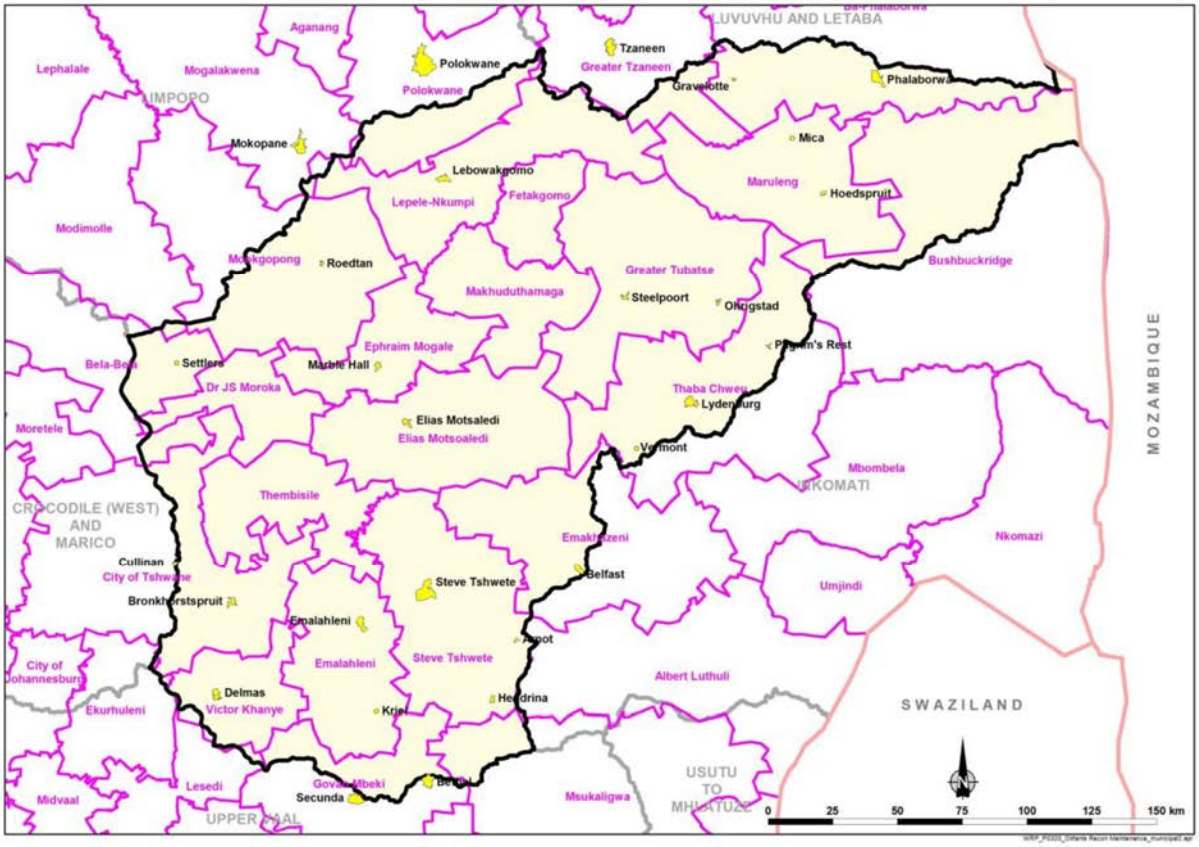

Figure 1: Local municipalities included in the Olifants Catchment (Source WRP consulting)

In order to manage the water resources of the country, both quality and quantity, a series of Resource Quality Objectives (RQOs) have been determined for various reaches of the rivers and resources of South Africa. The RQOs provide a set of targets and thresholds against which to manage the water resources, i.e. a volume of flow and level of acceptable pollution of the water resources at different locations. Water users and discharges, including stormwater runoff, must be managed in such a way that the national standards are met, i.e. that the pollution load reaching the water resource does not exceed the threshold set.

The Ba-Phalaborwa Local Municipality is currently updating their Spatial Development Framework (SDF) and together with Maruleng Local Municipality (both part of Mopani District Municipality) require advice on how to respond to resource management challenges in their landuse planning process. The scope of this work includes consideration of land use impacts to water quality, as well as water related risks (flooding, drought and pollution) as a result of climate change in the area; identification of pollution hotspots, applicable legislation to manage the pollution, spatial planning recommendations along riverine zones, and various mitigation recommendations.

1.1 The Purpose of this report

This report sets out to outline the impacts of landuse on riparian zones especially taking into consideration the effects of climate change, specifically within the study area. The report continues to identify the applicable legislation for managing the landuses, and landuse planning practices that should be considered during the SDF process taking into consideration the impact of landuse on the water quality.

1.2 Introduction to the Mopani DM, Ba-Phalaborwa & Maruleng LM

1.2.1 Mopani District Municipality

Mopani District Municipality (DM) is situated in the North-eastern part of the Limpopo Province, in South Africa. It is bordered in the east by Mozambique, in the north, by Vhembe District Municipality through Thulamela & Makhado Municipalities, in the south, by Mpumalanga province through Ehlanzeni District Municipality (Bushbuckridge, Thaba - Chweu and Greater Tubatse) and, to the west, by Capricorn District Municipality (Molemole, Polokwane & Lepelle - Nkumpi), in the south - west, by Sekhukhune District Municipality (Fetakgomo).

The district spans a total area of 2,001,100 ha (20,011 km^2), inclusive of a portion of Kruger National Park from Olifants to Tshingwedzi camps or Lepelle to Tshingwedzi Rivers. There are 16 urban areas (towns and townships), 354 villages (rural settlements) and a total of 125 Wards. Ba-Phalaborwa and Maruleng are two of the local municipalities serviced by the Mopani District Municipality.

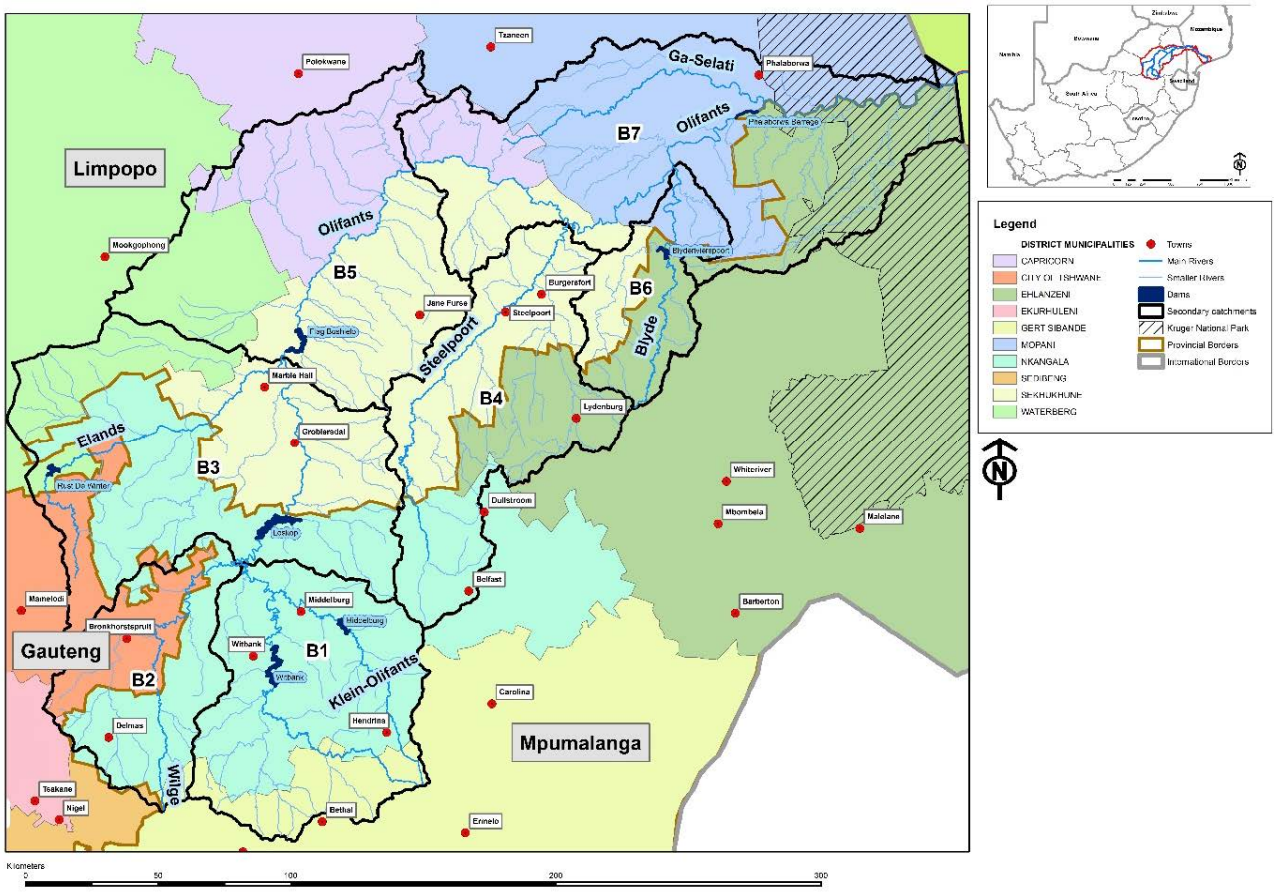

Figure 1: District municipalities in within the Olifants Catchment

The key water resources in the Mopani DM consists of:

- Lower Olifants River from where it enters the Mopani DM near Ga-Mametsa up to the outflow from the DM and Kruger National Park at Olifants Gorge,
- Blyde River from downstream of the Blyderivierpoort Dam up to its confluence with the Olifants River,
- Selati River from its origin to its confluence with the Olifants River at Phalaborwa,
- Various smaller tributaries such as the Makhutswi and Klaserie rivers, and
- Letaba River which forms part of the northern border of the DM up to its confluence with the lower Olifants River in the Kruger National Park *(Although the Letaba is not part of the Olifants (East) catchment, the principles of this report still apply)*.
- The impoundments in the study area includes the Phalaborwa Barrage, Klaserie Dam (previously called Jan-Wassenaar Dam), and some smaller farm dams.

1.2.2 Ba-Phalaborwa Local Municipality

Ba-Phalaborwa Local Municipality (LM) is situated in the north-eastern part of South Africa, in the Mopani District of the Limpopo Province. It is one of the five local municipalities in the Mopani District. The municipality has a geographic area of 746,200ha) (7,462km$^{2)}$, with private farms covering a large proportion of the area, as well as tribal land that is under the control of traditional leaders (namely, Ba-Phalaborwa Traditional Authority, Maseke Traditional Authority, Selwane Traditional Authority and Majeje Traditional Authority).

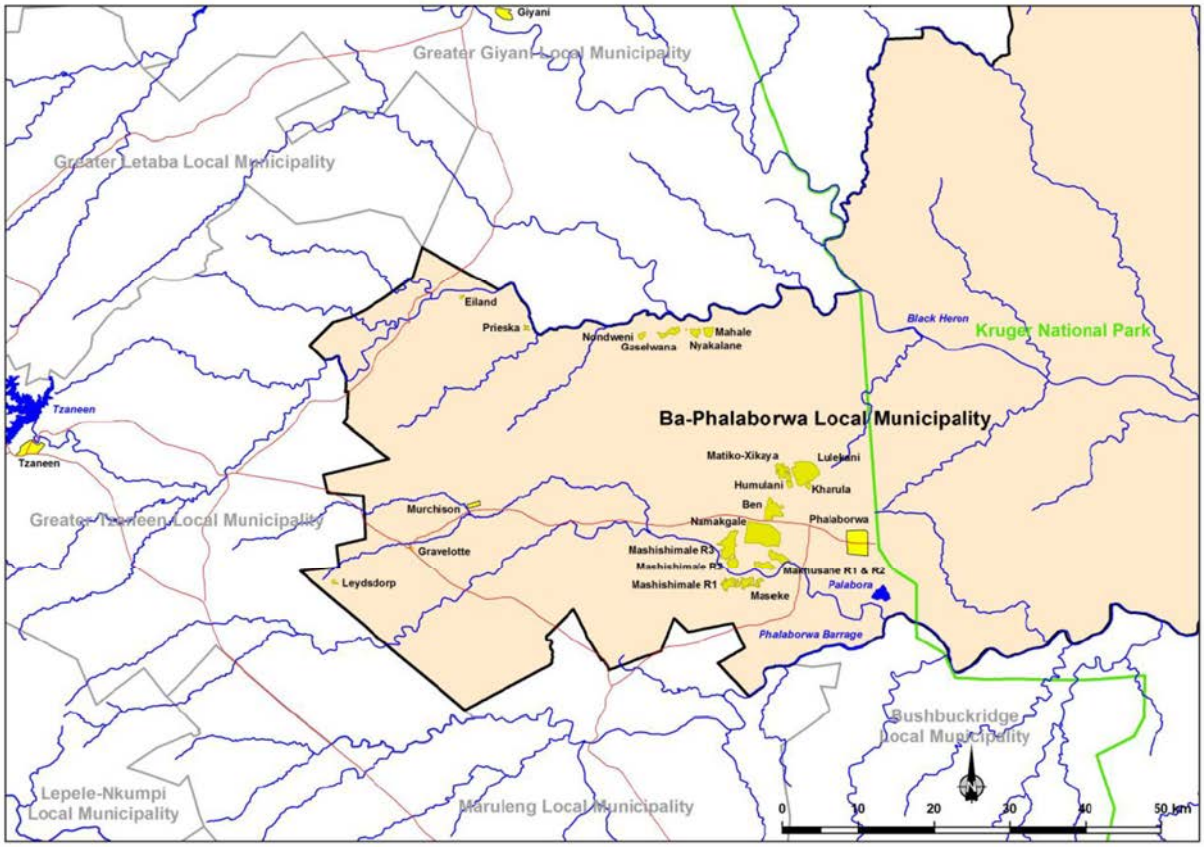

Figure 3: Ba-Phalaborwa Municipality showing high density residential including industrial and commercial areas (source WRP consulting)

The other areas are proclaimed towns of Namakgale, Lulekani and Gravelotte. Farms constitute 27% of the total municipal area. Most of the farms in Ba-Phalaborwa belong to private owners and are used for game and citrus farming. Ba-Phalaborwa serves as a convenient gateway to the Kruger National Park and the Greater Limpopo Transfrontier Park through the Mozambique (Masingir-Xai-Xai) Channel. There are several mines operating within the municipal area.

Water is mainly supplied by Lepelle Northern Water at 334.94 c/kl (2015). Phalaborwa is supplied from the Phalaborwa Barrage with the remaining schemes relying on boreholes and springs. Ba-Phalaborwa LM is supplied by 8 reservoirs that are owned and managed by Lepelle Northern Water, these reservoirs supplies BPM Town, Namakgale, Lulekani, Benfarm and Mashishimale.

Water schemes (Water Infrastructure Status & Intervention Plans, DWS, 2012)

1. Phalaborwa / Namakgale / Lulekani RWS
2. Murchison WS
3. Gravelotte WS
4. Leydsdorp local WS
5. Eiland supply
6. Prieska supply

1.2.3 Maruleng Local Municipality

The Maruleng Local Municipality (LM) is situated in the south-eastern quadrant of the Limpopo Province within the Mopani District Municipal Area of Jurisdiction. The municipal area extends over 324,699ha (3,246.99km^2).

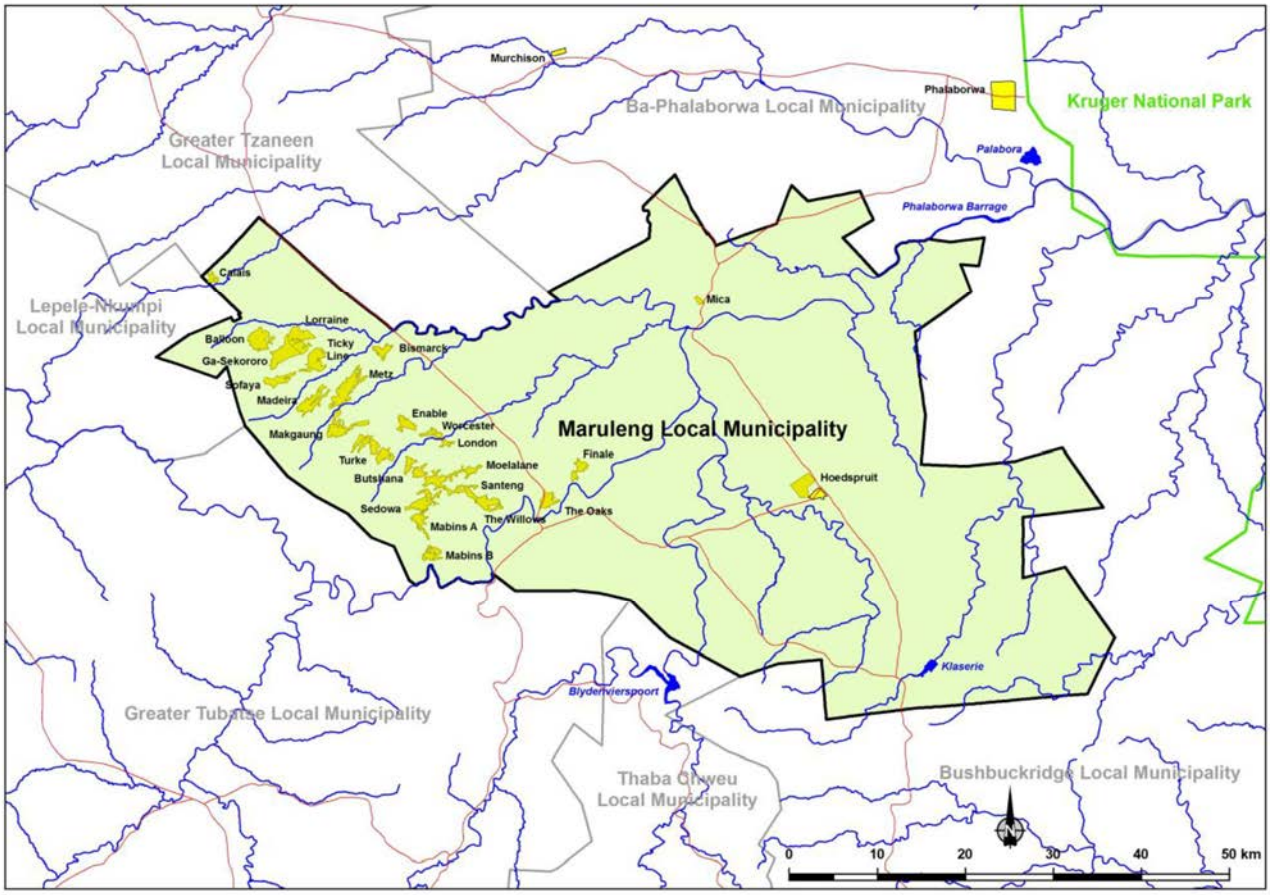

Figure 4: Maruleng Municipality showing high density residential including industrial and commercial areas

The Maruleng LM is bordered by the Kruger National Park to the east, the Ba-Phalaborwa and Tzaneen Local Municipalities to the north, the Lepelle Nkumpi Local Municipality to the west, and the Tubatse Local Municipality and Bushbuckridge Local Municipality to the south.

Agriculture, especially commercial agriculture, is a key economic driver and employment generator in Maruleng LM. The area exports mango and citrus, but other crops such as vegetables are becoming increasingly important. Maize is also cultivated by both commercial and subsistence farmers. There are other agricultural activities such as livestock which focuses on cattle, goats and poultry, and game farms and marula fruit.

The Maruleng Local Municipality is characterized by low rainfall. This results in limited water resources culminating in severe water shortages and drought condition. Only 9%of the population have access to RDP standard water sources. The Municipality also provide free basic water (6000 litres per household per month).

Hoedspruit town is supplied by the Air Force base at Drakensig. The rest of the areas in Maruleng are supplied by boreholes.

Water schemes (Water Infrastructure Status & Intervention Plans, DWS, 2012)

7. Hoedspruit / Kampersrus WS
8. Mametje Sekororo Raw Water Scheme
9. Maruleng individual WS

Lack of access to basic sanitation services has created significant environmental and health problems. The fact that most villages in the municipality don't have RDP level sanitation constitutes a major risk in terms of ground water pollution. The main types of sanitary system used in the municipality are water borne sewerage (flush toilets), septic tanks, ventilated improved Pit latrines (VIP), French drains and ordinary pit latrines to no basic services at all.

2 Spatial planning for riparian areas

Under the new Spatial Planning and Land Use Management Act (16 of 2013) (SPLUMA) is the opportunity to integrated rivers and stormwater management more appropriately into the developed environment, and therefore elicit more effective land use management. H. van den Berg and S. Braid (2017) notes that in order to successfully incorporate urban rivers into municipal landuse planning, it is critical that the state of urban areas, adjacent to riverine environments, are well-managed, regulated and are subject to sound planning practices. This necessitates that the function of urban rivers forms a fundamental informant of City Planning strategies in areas characterised by riverine environments. Urban planners must provide a facilitating environment whereby urban river are able to perform their natural functions through sound planning practices. This will not only reduce the health and safety risks to urban residents, but it also acts as a social, economic and environmental attraction for a healthy mix of land uses, which is essential to create good quality living environments for citizens.

2.1 Landuse within river buffers

Land uses can contribute toward river alteration, or river protection, to varying levels. These landuses are typically defined through the planning process, and it is therefore of fundamental importance that rivers, with a special focus on urban rivers, are included into the plans for the future of towns and cities. This requires multiple stakeholders, a strong supporting governance framework and the flexibility to transcend spatial and temporal scales.

Figure 5a provides an overview of typical landuses in the urban environment. It is important to note that this figure is illustrating all landuses and it does not imply that the land used in the diagram should be located next to urban rivers. Types of landuses are described whilst examples of building typologies that one might typically find within these landuse categories are detailed in Annexure D (taken from H. van den Berg and S. Braid, 2017).

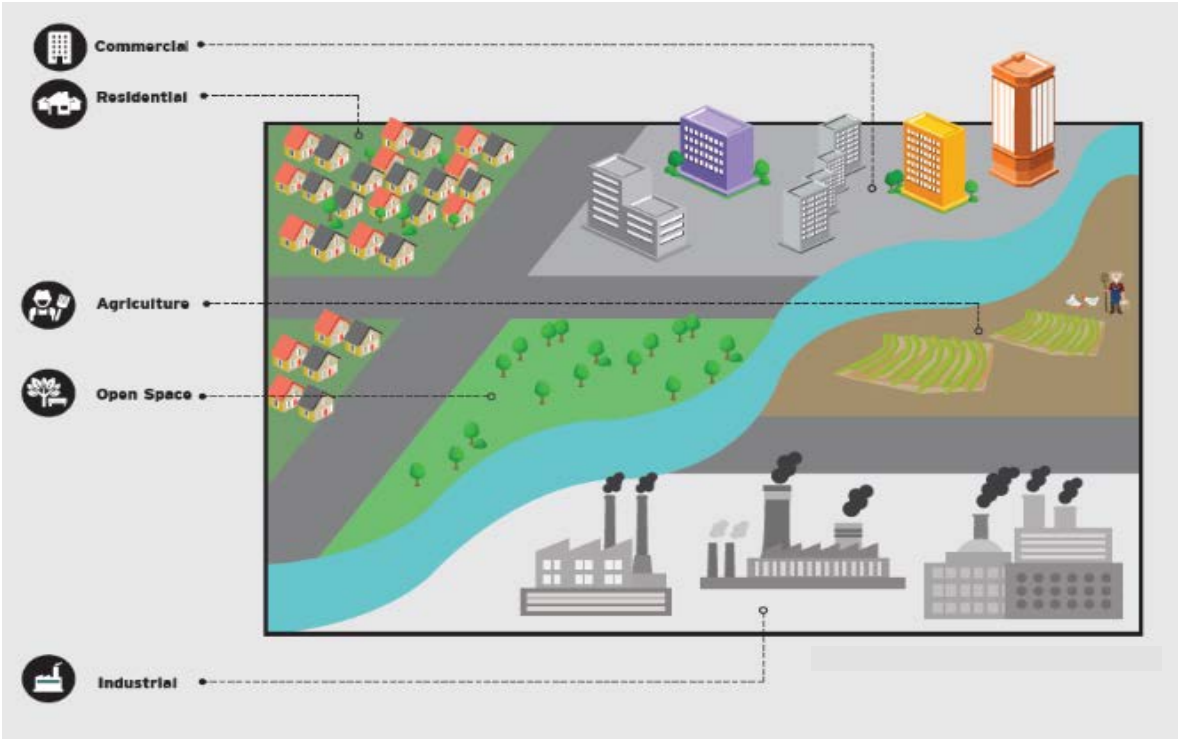

Figure 5a: Typical landuses in the urban environment (H. van den Berg and S. Braid, 2017)

Commercial

A commercial landuse zone consists of real estate intended for use by for-profit businesses for wholesale, retail and service activities, such as office complexes, shops, service stations, car dealership, mechanic, banks and restaurants. While commercial activities typically take up a relatively small amount of land compared to other types of landuses, they are extremely important to a community's economy.

Residential

Residential landuses are predominantly allocated to housing. Residential landuses vary in intensity and thus consists of low, medium and high density residential developments, or informal settlements. Lower density residential landuses typically consist of single family units on individual lots i.e. low concentration of people living on the erf. Higher density residential landuses typically consist of duplexes, townhouses or apartment buildings i.e. higher concentration of people living on the same erf, similarly with informal settlements.

Agriculture

Agricultural land, which is used for growing crops and rearing animals. Agricultural landuses are generally synonymous with farmland or cropland. Irrespective of the type of agricultural practices undertaken on the land, all areas used for agriculture is zoned under Agricultural Landuse.

Open Space

Open space landuse zones are land which are essentially unimproved and devoted to open space use, including areas for conservation of natural resources and habitat values, for protection of public health and safety such as areas subject to flooding, stoop or unstable slopes, and for compatible outdoor recreational uses such as access-ways, parks and recreation including trails and scenic enjoyment.

Industrial

Industrial landuse is the use of land dedicated to industrial activities such as manufacturing, processing, storage and mining of products. There is a wide range of industrial activities that fall under the industrial landuse; however, due to the industrial sector being a bigger threat to the environment and people's amenity, the location and integration with other zones within the city must be carefully considered. Industrial uses can generally be split into noxious and non-noxious, heavy and light industries.

A number of steps are required in order to select suitable landuses within river buffers to mitigate the impacts of landuse activities on runoff water and to mitigate effects of climate change.

2.1.1 Determine and delineate the River Setback Zones

Before identifying suitable landuses it is necessary to determine and delineate the river setback zone. Figure 5b conceptually illustrates and defines the main areas of intervention. It illustrates the ideal zones adjacent to the river where all proposed actions should occur to not only protect the river itself, but also the communities alongside the river. It must be understood that each Local Government should have different legislation outlining the width of different areas of intervention (based on their individual topographic context), thus the suggested widths used in this guideline is generally proposed width measurements based on international best practice examples.

Figure 5b: Diagram illustrating different setback zones based on best practice (H. van den Berg and S. Braid, 2017)

The Active Channel Zone

The Active Channel Zone (1:2 year floodline) consists of the actual river up to the water's edge, with the addition of a 5-meter buffer from the water's edge inland. The actual river plus the 5-meter buffer then makes up the Active Channel Zone. Strictly, no development or related (development) activities should be permitted in this zone. This zone will make allowance for 1:2 year floods and must thus remain in its natural state. The water's edge must be determined in wet months (rainy season) when the river is at its normal annual peak flow.

The Riverbank Zone

The Riverbank zone (1:100 year floodline), also known as the ecological zone, is the area stretching inland from the edge of the active channel. This zone should ideally be treated with indigenous vegetation planting and recreational mixed uses (e.g. foot paths, recreational open spaces). Exceptions to this principle include development or construction required by river dependent uses, and existing formal buildings or structures as well as other uses stipulated within this report. Undesirable uses i.e. uses that pose a risk to life from flooding, must be removed from this area and must consequently be rehabilitated. This zone falls within the 30 – 50 metre setback as illustrated in Figure 5b (refer to Table 1 for further details on the width of the buffer).

The Zone of Integration (The Light Development Zone)

The zone of integration is the area adjacent to, and on the land side of, the riverbank zone. The Zone of Integration is the area where renovation, redevelopment, or new development will occur as well as where landuses or zonings are proposed within this guideline. Such development may be commercial, residential, institutional, or any other use proposed within this guideline; however, all developments permitted in this zone should be light development.

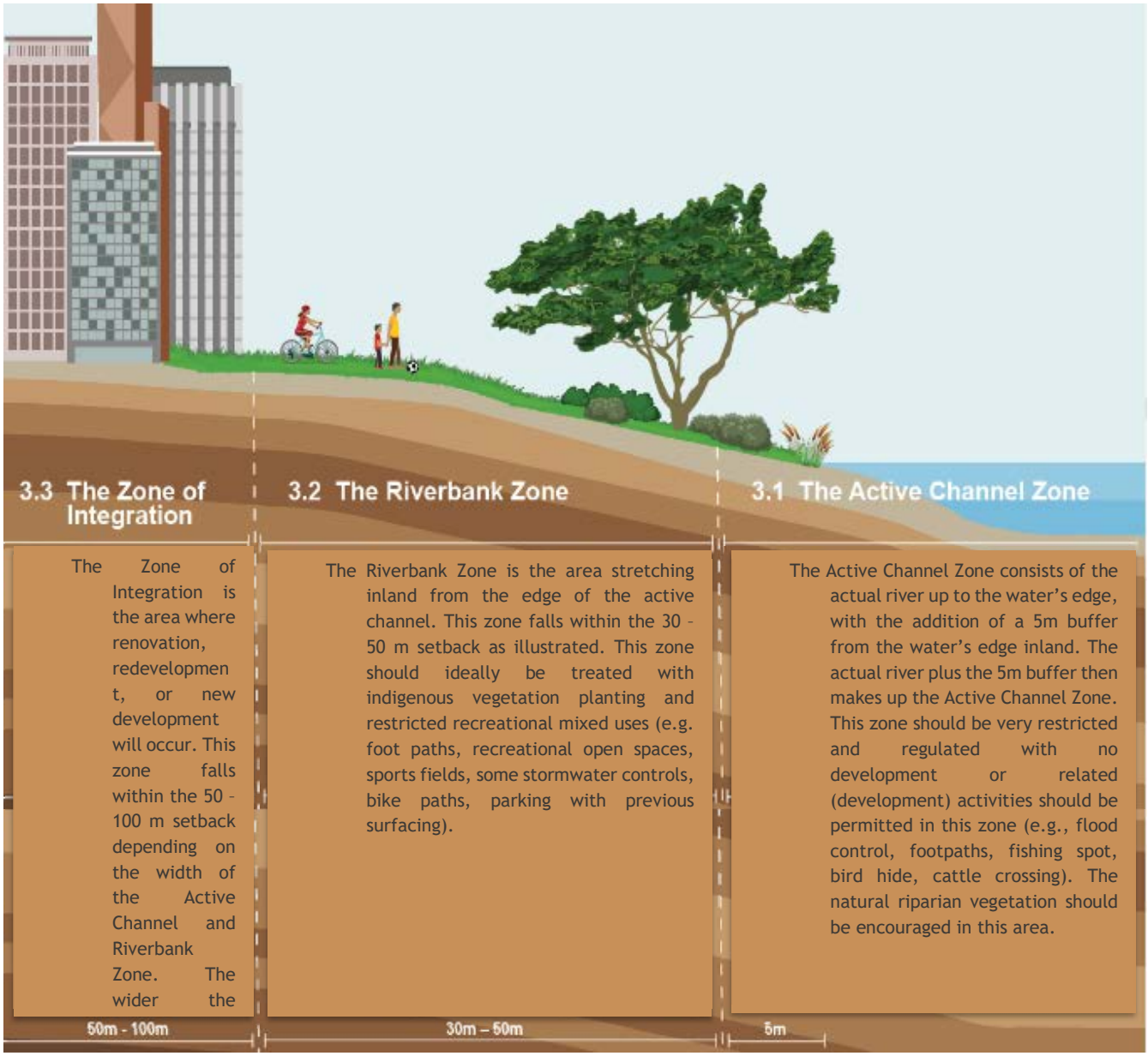

Figure 5c: Categories of River Setback Zones illustrated (H. van den Berg and S. Braid, 2017)

2.1.2 Identify suitable landuses in the Riverbank Zone

Suitable landuses in the Riverbank Zone are identified in **Error! Reference source not found.**1 below.

TABLE 1: DEFINING RIVER SETBACK ZONES

	The Active Channel	The Riverbank Zone	The Zone Of Integration
Width	- 5m measured inland from the end of saturation zone (includes 1:2year floodline	- Depends on width of river. - 1-3m wide river= 15m buffer - >3m river = 30-50m (approx.1:100year floodline or macro-channel bank whichever is greatest)	- 50m – 100m depending on width of riparian buffer. The wider the buffer, the wider the zone of integration. - Measured inland from the macro-channel bank or 1:100year flood line whichever is greatest.
Vegetative target	- Perennial grasses on steep slopes, promote slope protection and stabilisation. - Undisturbed mature forest. - Reeds. - Natural riparian vegetation	- To trap sediment filter contaminants from non-point source runoff. - Managed forest, reeds and grasses. Mix of riparian and terrestrial species. - Must promote indigenous species – clear alien, invasive and opportunistic species or sustainably managed. - Exposed soils must be covered, e.g. ground cover with beneficial plant types e.g. vygies (family of Aizoaceae), nasturtium, creeping vegetables.	- Promote indigenous vegetation. Terrestrial species. - Exposed soils must be covered, e.g. ground cover with beneficial plants e.g. vygies (family of Aizoaceae), nasturtium, creeping vegetables. - Sediment buffer e.g. vetiver grass, or sediment traps e.g. absorption trenches, to mark edge of Riverbank zone and start of zone of integration.
Allowable uses	- Very restricted and regulated (e.g. flood control, footpaths, fishing spot, bird hide, cattle crossing). - Vegetation clearing limited to only identified sites.	- Restricted activities (e.g., some recreational uses, some stormwater controls, bike paths, foot paths). - Recreational areas with floodwater attenuation e.g. depressed soccer field. - Must be pervious surfacing, silt trapping activities. - Constructed wetlands for pre-treatment of runoff. - Limited farming activities in specific identified sites. Must comply with climate smart farming and sustainable landuse practices – no tillage, rotational grazing, mulching, sediment trapping, etc. Must include flood protection farming e.g. regular vegetation barriers, flood resistant crops e.g. hardy trees. - Use a road, footpath, flood berm or vegetated contour ridge to demarcate the upper edge of the buffer area.	- Landuses may include: residential, commercial, recreational, transport, education. Must adhere to landuse control activities for mitigating impacts. - Must include waste and pollution minimisation activities. - Farming practices must include silt trapping, erosion protection, minimal tillage and other soil conservation and climate smart farming practices. - Must be pervious surfacing, silt trapping activities, constructed wetlands for pre-treatment of runoff.

	- No formal structures in this area.

2.1.3 Sustainable Urban Drainage Systems (SUDS)

According to Armitage *et al* (2013) stormwater management in the urban areas of South Africa has and continues to predominantly focus on collecting runoff and channelling it to the nearest watercourse. This means that stormwater drainage currently prioritises quantity (flow) management with little or no emphasis on the preservation of the environment or the quality of the runoff water. The result has been a significant impact on the environment through the resulting erosion, siltation, pollution and reduced groundwater recharge. An alternative approach is to consider stormwater as part of the urban water cycle, a strategy which is being increasingly known as Water Sensitive Urban Design (WSUD) with the stormwater management component being known as Sustainable Drainage Systems (SUDS).

Armitage *et al* (2014) notes that the adoption of an approach like WSUD has the potential to bring about a positive change in urban areas in many ways, e.g. lowering temperatures, in respect of climate change adaptation and mitigation, improving ground water recharge and improved water quality at discharge. Conserving potable water resources also means that there will be water available for other productive uses; this has socio-economic implications and ensures greater equity in terms of the availability of a wider variety of water services

SUDS attempt to manage surface water drainage systems holistically in line with the ideals of sustainable development. It aims to design for water quantity management, water quality treatment, enhanced amenity, and the maintenance of biodiversity. In so doing many of the negative environmental impacts of stormwater are mitigated and some benefits, such as resilience to climate change, are realised.

Infrastructure-related activities which can be implemented as part of WSUD include:

- Stormwater management- taking a SUDS approach which incorporates elements such as flood mitigation.
- Sanitation/wastewater minimisation- including effluent quality improvement and use of treated wastewater/recycled water.
- Groundwater management- artificial recharge, use of groundwater.
- Sustainable water supply options- including water conservation/demand management, reduction of non-revenue water, alternative water sources, e.g. rainwater/stormwater harvesting.

For the purposes of this report only SUDS will be looked at in more detail in Section 6.2.

3 Concluding remarks

Water quality in the Mopani DM would be affected by the increase in water temperature that would affect the growth and/or decay rates of aquatic flora and organisms, and by an increase in rainfall intensity and probably flash floods that could overtop existing pollution control dams. The current stormwater management requires review and integration into the land use planning process to ensure improved management especially of water quality reaching the receiving water sources.

Monitoring of water quality in urban areas is the responsibility of local authorities and there is an urgent need for the two LA's to implement monitoring of their wastewater discharges, and the quality of urban and peri-urban streams and rivers. Similarly, it is the responsibility of the LMs to ensure their discharge, especially stormwater, does not exceed the RQOs.

4 References

Anchor Environmental Consultants, The Freshwater Consulting Group and 3rd Quarter 2012. *Development of a Water Quality Index and Related Reporting Tools and Information for Inland and Coastal Waters of the City of Cape Town*. Application of the City of Cape Town Water Quality Index to historical water quality data: 1978 to 2011. Prepared for the City of Cape Town, July 2012.

Armitage, N., Vice, M., Fisher-Jeffes, l., Winter, K., Spiegel, A., and J. Dunstan. (2013). *Alternative Technology for Stormwater Management. The South African Guidelines for Sustainable Drainage Systems*. Report to the Water Research Commission by University of Cape Town. WRC Report No. TT 558/13.

Armitage, N., Fisher-Jeffes, L., Carden, K., Winter, K., Naidoo, V., Spiegel, A., Mauck, B., and D. Coulson. (2014). *Water Sensitive Urban Design (WSUD) for South Africa: Framework and Guidelines*. Report to the Water Research Commission by Urban Water Management Research Unit Departments of Civil Engineering, Environmental & Geographical Science, Social Anthropology, and Political Studies, University of Cape Town. WRC Report No. TT 588/14

Ashton, P.J. (2009). *An overview of the current status of water quality in South Africa and possible future trends of change*. Unpublished report by the Water Ecosystems and Human Health Research Group, Natural Resources and the Environment Unit, CSIR, Pretoria.

Department of Water Affairs (DWA), 2009. *Adopt-a-River Programme Phase II: Development of an Implementation Plan. Manual for Volunteer Monitoring*. Prepared by K. Versfeld and J.N. Rossouw for Department of Water Affairs, Pretoria, South Africa.

Department of Water Affairs (DWA) (2011). *Planning Level Review of Water Quality in South Africa. Directorate Water Resource Planning Systems: Water Quality Planning. Resource Directed Management of Water Quality*. Sub-series No.WQP 2.0. Pretoria, South Africa.

Department of Environmental Affairs (DEA). 2013. *Long-Term Adaptation Scenarios Flagship Research Programme (LTAS) for South Africa*. Summary for Policy-Makers. Pretoria, South Africa.

Department of Water Affairs, 2013. *Climate change Water Quality Assessment*. Prepared by JN Rossouw as part of the Climate Change Status Quo Analysis and a Climate Change Strategy for Water Resources project. Final draft, December 2012.

Department of Water Affairs, 2013. *Green Drop Report. Volume 1: Municipal and Private Waste Water Systems*. Final Draft.

Department of Water and Sanitation (DWS). 2014. *Determination of Resource Quality Objectives in the Olifants Water Management Area (WMA4): Resource Quality Objectives and Numerical Limits Report*. Report No.: RDM/WMA04/00/CON/RQO/0214. Chief Directorate: Water Ecosystems. Study No.: WP10536. Prepared by the Institute of Natural Resources (INR) NPC. INR Technical Report No.: INR492/14.(vi). Pietermaritzburg, South Africa.

Department of Water and Sanitation (DWS). 2015. *Proposed classes and resource quality objectives of the water resources for the Olifants catchment*. Government Notice No. 619. Government Gazette, 39004 of 20 July 2015.

H. van den Berg and S. Braid (2017). *Development of Sustainable River-Based Urban Planning Guideline for Sub-Saharan Africa*. Guidelines compiled for ICLEI BY Aurecon South Africa. Project no. 113163, *Pre-Final Draft Report 2*.

Rossouw, JN, Kamish, W, & Görgens, AHM (2008). *Technical Instruments to Support Water Quality Use Allocation*. WRC Report No. TT 363/08, Water Research Commission, Pretoria.

Smith, D.G., McBride, G.B., Bryers, G.G., Davies-Colley, R.J., Quinn, J.M. and Vant, W.N., 1989. *A National Water Quality Network for New Zealand*. Consultancy Report 8016/2. Prepared for The Manager, Water Resources Survey, DSIR, May 1989.

W Vermeulen, Retired CEO of Lepelle Water, 2017. Personal Communication.

Annexure A: Detailed delineation of land use typologies & it's desirability in the river setback zones

(from H. van den Berg and S. Braid, 2017)

<table>
<tr>
<td rowspan="3">This section of the guideline will outline a range of land uses or zonings that generally apply across the Sub-Saharan African context. This will be followed by providing examples of building typologies that one might typically find within these land use categories or zoning areas. The purpose of this is to provide practitioners and decision makers with guidance in terms of the type, intensity and category of land use or zoning that is desirable within each of the river setback zones (i.e. Active channel, Riverbank and Integration zone). Importantly, this list is not exhaustive and exceptions will exist and as such it simply aims to provide guidance. NB: It is critical to note that where these different typologies already exist within the river setback zones, it does not necessarily mean that relocation is required. Rather, it simply means that certain measures need to be put in place to mitigate the negative impacts on the riverine environments that are caused by certain land use or zoning types. The recommendations made within this section should ideally be conformed too for all future developments.</td>
<td>  </td>
<td>Land use and typology type is desirable for current and new developments within the river setback zone (specifically the zone of Integration unless otherwise stated).</td>
</tr>
<tr>
<td>  </td>
<td>Land use and typology type could be suitable (new developments) or made suitable (existing developments) on the condition that the adequate nature based preventative measures are instituted to mitigate the potential negative effects on riverine environment (only applicable to the Zone of Integration unless otherwise stated)</td>
</tr>
<tr>
<td>  </td>
<td>This land use and typology type, in terms of new developments, are not suitable within the river setback zone. In terms of existing developments, urgent nature based preventative solutions need to be instated (if not already present) in order to mitigate any further impact on the riverine environment.</td>
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Residential Zones

Single Residential Zone 1:

Low to Medium Density (Planned and Unplanned)

The main objective of this zone is to provide for residential development where the main type of accommodation is a dwelling house for a single family. The aim is further that each dwelling has its own land unit and adequate outdoor space. The dominant use of the property remains residential, but limited employment and additional accommodation opportunities are possible as primary, secondary or consent uses and impacts of such uses do not adversely affect the quality and character of the surrounding environment.

Typology Description: Low cost or affordable single-family home typically on a separate plot in accordance with a municipal approved plot layout plan and building plan approval. Occupied by either the owner of the structure or through permission from the owner through a rental agreement. The structures could either be attached or free standing.

Advantages: Built in accordance to a larger town plan with space for formal roads and consequent emergency vehicular access. Also, it typically includes formal bulk infrastructure and limited hardened surfaces maximises infiltration and reducing stormwater runoff into riverine environments.

Disadvantages: Low density of typology utilises relatively large tracts of often limited and valuable land. Also raises the cost of bulk infrastructure provision as connections need to be provided over a larger area to single families.

Target Zone: Zone of Integration

Desirability: Medium

SEMI FORMAL STRUCTURE IN AN UNPLANNED SETTLEMENT  Low Cost | Unplanned | Permanent | Single Res 1	**Typology Description:** Low cost or affordable single-family home that is typically self-built and unplanned on a land parcel that is not linked to a municipal approve plan. Built with formal materials such a bricks and mortar. **Advantages:** Provides residents with better protection from the elements as well as being less of a fire risk than non-permanent structures built out of corrugated iron and wood. **Disadvantages:** Low to medium density typology which utilizes relatively large tracts of often limited and valuable land. Often does not include formal bulk infrastructure as well as making the connection to formal bulk infrastructure networks costly or unlikely due to the permanent nature of the structure. Knock on affects include informal sanitation networks that pollutes rivers and groundwater as well as a lack of formal stormwater. **Target Zone:** Zone of Integration (subject to mitigation measures that needs to be put in place). **Desirability**: Medium to Low
INFORMAL STRUCTURE IN A REBLOCKED SETTLEMENT  Low Cost | Semi-Planned | Non - Permanent | Single Res 1	**Typology Description:** Low cost single resident or family informal structure that is typically self-built, but organized in accordance to an informal plan. It is typically located on land that is not owned by the resident(s), however permission of the land owner for residents to occupy the land has typically been provided. Built with informal materials such as corrugated iron and wood. **Advantages:** Structure is built in accordance with an informal plot plan that allows adequate space for emergency vehicular access, through the provision of adequate space between dwellings. Consequently, connection to formal infrastructure networks is made possible without the need for relocation as each structure has direct access/frontage to informal roads. **Disadvantages:** Low to medium density typology which utilizes relatively large tracts of often limited and valuable land. Reliant on strong community networks and mutual cooperation to enforce and maintain re-blocked pattern. Re-blocking an informal settlement might lead to the displacement of a few families/residents. **Target Zone:** Zone of Integration (subject to mitigation measures that needs to be put in place). **Desirability:** Medium to Low

Typology Description: Single family dwellings that are informally constructed and not in line with any municipal approved plan. Typically: the land does not belong to the residents and occupation is without the permission of the land owner. Dwellings are typically constructed out of corrugated iron and wood.

Advantages: None

Disadvantages: This type of residential typology has a plethora of disadvantaged some of which include fire risks due to density, little or none formal bulk infrastructure, little to non-green open spaces, inadequate protection from natural elements, low to no access for emergency vehicles and health risks.

Target Zone: Zone of Integration (A multitude of nature based solutions are required to mitigate the impact of this typology on riverine environments.

Desirability: Very Low

Single Residential Zone 2:
Medium to High Density

The objective of this zone is to provide a more compact residential development for single families. The main type of accommodation envisaged for this zone are attached dwelling units, walk-ups or medium to high rise residential blocks. The dominant use within this zone remains residential, but limited employment and additional accommodation opportunities are possible as primary, secondary or consent uses on the condition that such uses do not adversely affect the quality and character of the surrounding environment. This may take the form of commercial uses on the ground floor of multi-story walk-ups or high to medium rise residential blocks.

Typology Description: Single family dwellings in a multi-story walk up apartment block.

Advantages: Medium to high density nature of typology ensures a good use of limited land availability as well as relatively cheap bulk infrastructure connections due to the fact that multiple families are served with a single building connection.

Disadvantages: Rental or sectional title ownership associated with these residential typologies often causes common areas to be ill maintained if used for affordable or low-income housing. More suitable for medium income households who are able to afford levies for the

maintenance of common areas.

Target Zone: Zone of Integration (ensure hardened surfaces are kept to a minimum to reduce runoff).

Desirability: High

MEDIUM RISE STRUCTURE WITH MULTIPLE RESIDENTIAL UNITS  Medium Cost | Planned | Permanent | Single Res 2	**Typology Description:** Single family dwellings in a medium rise apartment block. **Advantages:** Medium to high density nature of typology ensures a good use of limited land availability as well as relatively cheap bulk infrastructure connections due to the fact that multiple families are served with a single building connection. **Disadvantages:** Rental or sectional title ownership associated with these residential typologies often causes common areas to be ill maintained if used for affordable or low-income housing. More suitable for medium income households who are able to afford levies for the maintenance of common areas. **Target Zone:** Zone of Integration (ensure hardened surfaces are kept to a minimum as well as adequate landscaped areas to ensure infiltration and consequent reduced runoff). **Desirability:** High
HIGH RISE STRUCTURE WITH MULTIPLE RESIDENTIAL UNITS  High Cost | Planned | Permanent | Single Res 2	**Typology Description:** Single family dwellings in a high-rise apartment block. Typically, occupation/ownership is facilitated through sectional title ownership or through a rental agreement with the sectional title owner. **Advantages:** High density nature of typology ensures a good use of limited land availability as well as cheap bulk infrastructure connections due to the fact that multiple families are served with a single building connection. This type of residential typology also enhances the viability of public transport infrastructure provision due to the high dwelling unit per hectare ratio. Importantly, this typology is also particularly suited to river corridor developments due to the passive surveillance factor that arise from this high-density typology. **Disadvantages:** Rental or sectional title ownership associated with these residential typologies often causes common areas to be ill maintained if used for affordable or low-income housing. Additionally, due to the high capital cost of construction, this type of typology is best suited for middle to high income individuals/families. **Target Zone:** Zone of Integration (ensure hardened surfaces are kept to a minimum as well as adequate landscaped areas to ensure infiltration and consequent reduced runoff). **Desirability:** High

MEDIUM TO HIGH RISE STRUCTURE WITH MULTIPLE RESIDENTIAL UNITS (HOTEL)  High Cost | Planned | Permanent | Single Res 2	**Typology Description:** Hotel accommodating tourists visiting local attractions. This type of hotel is focused on attracting family orientated tourists and would typically offer a selection of activities and restaurants to guests. Typically: 3 – 10 floors with 15m – 38 m total height. **Advantages:** These residential typologies offer alternative residential use to tourists. These type of hotel developments typically do not have a great impact on the riverine areas as they are associated with formal bulk infrastructure. With the correct management and implementation of nature based solutions it can raise environmental awareness of river sustainability by increasing the amenity value of riverine areas. **Disadvantages:** Large site area that is required could potential increase run off of grey water into riverine environments if the correct mitigation methods are not adhered to. Expanded construction of recreational facilities adds more pressure to both natural landscapes and resources, which may lead to land degradation if not managed correctly. The target market will focus on higher income segment of society and thus might be considered as exclusive and contribute to the privatisation of space which only benefits a small segment of the population. **Target Zone:** Zone of Integration (ensure hardened surfaces are kept to a minimum as well as adequate landscaped areas to ensure infiltration and consequent reduced runoff). **Desirability:** High

	**Typology Description:** This hotel type will offer a "full service" accommodation type which will incorporate restaurants and other amenities. The most notable of the amenities will include on-site meetings and conference facilities. This type of hotel focuses on business and cater mainly for business clients or business guest which are attending a conference at the hotel. Typically: 3 – 10 floors with 15m – 38 m total height. **Advantages:** Visitors that are on business trips will be able to have on site access to a variety of amenities and facilities. It will complement the area's business characteristic. Will increase the mix of land uses in the area. This typology type is usually accompanied by formal bulk infrastructure which minimises the risk of contaminating groundwater sources as well as any other negative impact that is associated with a lack of formal bulk infrastructure. **Disadvantages:** Large site area that is required could potential increase run off of grey water into riverine environments if the correct mitigation methods are not adhered to. Expanded construction of recreational facilities adds more pressure to both natural landscapes and resources, which may lead to land degradation if not managed correctly. The target market will focus on higher income segment of society and thus might be considered as exclusive and contribute to the privatisation of space which only benefits a small segment of the population. **Target Zone:** Zone of Integration (ensure hardened surfaces are kept to a minimum as well as adequate landscaped areas to ensure infiltration and consequent reduced runoff). **Desirability:** High

Business Zones

Business Zone 1:
Low Intensity Business (Planned and Unplanned)

The main objective of this zone is to provide for commercial and mixed-use development of low intensity. The aim is that this zone should serve the local neighbourhood needs for convenience goods and personal services.

The development should be limited in scale and must be capable to become integrated into the adjacent residential neighbourhood without affecting the amenity of the residential neighbourhood to an adverse extent. Mixed use development is encouraged in this zone but care has to be taken not to compromise business operations. The following restrictions have to be adhered to: Primary uses are business premises, flats and public parking.

Consent uses include: guest house, place of assembly, place of entertainment, restaurant, bottle store, service trades or any use that include the sale of alcoholic beverages and commercial antenna

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Typology Description: Informal/temporary structures erected in public open spaces (typically along movement corridors) from where trade in a narrow mix of convenience goods and personal services are conducted.

Advantages: The low cost associated with erecting these structures from where basic goods and services are traded enables entrepreneurs and job seekers easy entry into the market as well as facilitating lower costs of goods and services due to limited overhead costs.

Disadvantages: The disadvantages of this business typology relate to the informality and unregulated nature of the business conducted. This includes a lack of regulation and adequate health and safety standards related to goods and services traded. This is compounded by inadequate infrastructure such as cooling, storage and waste removal and treatment.

Target Zone: Zone of Integration (A multitude of nature based solutions are required to mitigate the impact of this typology on riverine environments) for proposed mitigation measures).

Desirability: Low

FORMAL STRUCTURE WITH PRIMARILY LIGHT RETAIL USES  **Medium Cost | Planned | Permanent | Business 1**	**Typology Description:** Formal single or multi-story structures utilised for light commercial and single residential purposes. Typically, with light commercial (trading a narrow mix of convenience goods and personal services) on the ground floor with residential uses on the subsequent floors. If the structure is a single-story, it is typically used for commercial only, with sporadic residential occupation in the room(s) behind the commercial floor space. **Advantages:** This typology type facilitates active streets through facing the street/movement corridor instead of being confined within a mall type commercial development. It tends to encourage exclusivity and diversity as it is directly accessibly from public spaces or streets. This is in contrast to mall type commercial developments which are located in semi-private spaces where restricted access can be enforced. The added single residential use to this typology also ensures that activity and footfall does not disappear after trading hours, but rather facilitates sustained activity around these typologies which minimises crime and vandalism through passive surveillance after trading hours. **Disadvantages:** The disadvantages of this typology relate to its immediate proximity to public open spaces or roads/movement corridors which in some instances might cause congestion in narrow roads or spaces due to drop-offs, deliveries combined with the footfall traffic. **Target Zone:** Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments). **Desirability:** High

Business Zone 2:
Medium to High Intensity Business (Planned and Unplanned)

The main objective of this zone is to provide for mixed use developmental and general business activity which are of a medium to high intensity. This zone will serve a wider catchment area and care should be taken to ensure that it should not compromise business operations.

Typology Description: Small to medium sized general-purpose shopping centre focused on general merchandise and convenience orientated offerings, typically anchored by a supermarket.

Advantages: This retail/commercial typology type is usually accompanied by formal and well maintained bulk infrastructure which minimises the risk of contaminating groundwater sources as well as any other negative impact that is associated with a lack of formal bulk infrastructure.

Disadvantages: This typology type could potentially discourage inclusivity and diversity as the shops are located on semi-private property and not directly accessed from the street. Further, this type of retail typology is typically accompanied by medium sized parking lots (hardened surfaces) which leads to increased runoff of grey water into riverine environments if the correct mitigation methods are not adhered to.

Target Zone: Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments that might be caused by hardened surfaces).

Desirability: High

FORMAL STRUCTURE WITH HIGH INTENSITY RETAIL USE  **High Cost | Planned | Permanent | Business 2**	**Typology Description:** Shopping centre featuring upscale regional to national scale specialty stores with dining and entertaining in an outdoor or indoor setting. **Advantages:** This retail/commercial typology type is usually accompanied by formal and well maintained bulk infrastructure which minimises the risk of contaminating groundwater sources as well as any other negative impact that is associated with a lack of formal bulk infrastructure. **Disadvantages:** This typology type could potentially discourage inclusivity and diversity as the shops are located on semi-private property and not directly accessed from the street. Further, this type of retail typology is typically accompanied by large scale parking lots (hardened surfaces) which leads to increased runoff of grey water into riverine environments if the correct mitigation methods are not adhered to. **Target Zone**: Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments that might be caused by hardened surfaces). **Desirability:** Medium
FORMAL STRUCTURE WITH MIXED RETAIL AND OFFICE USE  **High Cost | Planned | Permanent | Business 2**	**Typology Description:** Two to five story office building with street facing retail use on the ground floor. **Advantages:** This retail/commercial typology type is usually accompanied by formal bulk infrastructure which minimises the risk of contaminating groundwater sources as well as any other negative impact that is associated with a lack of formal bulk infrastructure. This mix of uses also encourages vibrant streetscapes as it attracts a diversity of people. The ground floor retail use, if it includes dining, also facilitates footfall within the evening hours and thus minimises crime and vandalism through passive surveillance. **Disadvantages:** If the road or public transport infrastructure that services this development type, as well as the amount of parking provided, is not adequate to handle the traffic and footfall volumes, it could cause congestion. **Target Zone:** Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments that might be caused by hardened surfaces). **Desirability:** High

FORMAL STRUCTURE WITH PREDOMINANTLY BUSINESS USE  **High Cost | Planned | Permanent | Business 2**	**Typology Description:** Stand along office building serving single or multiple tenants; usually part of a cluster of stand-alone office buildings with some convenience dining and retail uses in-between. **Advantages:** This commercial/business typology is ideally suited for placement within the zone of integration as it is usually accompanied by formal bulk infrastructure and large landscaped areas which encourages infiltration and minimises runoff. The uses associated with this typology is very low intensity as well as not attracting large numbers of people, such as is the case with retail developments. Thus, it requires less hardened surfaces in the form of parking lots which has a positive influence on riverine environments. **Disadvantages:** Relatively exclusive as this type of serviced office space is expensive and thus not within reach of small or micro enterprises which are common throughout Sub-Saharan Africa. The singular focus on business/commercial use means that the area in which it is located becomes deserted in the evening hours and could increase the risk of crime and vandalism if the adequate security measures are not in place. **Target Zone:** Zone of Integration (Minimal interventions needed.) **Desirability:** Very High
FORMAL STRUCTURE WITH MIXED RETAIL AND OFFICE USE  **High Cost | Planned | Permanent | Business 2**	**Typology Description:** Two to five story office building with street facing retail use on the ground floor. **Advantages:** This retail/commercial typology type is usually accompanied by formal bulk infrastructure which minimises the risk of contaminating groundwater sources as well as any other negative impact that is associated with a lack of formal bulk infrastructure. This mix of uses also encourages vibrant streetscapes as it attracts a diversity of people. The ground floor retail use, if it includes dining, also facilitates footfall within the evening hours and thus minimises crime and vandalism through passive surveillance. **Disadvantages:** If the road or public transport infrastructure that services this development type, as well as the amount of parking provided, is not adequate to handle the traffic and footfall volumes, it could cause congestion. **Target Zone:** Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments that might be caused by hardened surfaces). **Desirability:** High

Typology Description: Prominent class A high rise office tower featuring a high profile iconic design.

Advantages: This large-scale business/commercial typology has a plethora of advantages in terms of being located within the zone of integration. The high vertical density of the typology means that it makes the best use of limited land as well as having a small footprint in relation to its density and thus minimises hardened surfaces. The high cost associated with this typology also means that it is usually accompanied by sophisticated bulk infrastructure as well as typically built in accordance to green building standards (if it is relatively new).

Disadvantages: The cost of construction of this type of building typology is typically justified due to a high demand for office space in the area (such as CBD's) and thus it could place tremendous pressure on surrounding transport infrastructure due to the density if this was not planned for properly.

Target Zone: Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments that might be caused by hardened surfaces).

Desirability: High

Industrial Zones

Industrial Zone 1:
General Light Industry

The objective of this zone is to accommodate industry uses and service trades that may be carried without nuisance to other properties or the general public. The uses proposed for general light industry may be located next to business uses and in close proximity to residential areas if there are no potential impacts on the character or amenity of such areas. The following restrictions apply to property in this zone: Primary uses include service trade, industrial hive, warehouse, and restaurant, service station and public parking.

The consent uses include: industry, motor repair garage, wholesale trade, shop, bottle store, offices, office park, and commercial antenna.

	**Typology Description**: This small footprint light industrial typology type is typically used for various small-scale assembly, warehousing, distribution and maintenance activities as well as small scale manufacturing for technology based activities. **Advantages:** This light industrial typology is the best suited industrial typology for the zone of integration as it does not involve any risk processing as well as having a relatively small footprint which keeps the hardened surfaces to a minimum if compared to other industrial typologies. Another benefit of this industrial typology type relates to modern trends in term of the provision of landscaped areas -which assists in infiltration - which are not commonly associated with industrial development types. **Disadvantages:** **Target Zone:** Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments that might be caused by hardened surfaces). **Desirability:** High
	**Typology Description:** This large footprint light industrial typology type is typically used for the storage and distribution of goods serving logistics or retail companies. **Advantages:** This development type is not recommended within the river setback zones. **Disadvantages:** The main disadvantages of this industrial typology relate to its large footprint and consequent hardened surfaces. The character of this development type is also not conducive to river setback zones. **Target Zone:** Zone of Integration (Some nature based solutions required to mitigate impact on riverine environments that might be caused by hardened surfaces). **Desirability:** High

Industrial Zone 2:
Risk and Extractive Industry

The main objective of this zone is to provide for those types of industries which are noxious in terms of smell, product, waste or other objectionable consequence of their operation.

This includes industries which may carry a high risk in the event of a fire or accident. Certain uses are permitted with consent in this zone but the Council must ensure that there is sufficient capacity for noxious trade in the limited areas suitable for this zone. This risk industry should not be located close to residential area. The following use of property apply to this zone: Primary uses include, noxious trade and risk activity; Consent uses include industry, service trade, warehouse, scrapyard, transport usage, shop, service station, motor repair garage, waste disposal site, public parking, and commercial antenna.

Typology Description: Large expansive and intensive industrial typology type. These industrial uses typically include, but are not limited to extraction of valuable minerals from ores or mine wastes, high volume fabrication and end-point assembly of product components as well as the processing of bulk ingredients into food products as well as final packaging and cold storage.

Advantages: There are no advantages of this land use and typology type being located within riverine setback areas, however, there is major economic benefits that would need to be weighed up on a case by case basis.

Disadvantages: This intensive land use and typology type holds a plethora of disadvantages for riverine environments which include, but are not limited to siltation, eutrophication, soil erosion, groundwater pollution, air pollution as well as detracting from the amenity value of riverine environments

Target Zone: Larger urban area

Desirability: Low

Agricultural zones

Agricultural Zone 1:
Agriculture

This zone's objective is to promote and protect light agricultural activities on small farms as an important economic, environmental and cultural resource. Provision for non-agricultural uses in this zone is limited. The aim is to provide communities with the opportunity to increase their economic output. This can only be achieved if the uses do not represent a negative impact on the primary agricultural resource. The following use restrictions apply to property in this zone: Primary uses are agriculture and dwelling house. Consent uses include, additional dwelling unit, home occupation, guest-house, bed and breakfast establishment, tourist facilities, farm stall, farm shop, aqua-culture, animal farming, horticulture, plant nursery, riding school, 4x4 trail, commercial kennel and commercial antenna.

 Low Cost | Planned Or Unplanned | Agriculture Zone 1	**Typology Description:** Agricultural practices adapted to a specific area to ensure that yields are sustainable. These practices are based on techniques that have proven to be successful in the past and include variations of crops, livestock, tillage, water use, fertilisers and other inputs. **Advantages:** Traditional practices are often less polluting than conventional practices. They are locally adapted and result in community food security with limited technology and resources. **Disadvantages:** Since it is based on traditional knowledge future changes in climate may make it more challenging for traditional farmers to be resilient. The local nature of traditional techniques makes it challenging to scale up to larger areas. **Target Zone:** Riverbank and Integration Zone (Some nature based solutions are required to mitigate the possible impacts of this landuse type). **Desirability:** Medium
 Medium Cost | Planned Or Unplanned | Agriculture Zone 1	**Typology Description:** Agricultural practices that produce high yields while reducing input costs and minimising negative impacts on the environment. The main principles of conservation agriculture are minimum soil disturbance, covering soil as much as possible and rotating and mixing crops. Conservation agriculture includes practices such as zero-tillage, agroforestry, crop rotation, intercropping and mulching. **Advantages:** Cover crops prevent moisture from evaporating from the soil and therefore reduces water requirements and improves water security. Cover crops also reduce soil erosion. The physical, chemical and biological condition of the soil is improved thereby reducing fertiliser requirements. **Disadvantages:** Thus far the initial lack of knowledge on conservation agriculture in particular areas is the biggest limitation. **Target Zone:** Riverbank and Integration Zone (This method of farming is based on nature based solutions and thus no additional interventions needed). **Desirability:** Very High

Agriculture Zone 2:
Intensive Agriculture and Agricultural Processing

The objective of this zone is to make provision for intensive agriculture and the processing of agricultural products on large farms or portions of farms. The objective further entails that where such processing may potentially impact negatively on the amenity of the surrounding area in terms of size and intensity of the activity, but for reasons of efficiency these activities are best situated within an agricultural area, as opposed to an urban or industrial area.

Typology Description: Agricultural forestry includes the harvesting of trees and their by-products as well as the haulage of logs for processing.

Advantages: Trees mitigate climate change through carbon sequestration. Forests offer watershed protection while preventing soil erosion and maintaining soil fertility. They are also important sources of fuel, food and fibre which could be an additional source of income.

Disadvantages: Forests pose as a fire risk. When trees are cleared for wood the risk of soil erosion increases until new trees are established.

Target Zone: Riverbank and Integration Zone (If located within the riverbank zone, nature based solutions are required to ensure that soil erosion does not occur when harvesting the trees).

Desirability: Medium to High

Typology Description: Conventional intensive agricultural activity that typically involve monocropping of genetically modified organisms carried out on large-scale farms that are frequently tilled.

Advantages: High yields

Disadvantages: Heavy use of fertilisers, pesticides and herbicides which could result in eutrophication. Soil conditions are deteriorated through tillage and exposure. Soil exposure also results in evaporation of soil moisture therefore high inputs of water are required.

Target Zone: Agricultural areas not within the river setback zone.

Desirability: Low

Conservation & open space zones

Conservation Zone 1:

Statutory Conservation

The main objective of this zone is to provide for the conservation of natural resources in areas which have been proclaimed as nature areas. The aim includes to sustain flora and fauna and to protect areas of undeveloped areas which include: woodlands, ridges, wetlands and coastline.

Open Space Zone 1: Pubic Open Space

The objective of the zone is to provide for active and passive recreational areas on public land. The aim is to promote recreation and enhance and protect the aesthetic appearance of an area. The primary use of land in this zone is public open space and no consent uses apply to this zone.

award

The Association for Water and Rural Development

AWARD is a non-profit organisation specialising in participatory, research-based project implementation. Their work addresses issues of sustainability, inequity and poverty by building natural-resource management competence and supporting sustainable livelihoods. One of their current projects, supported by USAID, focuses on the Olifants River and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems to sustain livelihoods and resilient economic development in the catchment.

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About USAID: RESILIM-O

USAID: RESILIM-O focuses on the Olifants River Basin and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems that support livelihoods and resilient economic development in the catchment. The 5-year programme, involving the South African and Mozambican portions of the Olifants catchment, is being implemented by the Association for Water and Rural Development (AWARD) and is funded by USAID Southern Africa.

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