water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

DETERMINATION REVIEW AND IMPLEMENTATION OF THE RESERVE IN THE OLIFANTS/LETABA SYSTEM

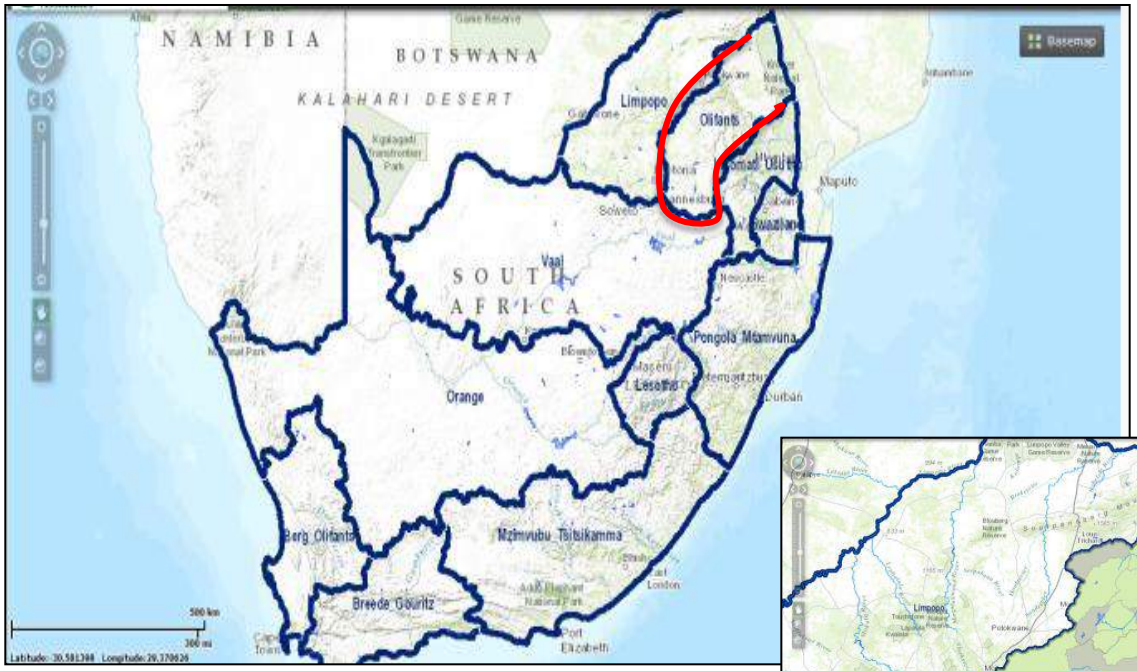
STAKEHOLDER MEETING

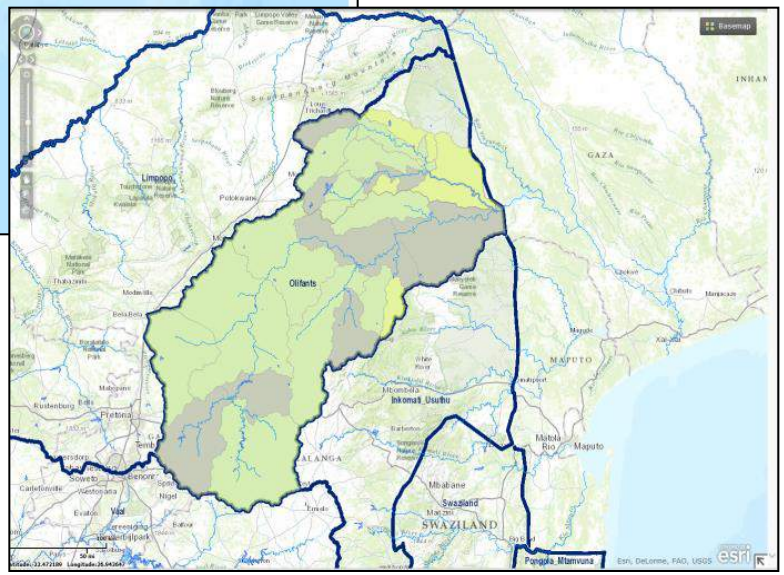
25 AND 26 MAY 2016

Introduction

- To introduce study and provide feedback on the progress to date on finalisation of the Reserve
- To provide the necessary information to stakeholders on the ecological status, assessment of wetlands and groundwater, key areas of ecological protection, and to engage with stakeholder on the proposed scenarios to assess ecological consequences
- To provide overview of the way forward

The Olifants WMA





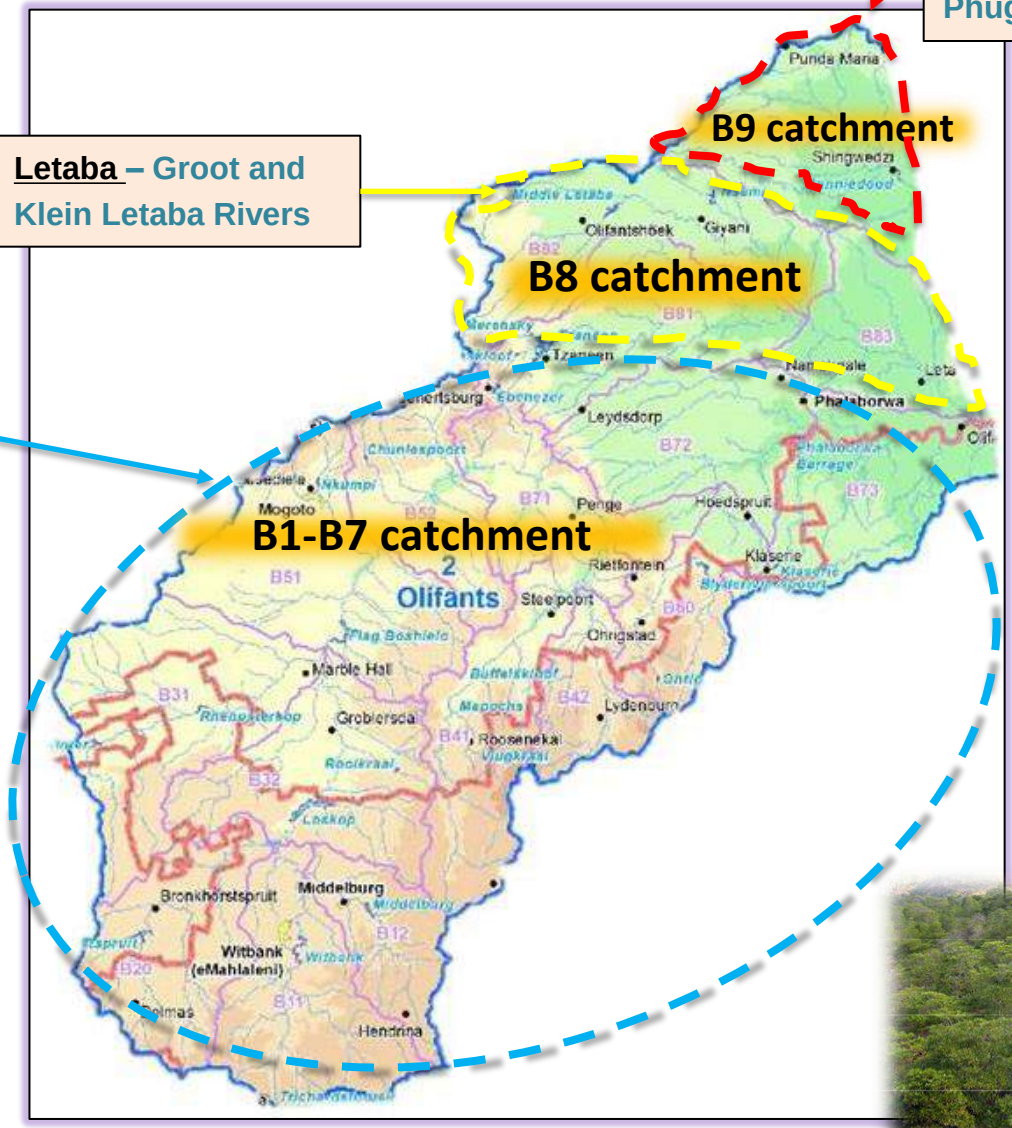
The Olifants River catchment (including the Letaba and Shingwedzi catchments) is a sub-catchment of the Limpopo Basin and is the largest tributary of the Limpopo River

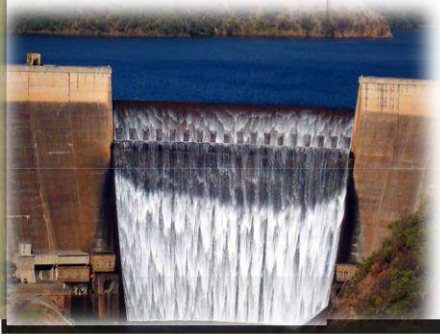
The Olifants WMA (WMA2)

Shingwedzi – Shisha and Dzombo, Mphongolo and Phugwane

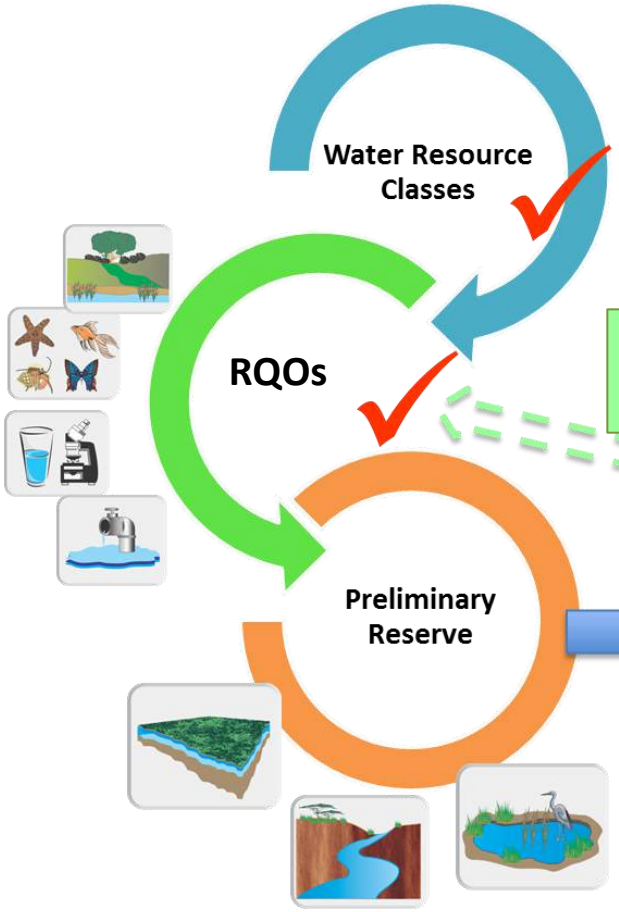
Letaba – Groot and Klein Letaba Rivers

Olifants – major tributaries are the Wilge, Elands, Ga-Selati, Klein Olifants, Steelpoort, Blyde, Klaserie and Timbavati Rivers.





Water Resource Protection: Olifants Reserve



Includes limits at EWR sites

To be done

THE RESERVE can be gazetted

GAP: identified priority area catchment areas – ecological specifications required for flow and quality

This study

Why the Olifants?

- **PROTECTION FRAMEWORK in place, however**:
  - Intensive mining upper and middle catchment, large thermal power stations
  - Planned future growth in the Middle Olifants
  - Intensive irrigation farming
  - Olifants stressed catchment (flow and water quality issues)
  - Key Conservation Areas requiring protection – Kruger National Park, Blyde River catchment.

The main stem rivers and key tributaries are addressed through the current framework.

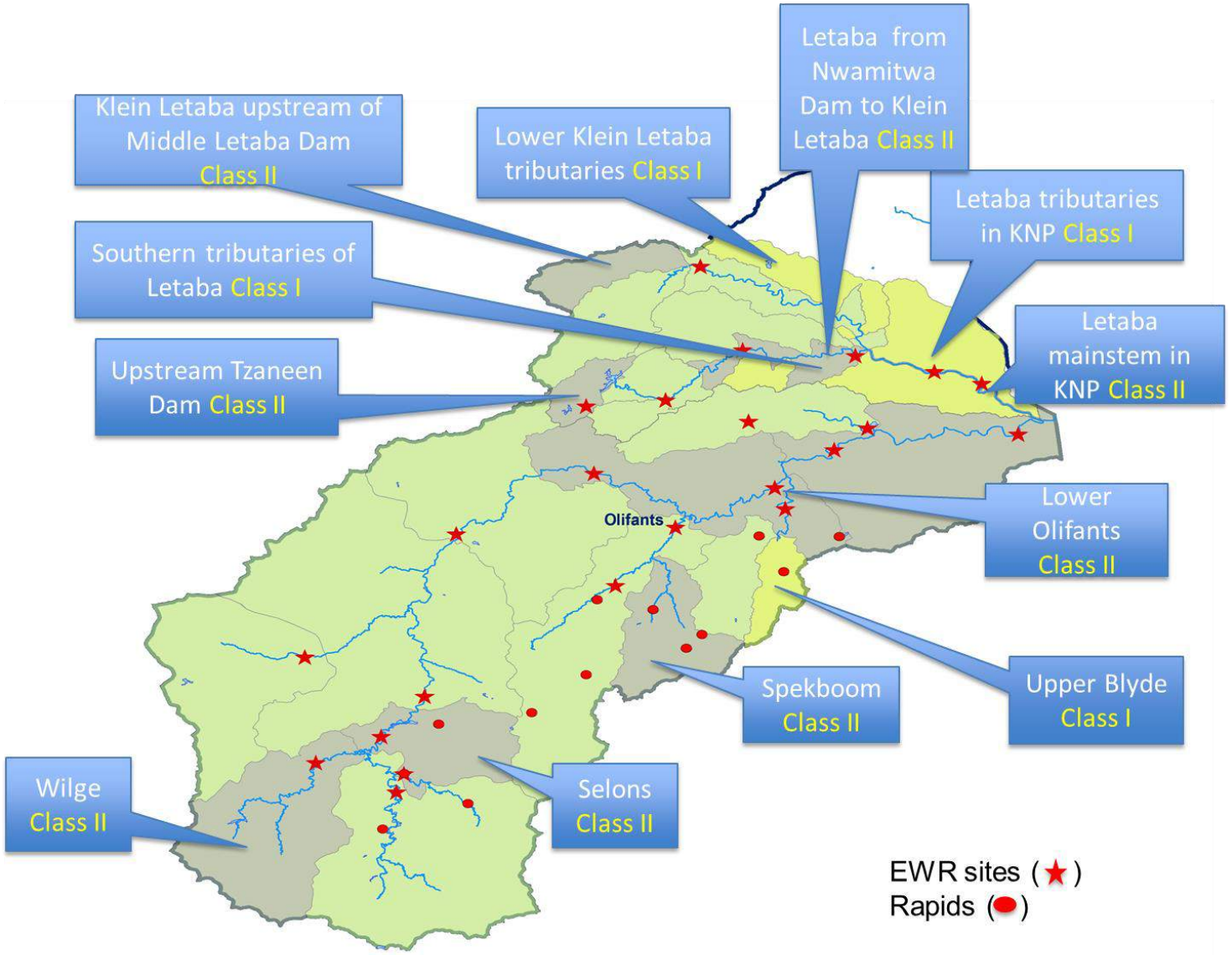
Need to protect and maintain the ecological health of smaller tributary catchments (widen the protection network)

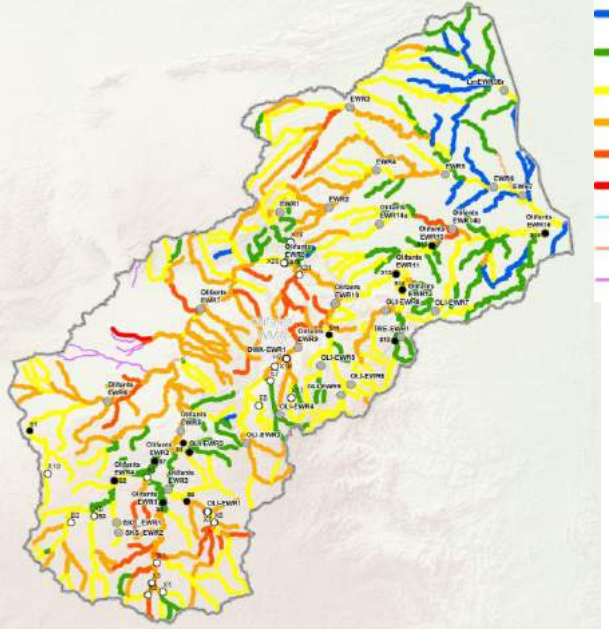
Important to protect these "pockets" as unique ecosystems and as feeders to the broader system

Study Objectives

- **To finalise the Reserve to be gazetted for implementation in the Olifants/Letaba System**
  - Requires **addressing the major ecological gaps** that exist at identified priority sites; the protection of the **wetlands systems** present and **water quality** where identified.
  - Improving the **detail of ecological specifications** *(objectives set for protection of the ecosystem – ecological attributes: flow, biological integrity, etc.) (only ecological information)*
  - Development of an **implementation plan**
- Outcome will be '**The Reserve'** for the Olifants WMA to be gazetted.

Water Resource Classes





Present Ecological State

Better ecological category than overall IUA Water Resource Class

ESEIS RIVERS 2013
A – Unmodified, natural
B – Largely natural with few modifications
C – Moderately modified

Not Classified, preliminary Reserve

III, D

II, C

I, A/B

III, D

II, C

III, D

II, C

III, D

Limpopo WMA

Olifants WMA

MOKOPANE

MOGOTO

MIDDELBURG

SECUNDA

ERMELO

Class II, maintain A and B ecological category resources

Class III, maintain B and C ecological category resources

Class I, A ecological category resources

Basic Human Needs

Such as

- **Water for drinking**
- **Water for food preparation**
- **Water for personal hygiene**

- The results of the preliminary Reserve will be compared to the requirements contained in the Reconciliation Strategy, and adjustments will be made if required.
- The latest available census data related to the people still directly dependant on the water resources for their subsistence use will be used.

Status Quo Summary

- Ecological Status
- Water quality
- Wetlands
- Groundwater

Ecological Status

- Describes the health or integrity of a resource according to ecological status compared to natural conditions
- Purpose is to gain insights into causes and sources of deviation of ecological status

Ecological status described in terms of ecological categories:

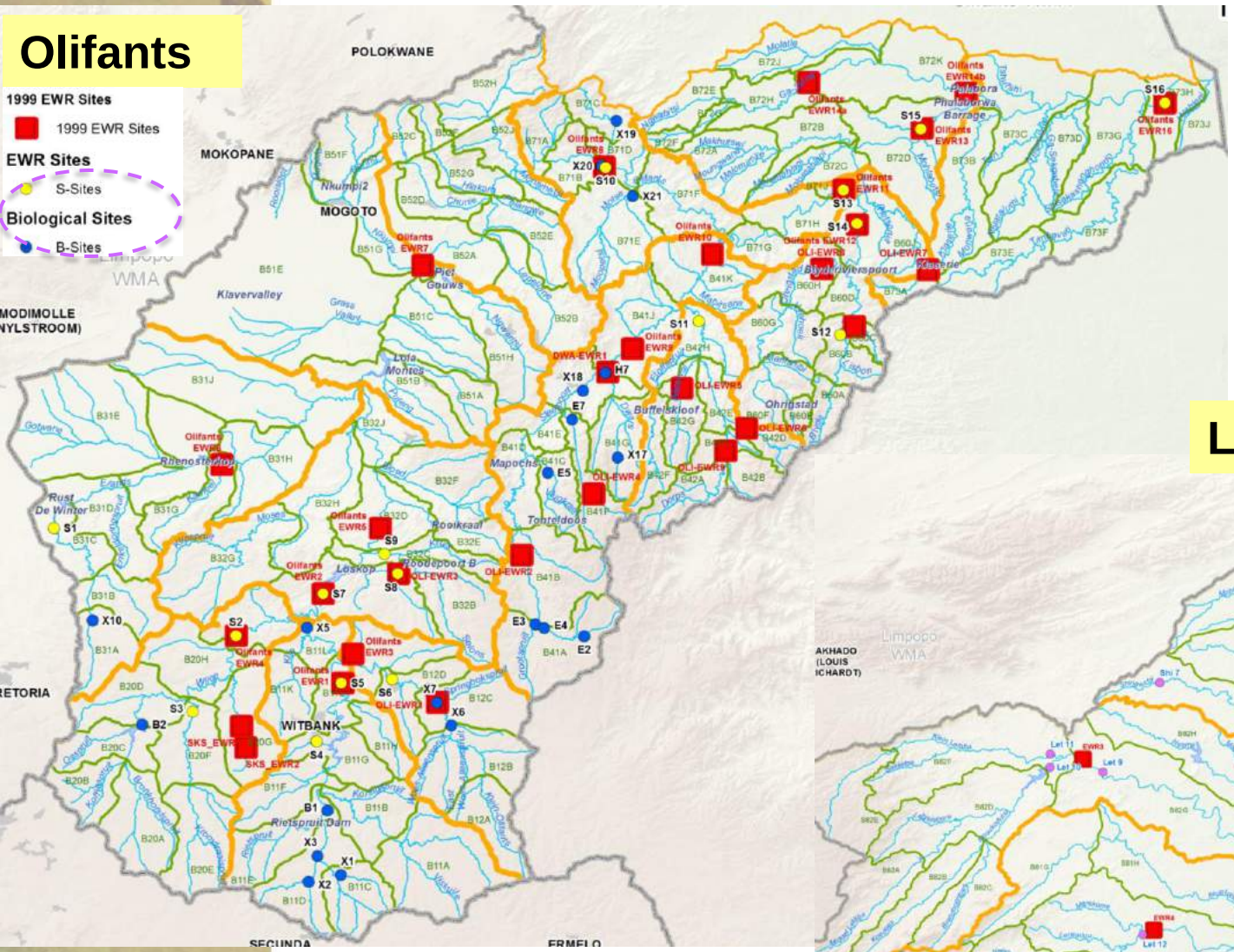
Ecological Category	Description
A	Unmodified, natural.
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	Critically / Extremely modified. Almost complete loss of natural habitat and biota. Basic ecosystem functions may have been destroyed and the changes are irreversible.

Ecological Status

- Ecological Classification Steps:
  - Predict the natural state (the “A”)
  - Evaluate human impacts and how the ecology has changed
  - Considers drivers (e.g. hydrology) and responses (e.g. fish)
  - Components assessed by suite of methods – evaluation of present state to reference condition
  - All components integrated into a single Ecological Status (present ecological state
  - Describe the ecological importance and future management targets
  - If important, then could recommend improvement in ecological state
  - Consider practicalities and whether goals are achievable (evaluate consequences)

Ecological Status: Survey Sites assessed as part of Study

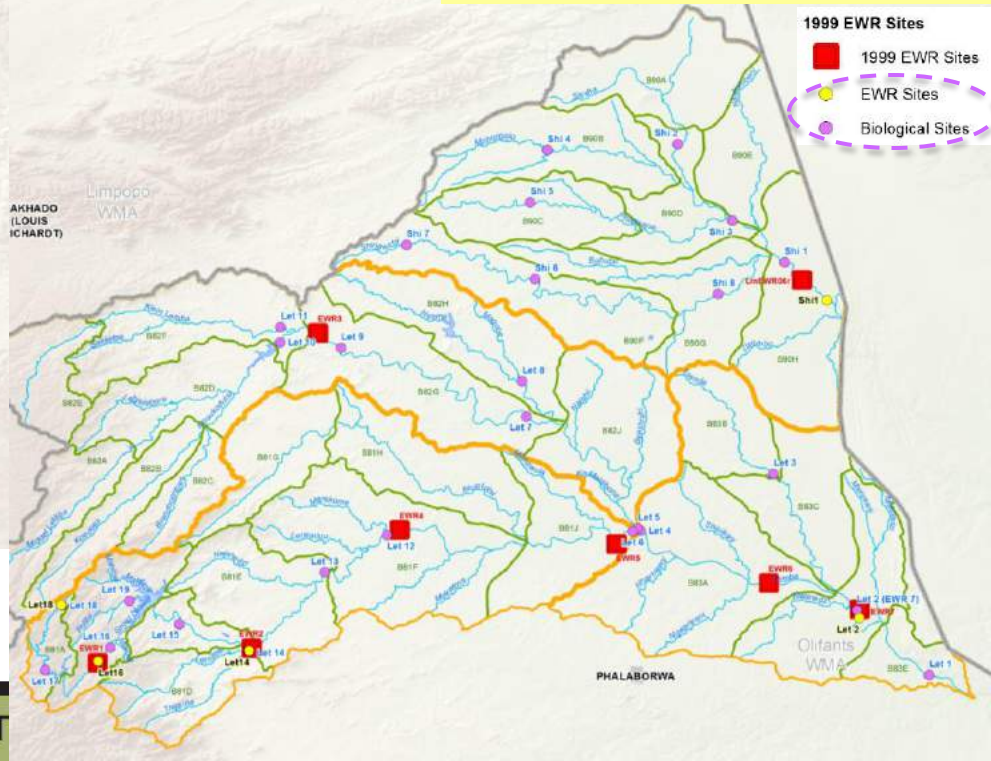
Olifants



Gap Analysis undertaken

Surveys in this study

Letaba/Shingwedzi



Upper and Middle Olifants Catchment

Site 1: Elands River B31C

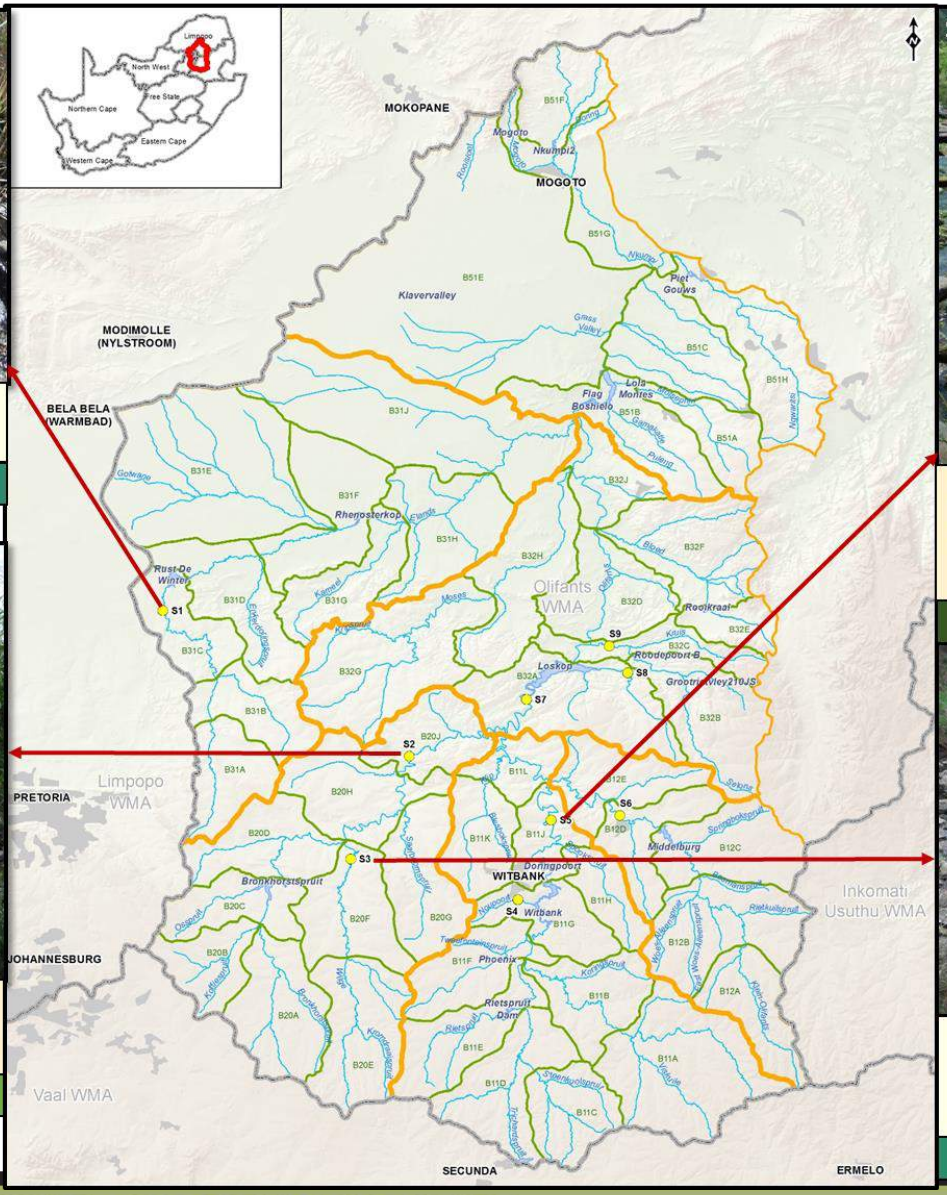
- Limited access to biotopes
- Low and reduced water levels
- Reduced eco-status.

PES 2015: C/D

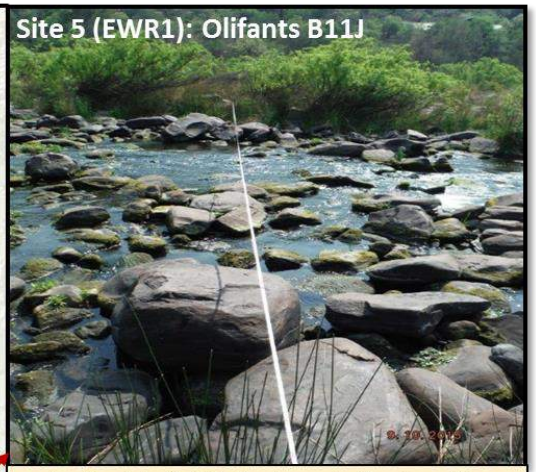
Site 2: Lower Wilge B20J

- Low water levels, marginal vegetation was not accessible
- Lack of biotope for macro -invertebrates.
- Poor water quality

PES 2015: C



Site 5 (EWR1): Olifants B11J



- Low flow, lack of habitat diversity, poor in situ water quality
- Considerable algal growth (completely smothered)
- Invasive fish species.
- The Eco-status has remained a D. However, potential negative trajectory's need to be managed to prevent the degradation to a lower category.

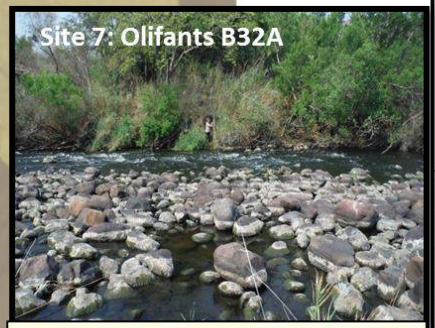
PES 2015: D

Site 3: Wilge B20F

- Low water levels,
- Most of the biotopes were dry and exposed. Limited flow regimes due to upstream abstraction activities and dry season.
- Poor water quality

PES 2015: C/D

Upper and Middle Olifants Catchment

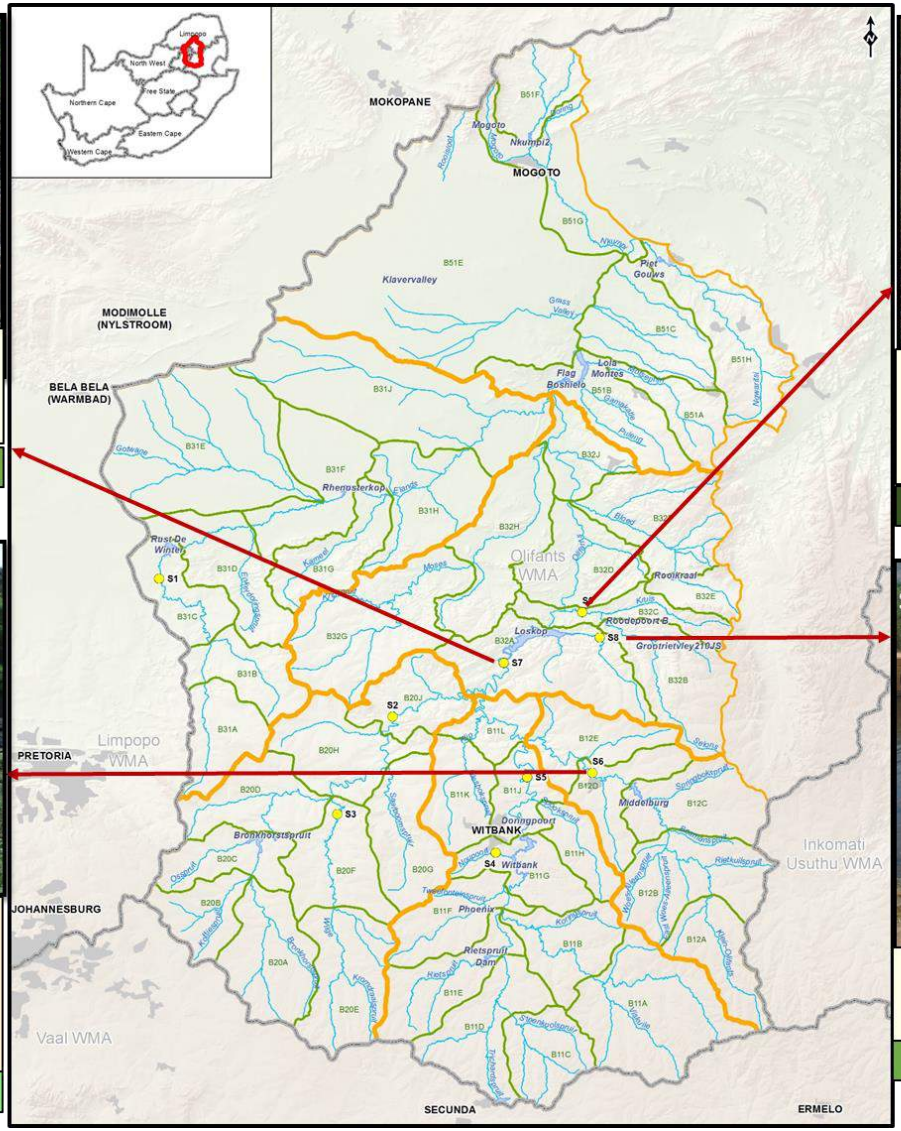


- d/s confluence of the Wilge and Klein-Olifants River just upstream of Loskop Dam.
- Impacts (mining, industrial, agricultural, WWTWs) Poor water quality
- High diversity of biotopes present at the site.

PES 2015: C

- Important site representative of the Klein-Olifants catchment.
- lack of management of surrounding land use impacts
- Severe degradation of the system - upstream activities resulting in a high risk to the sustainability of the system. Intervention required urgently.
- Considerable alien invasive fish species and aquatic macrophytes were observed.
- Lack of natural flow

PES 2015: D/E



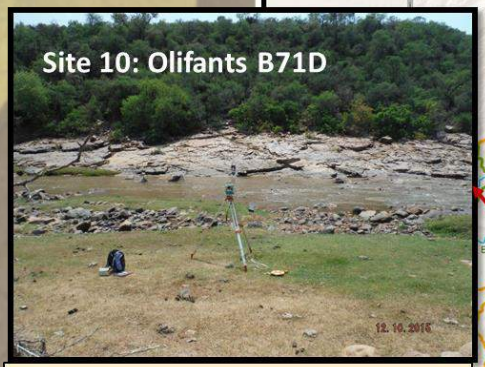
- u/s confluence with Olifants.
- Low flow velocities
- Severely modified owing to upstream impoundments and abstraction activities.
- GSM and marginal vegetation was limited.
- High nutrient enrichment within the system.

PES 2015: D

- Below the confluence of the Klip River.
- *Limited flow velocities* but with good instream habitats
- Marginal vegetation exposed.
- Moderate water quality owing to limited upstream impacts

PES 2015: C

Middle and Lower Olifants Catchment

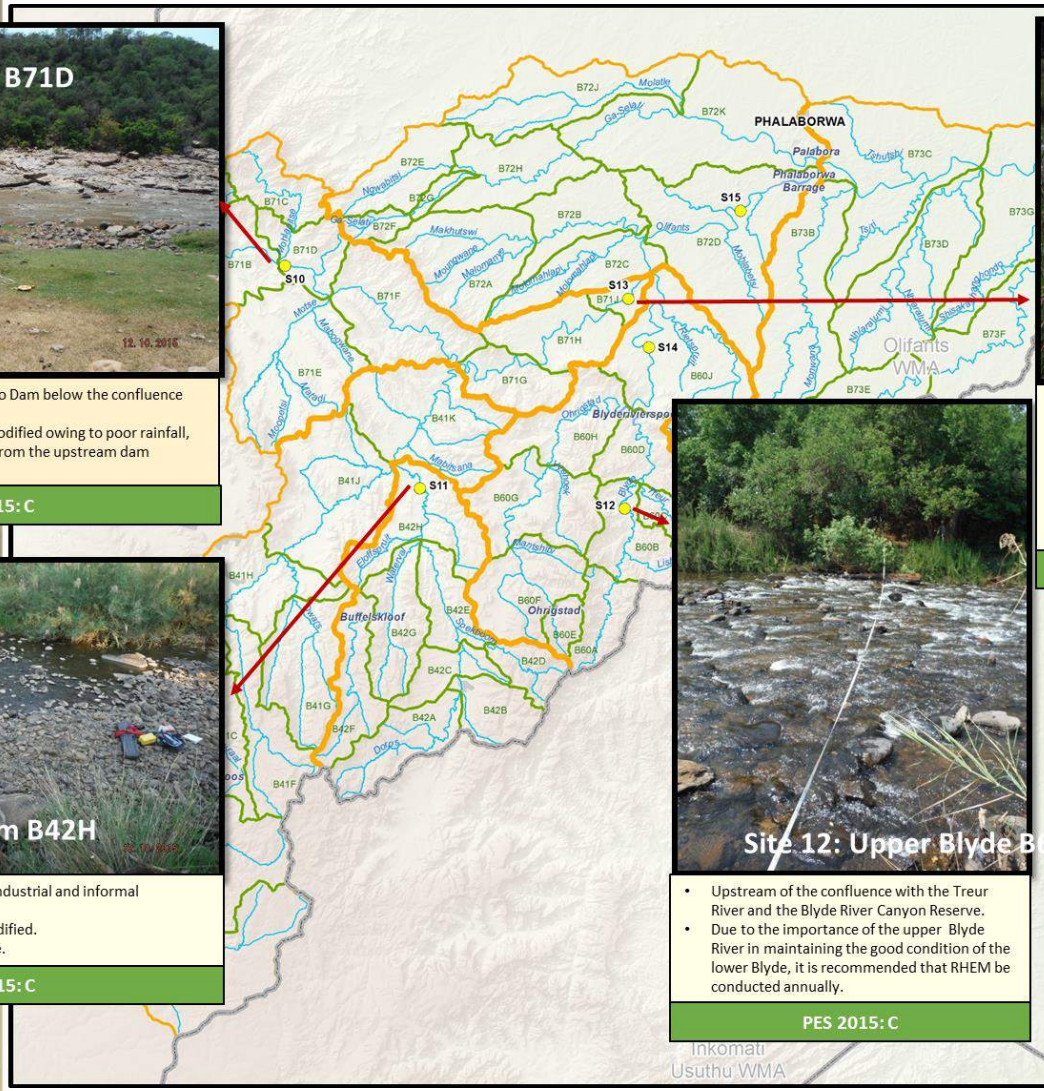


- Downstream of the Flag Boshielo Dam below the confluence with the Mohlapitse River.
- Low flow velocities - severely modified owing to poor rainfall, abstraction and lack of release from the upstream dam
- Poor water quality

PES 2015: C

- D/S from agricultural, mining, industrial and informal settlements.
- Flow velocities are severely modified.
- The water quality was adequate.

PES 2015: C



- Upstream of the confluence with the Treur River and the Blyde River Canyon Reserve.
- Due to the importance of the upper Blyde River in maintaining the good condition of the lower Blyde, it is recommended that RHEM be conducted annually.

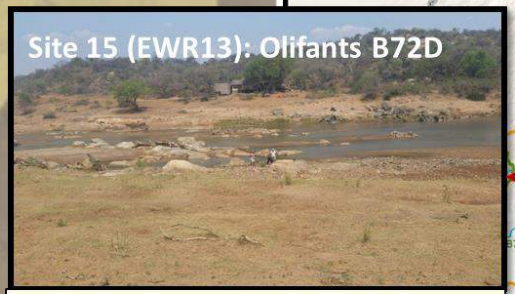
PES 2015: C

- PES 1999 - category E due to sand deposition
- Subsequent flooding, the sand build up was scoured - the instream habitat integrity improved ultimately contributing to an improved overall PES.
- Intensive commercial and subsistence farms.
- However, abstraction levels have reduced due to a newly constructed pipeline from the Blyde River

PES 2015: C

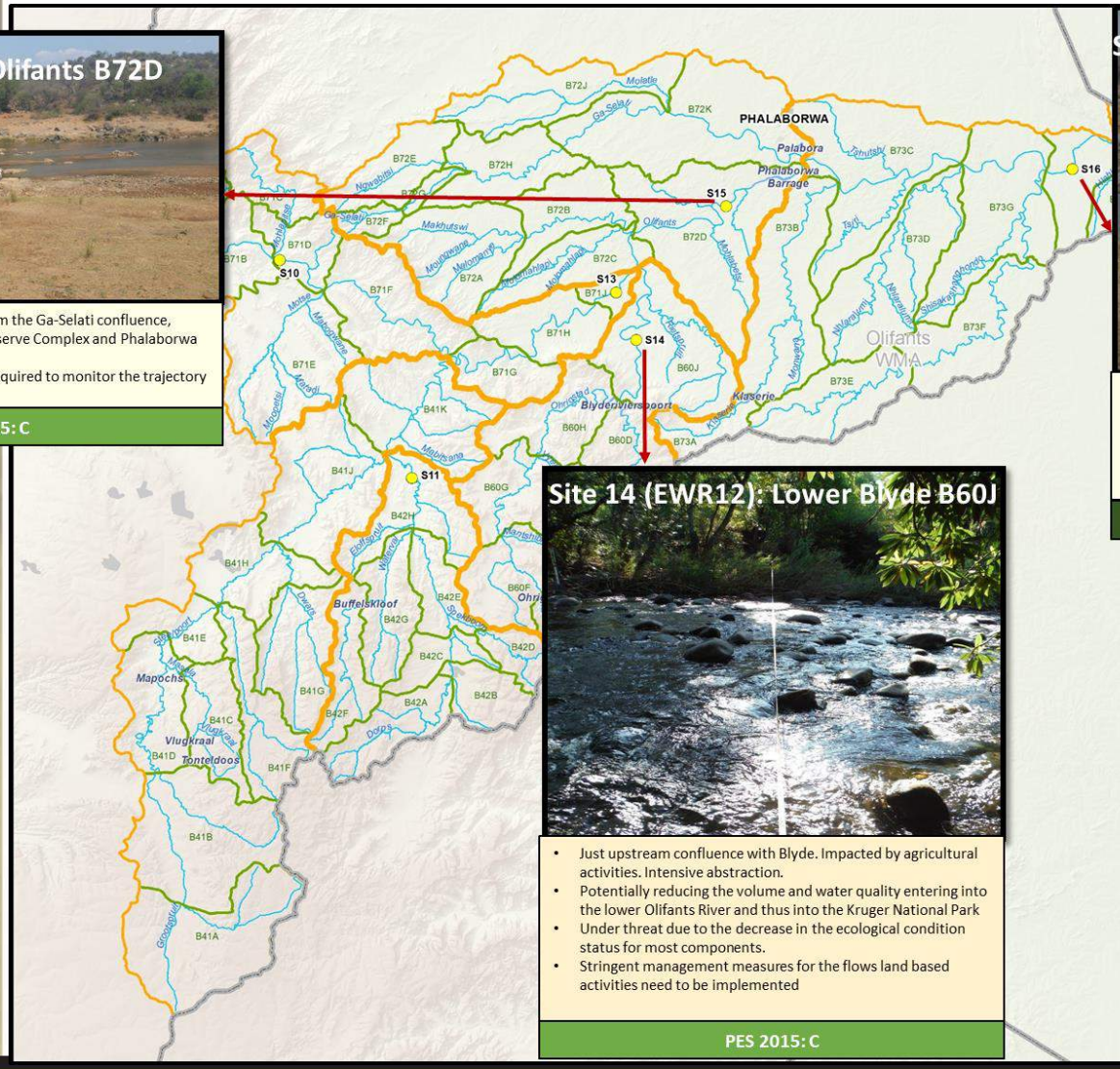
Lower Olifants Catchment

Site 15 (EWR13): Olifants B72D



- Olifants River 20km upstream from the Ga-Selati confluence, upstream of the Bulele Nature Reserve Complex and Phalaborwa impacts (Ga-selati River).
- Regular monitoring is therefore required to monitor the trajectory of change.

PES 2015: C



Site 14 (EWR12): Lower Blyde B60J

- Just upstream confluence with Blyde. Impacted by agricultural activities. Intensive abstraction.
- Potentially reducing the volume and water quality entering into the lower Olifants River and thus into the Kruger National Park
- Under threat due to the decrease in the ecological condition status for most components.
- Stringent management measures for the flows land based activities need to be implemented

PES 2015: C

Site 16 (EWR16): Olifants B73H

- Lack of habitat for fish and inverts, **low flow conditions**
- Furthest downstream EWR site in the system.
- Important monitoring site for monitoring water quality and flow velocity to Mozambique in terms of international obligations. It also contributes to biodiversity protection in the Kruger National Park.

PES 2015: D

Letaba Catchment

- u/s of Dap Naude Dam
- Good habitat diversity except limited veg)
- High predation impacts from alien invasive fish (OMYK)
- Good water quality

PES 2016: B/C

- Located in KNP u/s of Engelhard Dam/weir
- Limited flow conditions (u/s dams not releasing, irrigation)
- Limited habitat diversity
- Trampling, bank erosion and flood damage

PES 2016: C/D

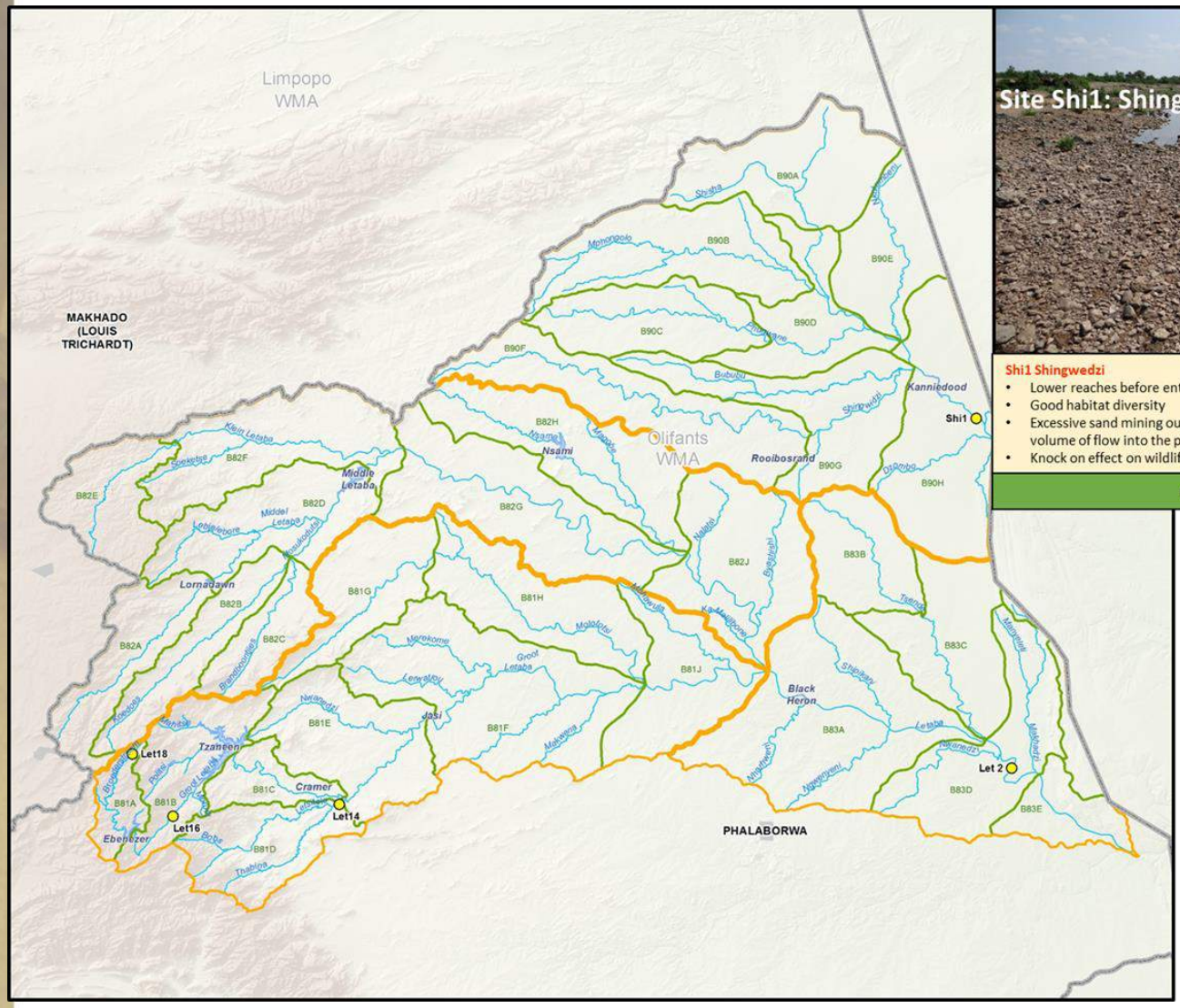
- Between Ebenezer and Tzaneen Dams
- Homogenous habitat dominated by pools of bedrock/boulders
- Low fish diversity
- Adequate water quality

PES 2016: C/D

- u/s of confluence of the Letaba River
- Good habitat availability
- Poor water quality (anthropogenic impacts)

PES 2016: D

Shingwedzi Catchment



Shi1 Shingwedzi

- Lower reaches before entering Mozambique
- Good habitat diversity
- Excessive sand mining outside KNP resulting in loss of flow and volume of flow into the park
- Knock on effect on wildlife

PES 2016: C

Ecological Status

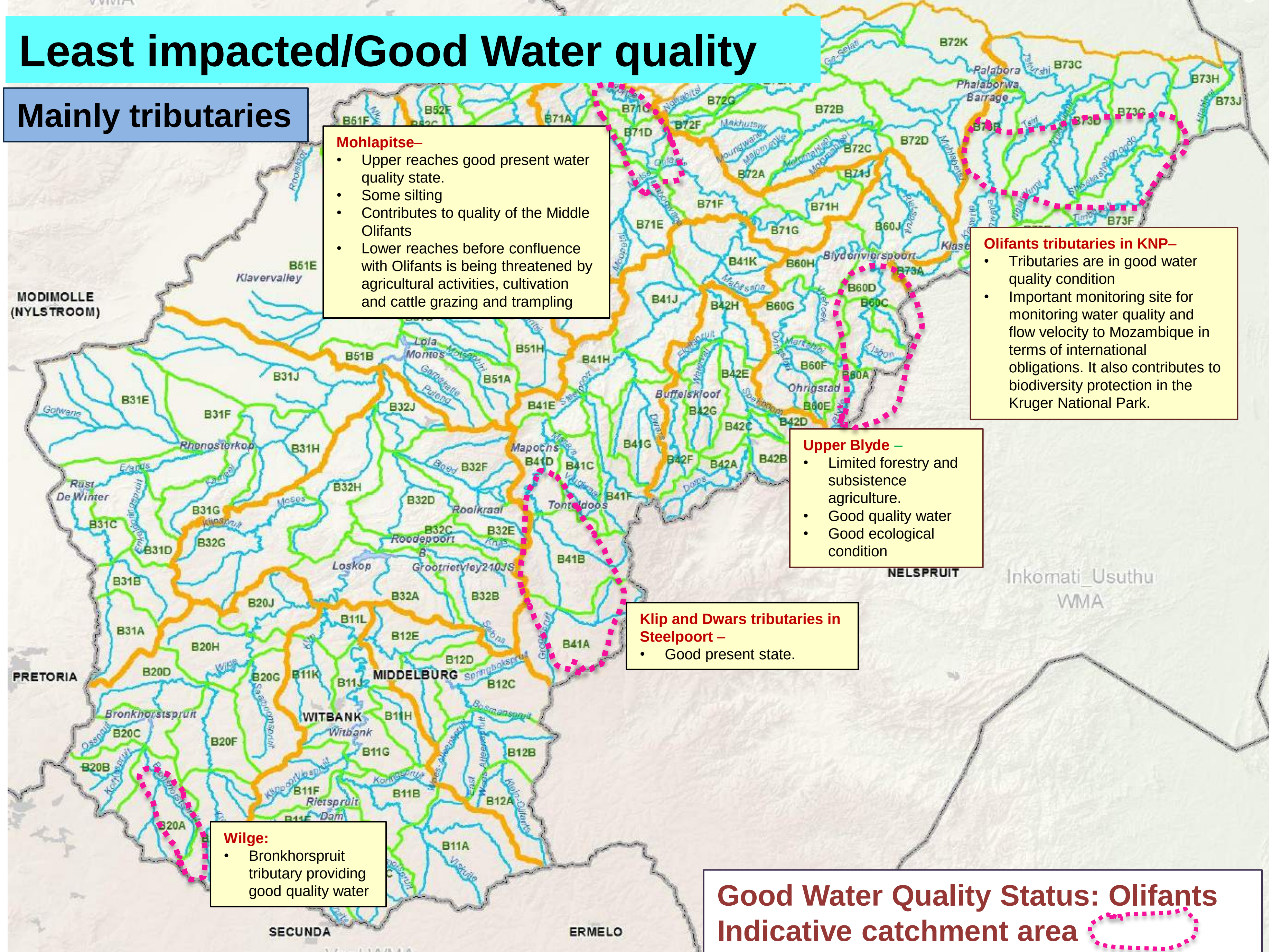
- **Ecological Status: Challenges**
  - Water quality issues impacting on large parts of the system (mining and urbanisation)
  - Many areas are currently under stress – low flows
  - Key conservation areas that must be protected
  - Important fish species

Water Quality Status

- **Prevalent Issues**
  - High levels of salinity and related macro-ions
  - Eutrophication – algal growth and water hyacinth in many parts of the catchment
  - Microbiological pollution
  - Discharges from mining, industries and wastewater treatment works
  - Agricultural run-off
  - Decants from mines – post closure
  - Metal contamination (localised)

Least impacted/Good Water quality

Mainly tributaries



Mohlapitse–

- Upper reaches good present water quality state.
- Some silting
- Contributes to quality of the Middle Olifants
- Lower reaches before confluence with Olifants is being threatened by agricultural activities, cultivation and cattle grazing and trampling

Olifants tributaries in KNP–

- Tributaries are in good water quality condition
- Important monitoring site for monitoring water quality and flow velocity to Mozambique in terms of international obligations. It also contributes to biodiversity protection in the Kruger National Park.

Upper Blyde –

- Limited forestry and subsistence agriculture.
- Good quality water
- Good ecological condition

Klip and Dwars tributaries in Steelpoort –

- Good present state.

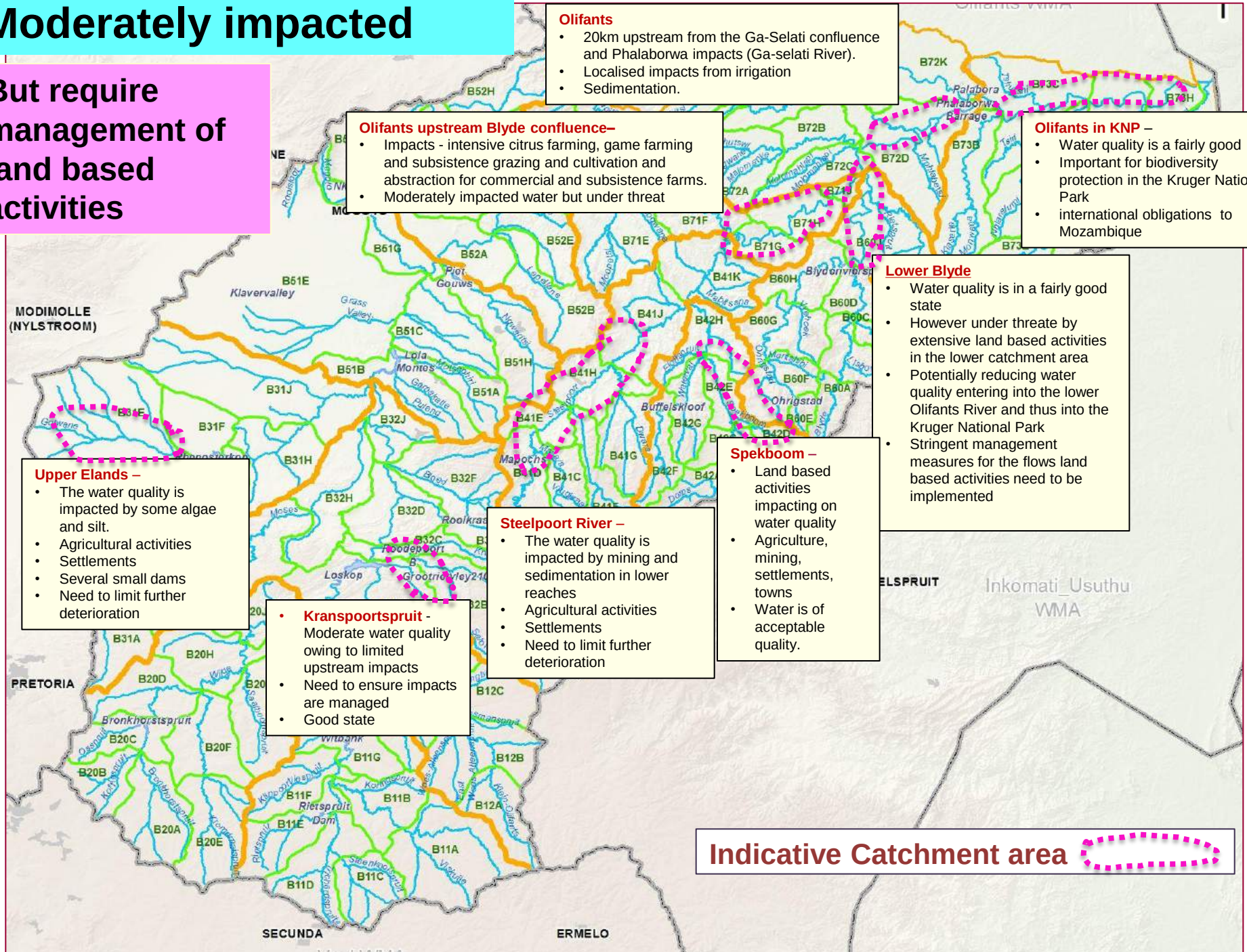
Wilge:

- Bronkhorspruit tributary providing good quality water

Good Water Quality Status: Olifants Indicative catchment area

Moderately impacted

But require management of land based activities



Olifants
- 20km upstream from the Ga-Selati confluence and Phalaborwa impacts (Ga-selati River).
- Localised impacts from irrigation
- Sedimentation.

Olifants upstream Blyde confluence–
- Impacts - intensive citrus farming, game farming and subsistence grazing and cultivation and abstraction for commercial and subsistence farms.
- Moderately impacted water but under threat

Olifants in KNP –
- Water quality is a fairly good
- Important for biodiversity protection in the Kruger National Park
- international obligations to Mozambique

Lower Blyde
- Water quality is in a fairly good state
- However under threate by extensive land based activities in the lower catchment area
- Potentially reducing water quality entering into the lower Olifants River and thus into the Kruger National Park
- Stringent management measures for the flows land based activities need to be implemented

Upper Elands –
- The water quality is impacted by some algae and silt.
- Agricultural activities
- Settlements
- Several small dams
- Need to limit further deterioration

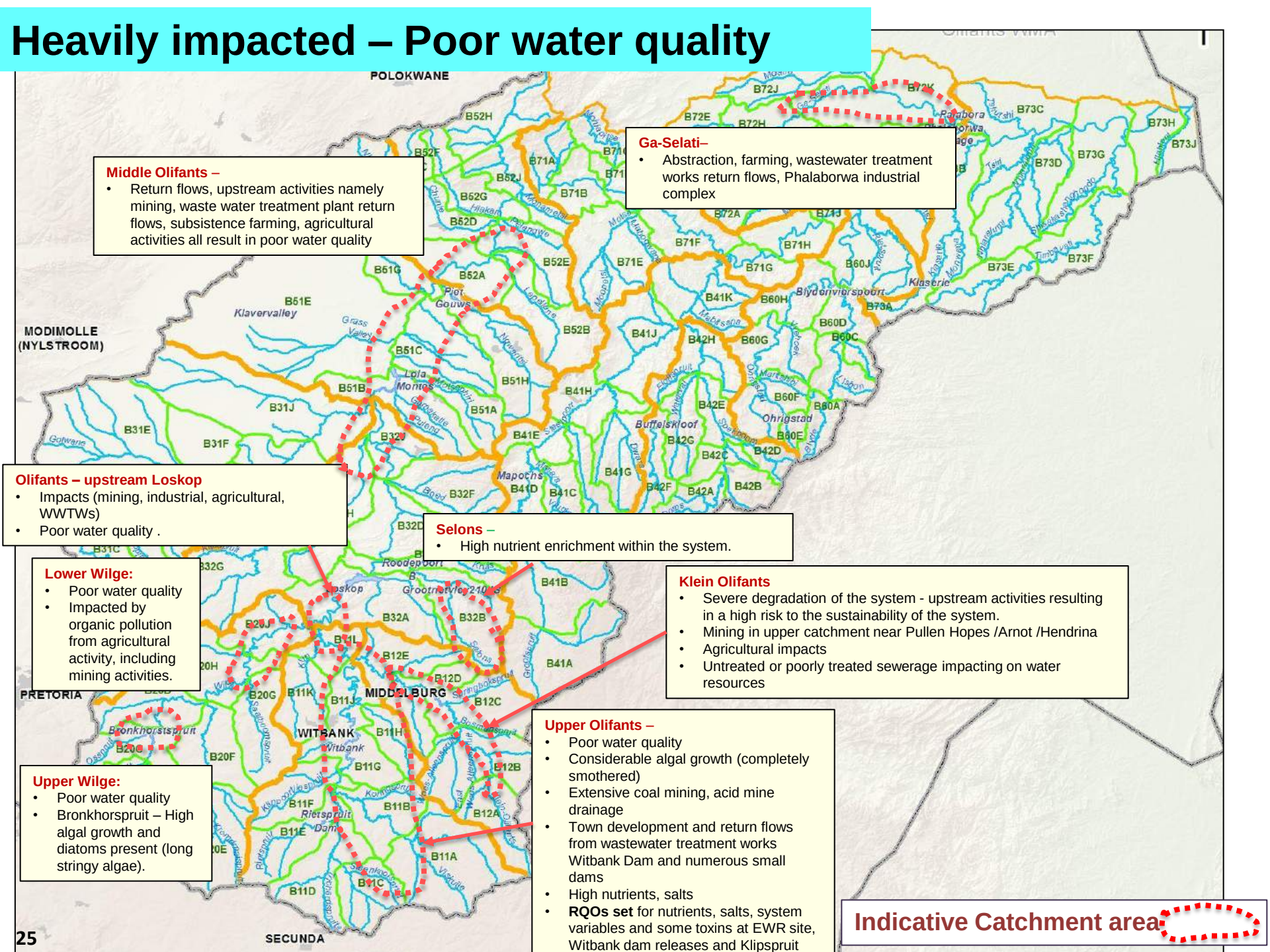
Spekboom –
- Land based activities impacting on water quality
- Agriculture, mining, settlements, towns
- Water is of acceptable quality.

Steelpoort River –
- The water quality is impacted by mining and sedimentation in lower reaches
- Agricultural activities
- Settlements
- Need to limit further deterioration

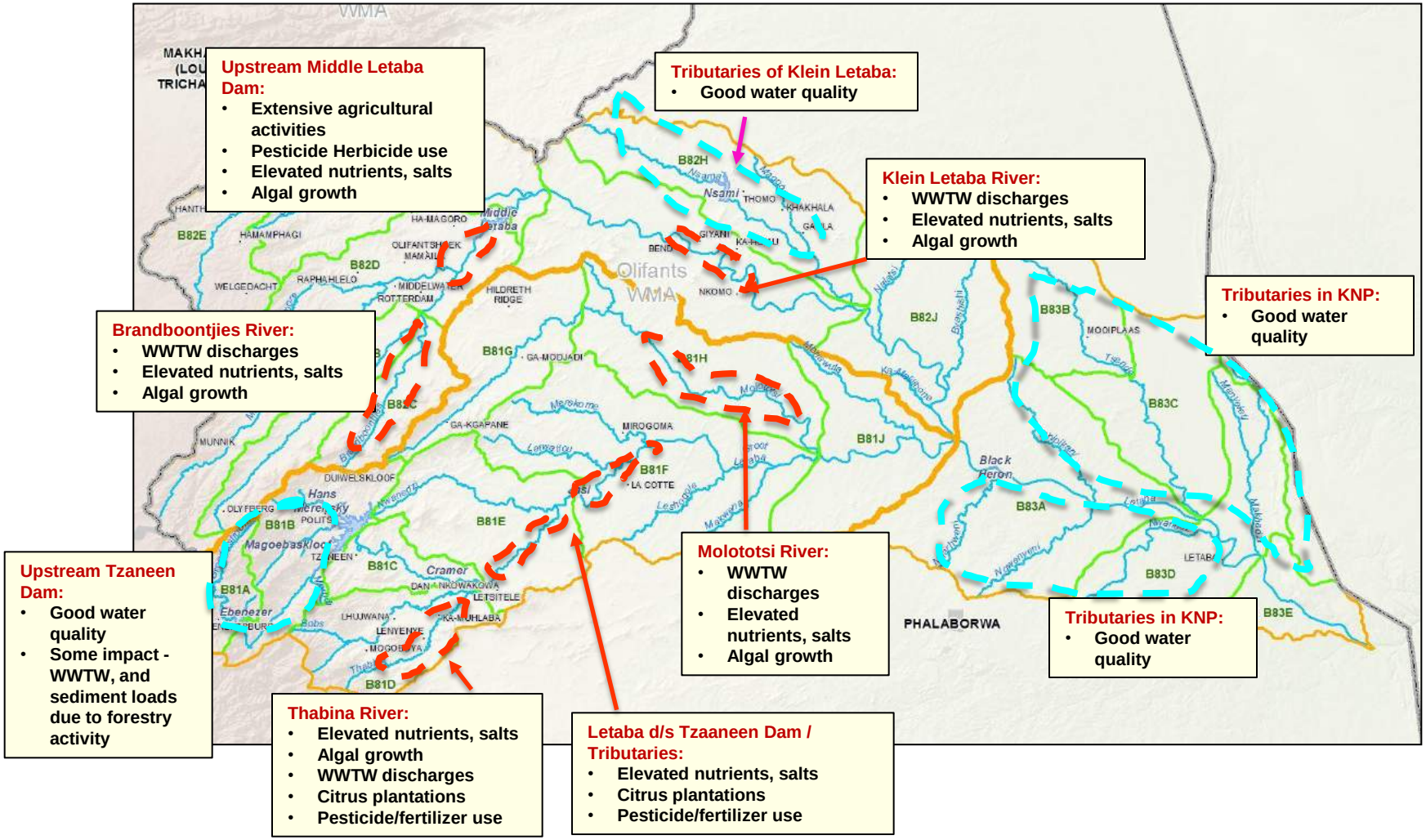
- **Kranspoortspruit** - Moderate water quality owing to limited upstream impacts
- Need to ensure impacts are managed
- Good state

Indicative Catchment area

Heavily impacted – Poor water quality



Water Quality Status: Letaba

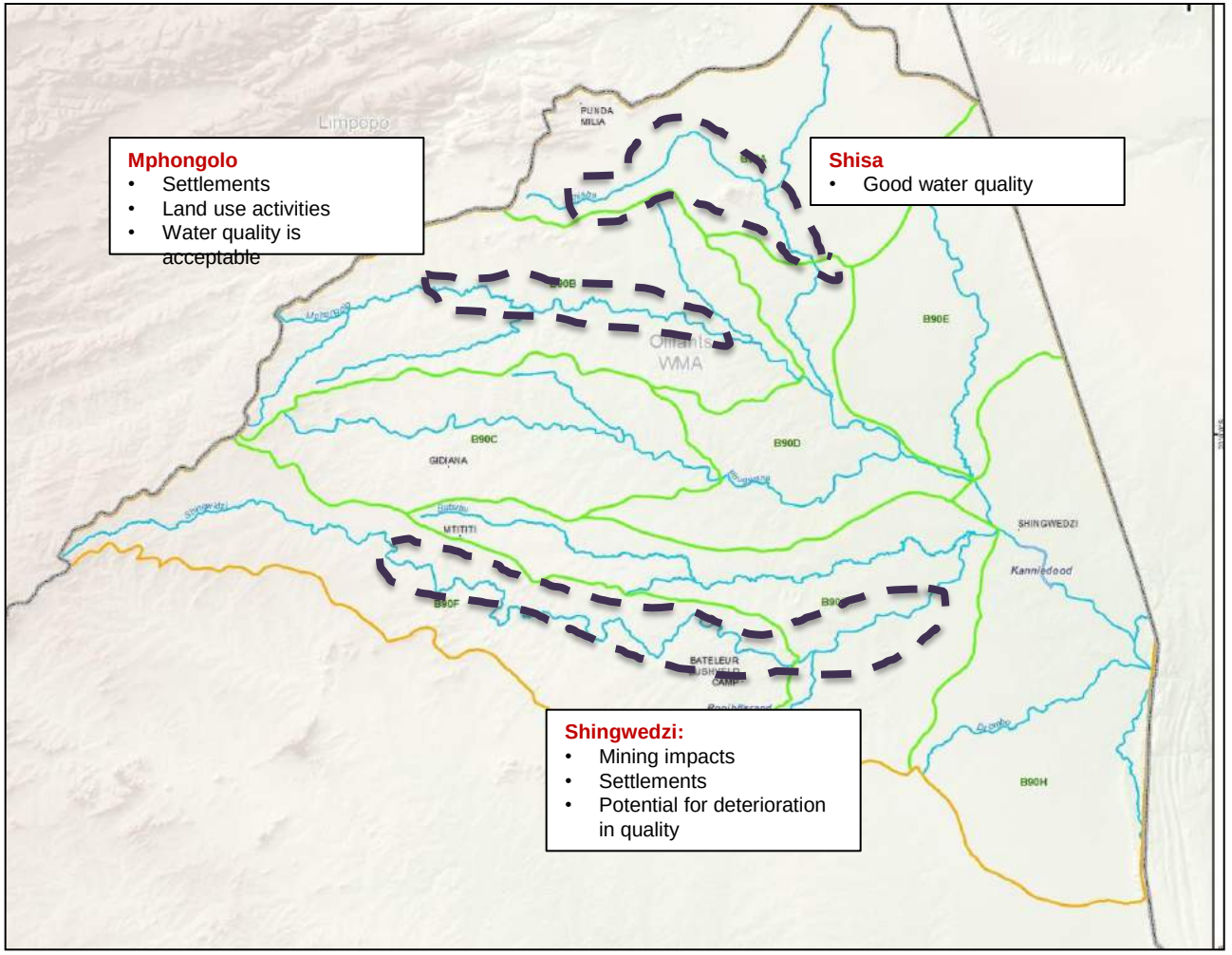


Indicative Catchment area

Good quality

Poor quality

Water Quality Status: Shingwedzi



Indicative Catchment area

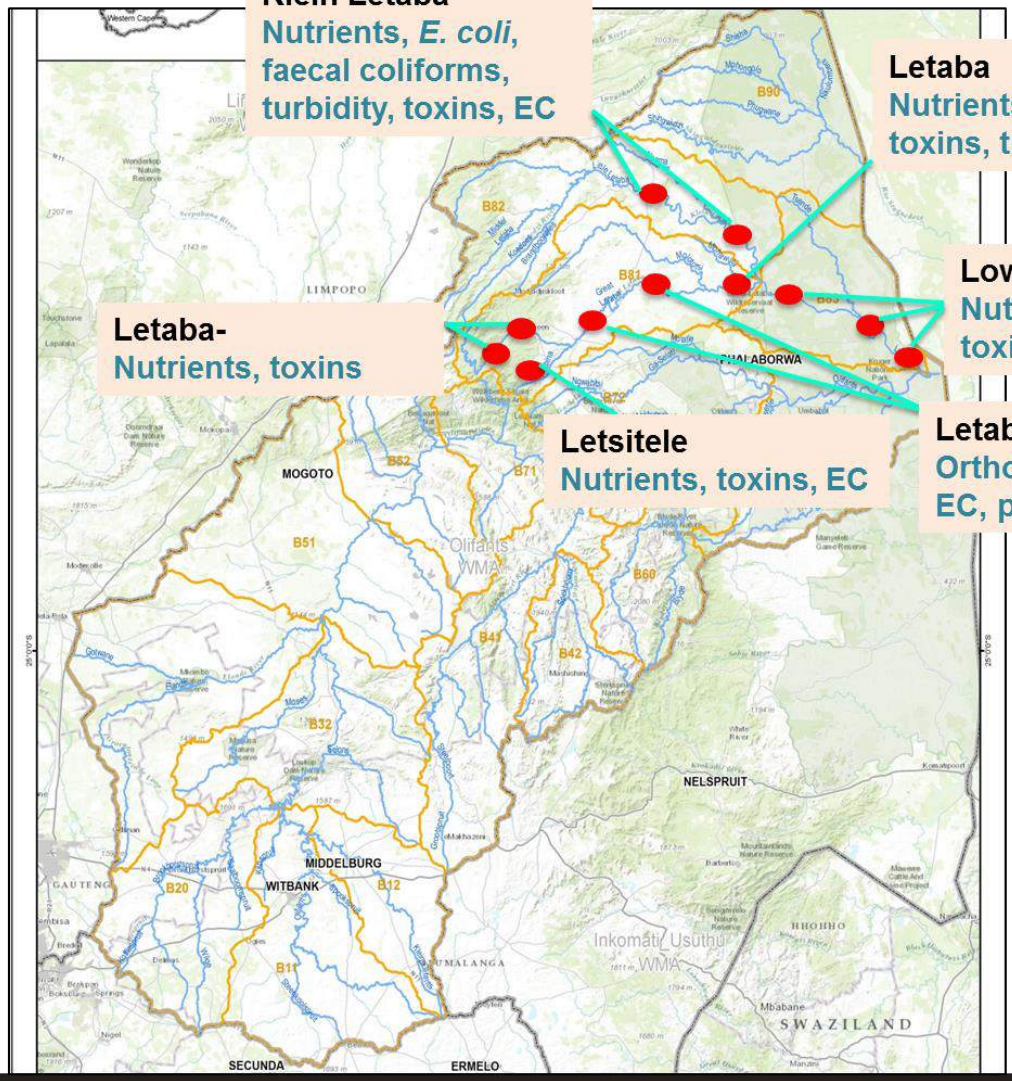
Water Quality Status

- Resource Quality Objectives

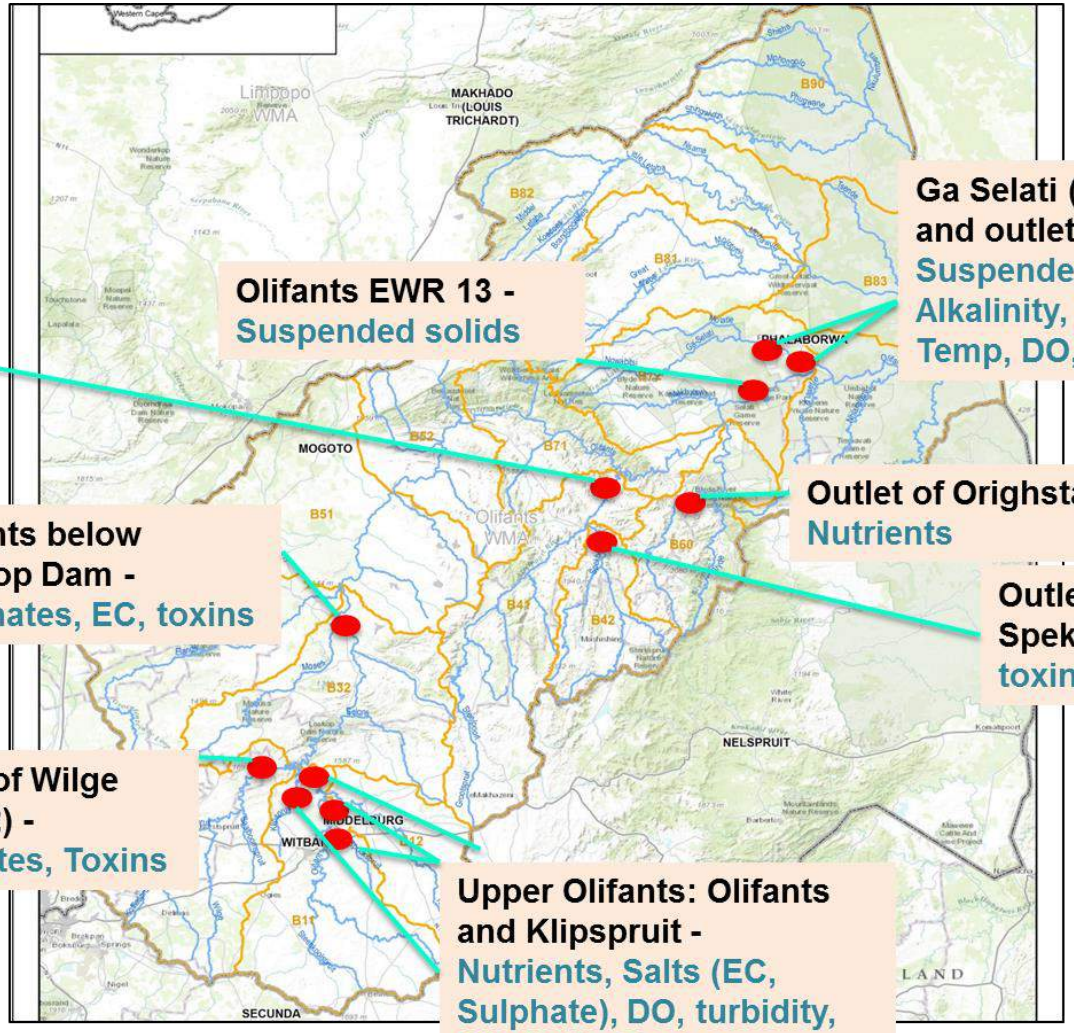
In support – this through this study:

- Water quality hotspots/key areas – water quality ecological specifications at the EWR sites/priority areas and key nodes through the system
- Strategic sub-catchment level water quality ecological specifications (at outlet nodes of catchment areas)
- DWS Olifants Integrated Water Quality Management Plan Study (recently underway)

Proposed Resource Quality Objectives
Letaba: Water Quality



Resource Quality Objectives Gazetted: Water Quality



Outlet of Steelpoort- Nutrients, toxins

Olifants EWR 13 - Suspended solids

Ga Selati (EWR site and outlet) - Suspended solids, Alkalinity, turbidity, Temp, DO, toxins

Outlet of Orighstad - Nutrients

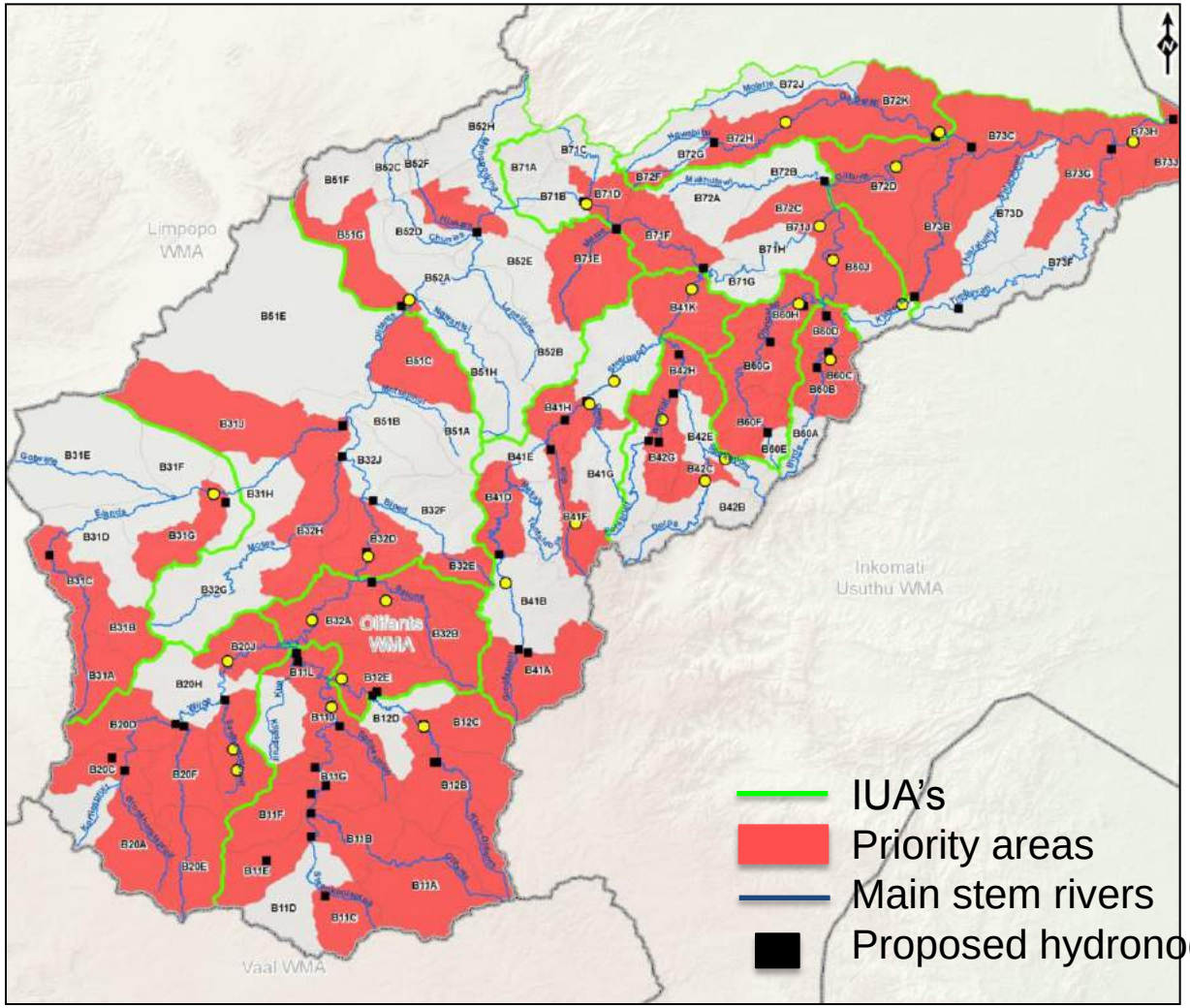
Olifants below Loskop Dam - Sulphates, EC, toxins

Outlet of Spekboom - toxins

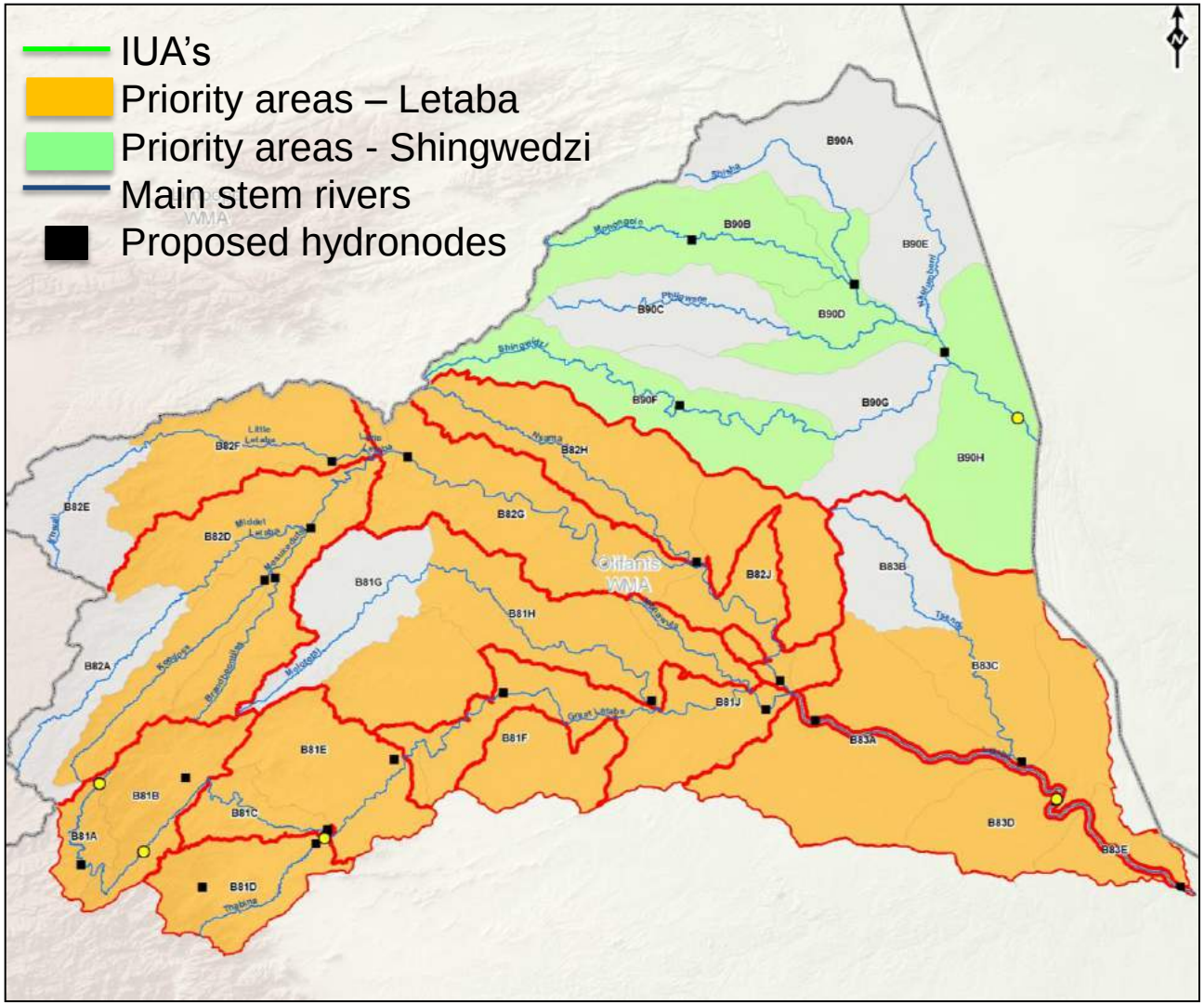
Outlet of Wilge (EWR 2) - Sulphates, Toxins

Upper Olifants: Olifants and Klipspruit - Nutrients, Salts (EC, Sulphate), DO, turbidity, Alkalinity, Toxins

Priority areas Rivers - Ecological Specifications Required: Olifants

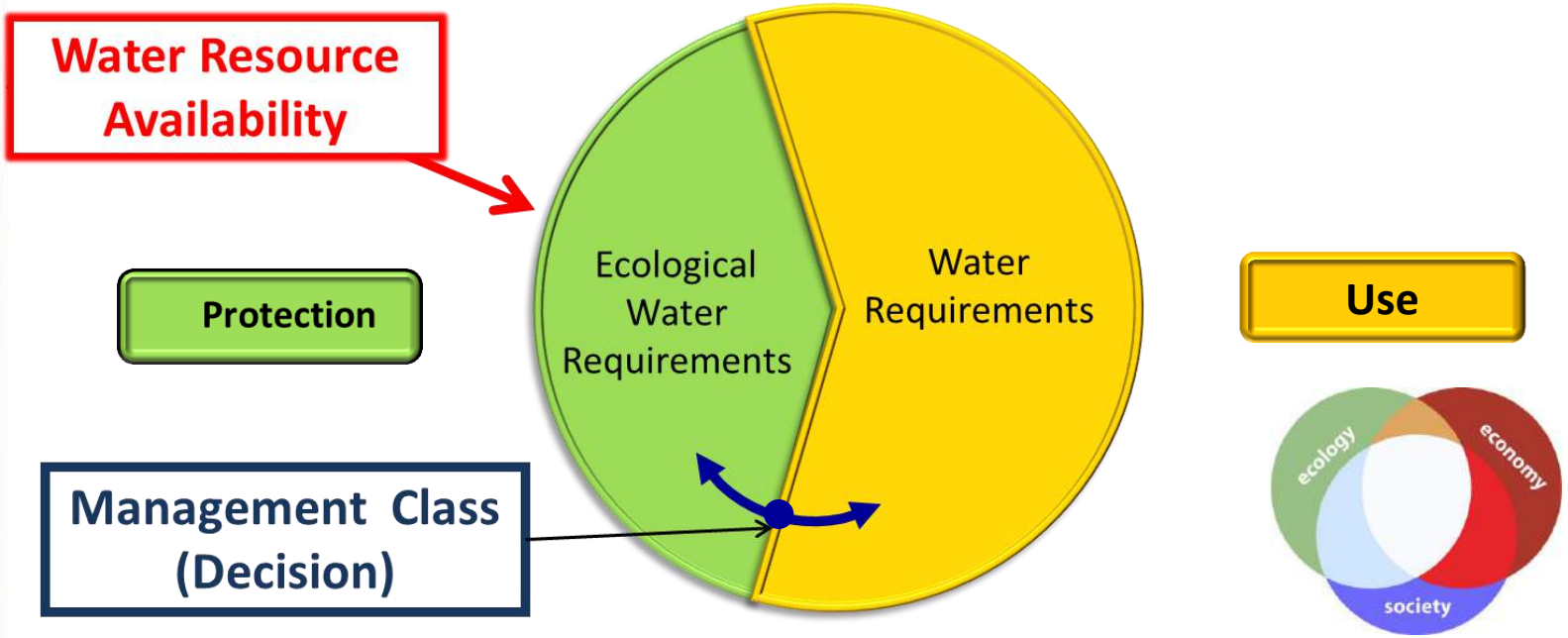


Priority areas Rivers- Ecological Specifications Required: Letaba and Shingwedzi



Evaluation of Ecological Consequences

- Different levels of water use and protection are evaluated to determine consequences
- Does not comprise ecological protection (Water resource class and target ecological category)
- Evaluate the flow requirements – in terms of factors that have an influence on water balance and water quality



Evaluation of Ecological Consequences

Flows at key nodes (to meet protection requirements)

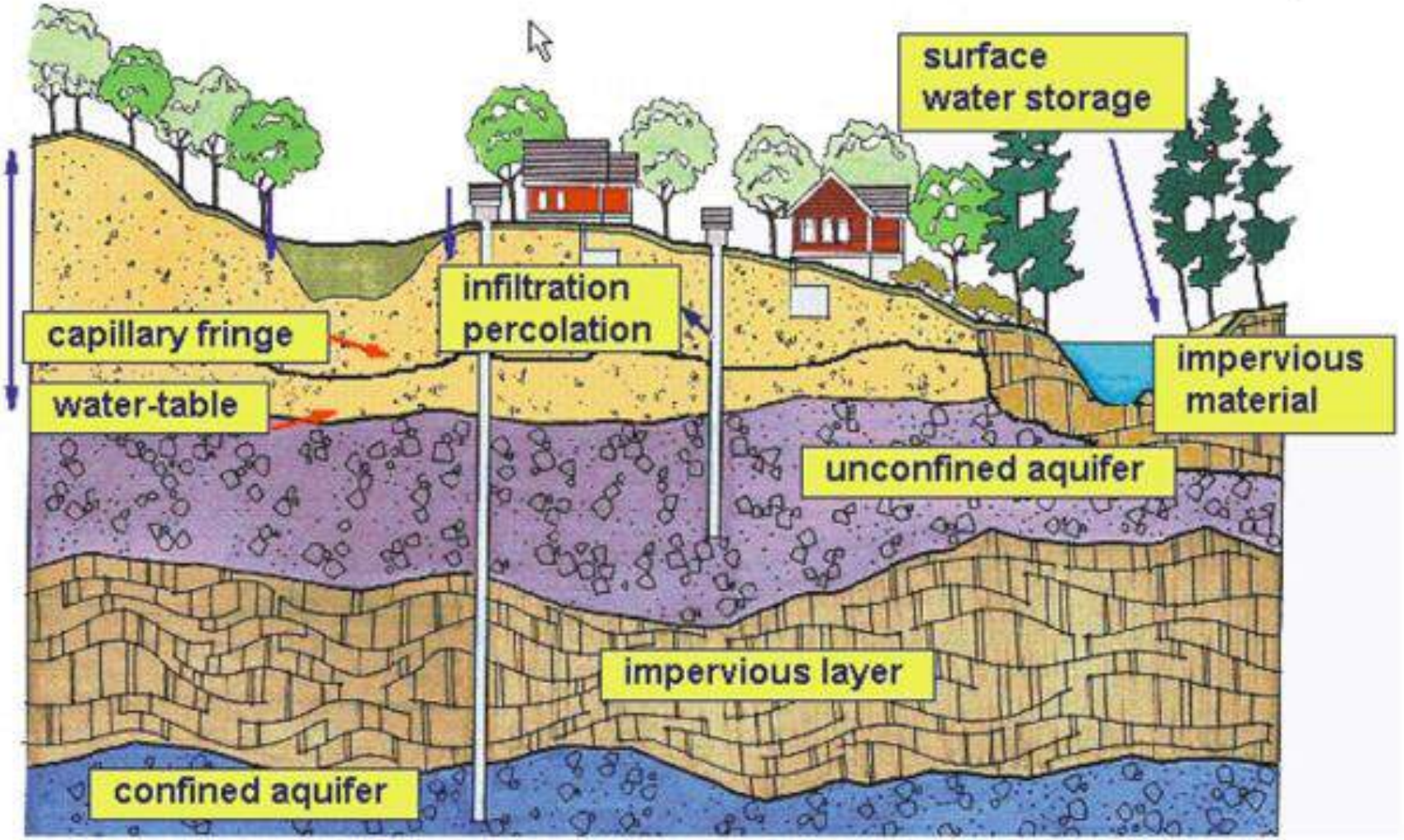
FACTORS TO BE CONSIDERED/ASSESSED:

- Review and incorporate the updated hydraulics into EWR flows.
- Resource quality objectives – review of drought and maintenance flows (where low confidence identified)
- Reconciliation option – demands on Middle Olifants (releases from Loskop Dam, Flag Boshielo and De Hoop
- Future Use

Groundwater Assessment

Groundwater Assessment

Groundwater:…… In Hydrological Cycle) (after land food.ubc)



Groundwater Assessment

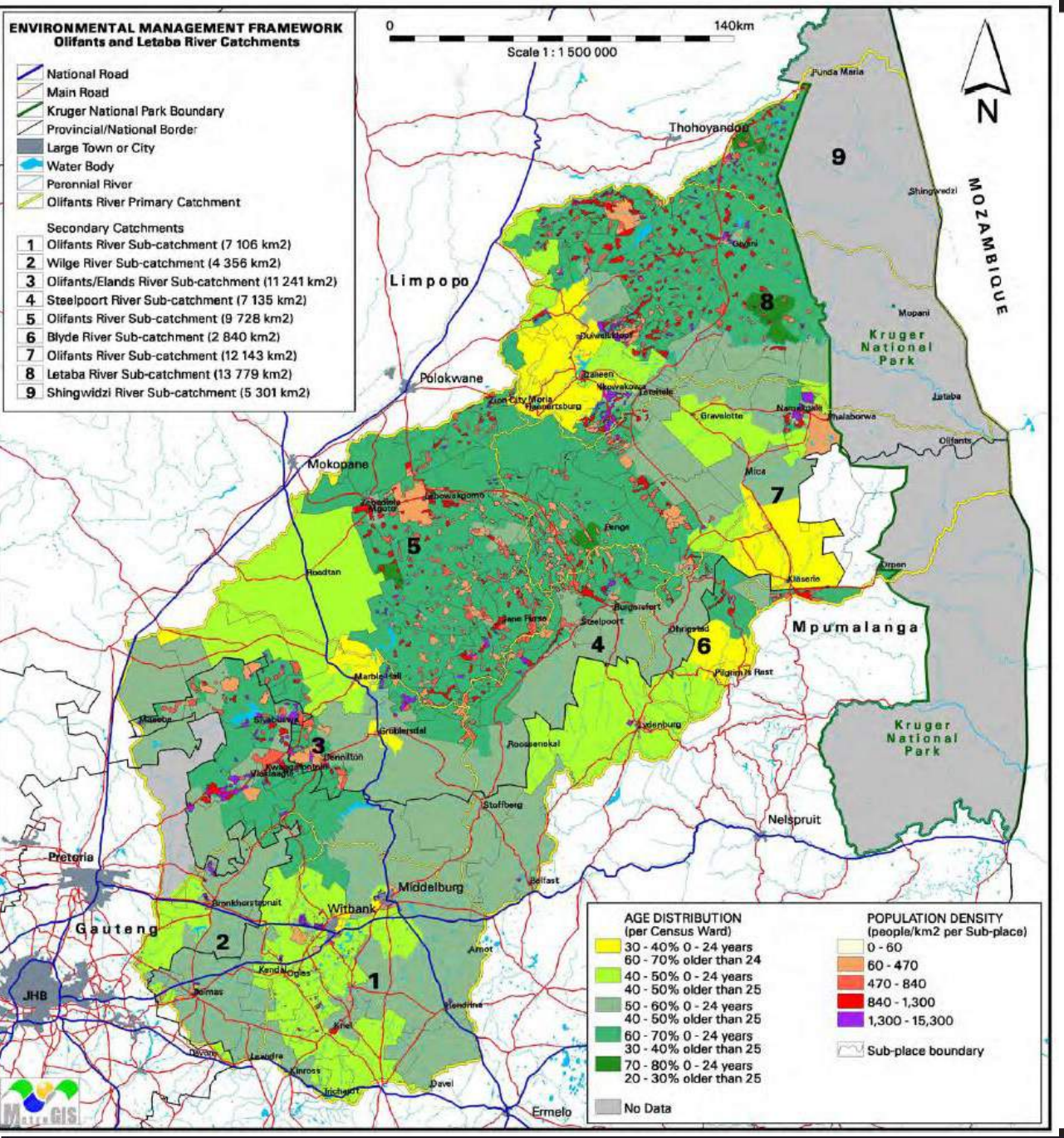
- Groundwater component of the Reserve:
  - Review of the existing quantification of the groundwater component of the Reserve (Qn, quantity/Ql, quality);
  - Set conditions for implementation to protect the groundwater resources;
  - Zoning of areas where over-utilization of groundwater resources could negatively impact on local water supplies (i.e. Schedule 1, General Authorizations and existing uses) and ultimately, maintaining discharges to surface water resources where applicable.
  - Reserve will be expressed as a Water Resource Category (guided by attributes such as Stress Index, Gw allocations[1], BHN and $EWR_{surface\ water}$.

  - In terms of Basic Human Needs (BHN) –
    - Secure sustainable water supply (Ql @ 25 ℓ/c/d and Ql using specific indicators such as total dissolved salts, nitrate and sulphate from long-term/historic Ql data);
  - In terms of Ecological Water Requirements –
    - Areas where interaction between surface and groundwater are present/possible;
    - Interaction with wetland systems (specifically driven by groundwater); and
    - Review of groundwater contribution/discharges to base flow.

[1] International obligations, Schedule 1 usage, General Authorizations and Existing Lawful Users.

Groundwater Assessment

- Specific Aspects of the Groundwater Reserve Determination, Review and Implementation Process:
  - Review/capturing of groundwater required to maintain BHN and ER under average climate conditions;
  - Gw Resource Directed Measures studies: ~12, 8 are site specific report;
  - Two different levels of Reserve Determinations in the Study Area (*viz*. Olifants and Letaba), none for the Shingwedzi (preliminary Reserve):
    - Review and combine the two datasets; and
    - Land use coverage assessment to identify 2015 activities that may impact on BHN.
  - Groundwater monitoring datasets (Qn and Ql)
    - National Gwater Quality Long-term Programme; and
    - Regional Groundwater Level Monitoring



GROUNDWATER ASSESSMENT

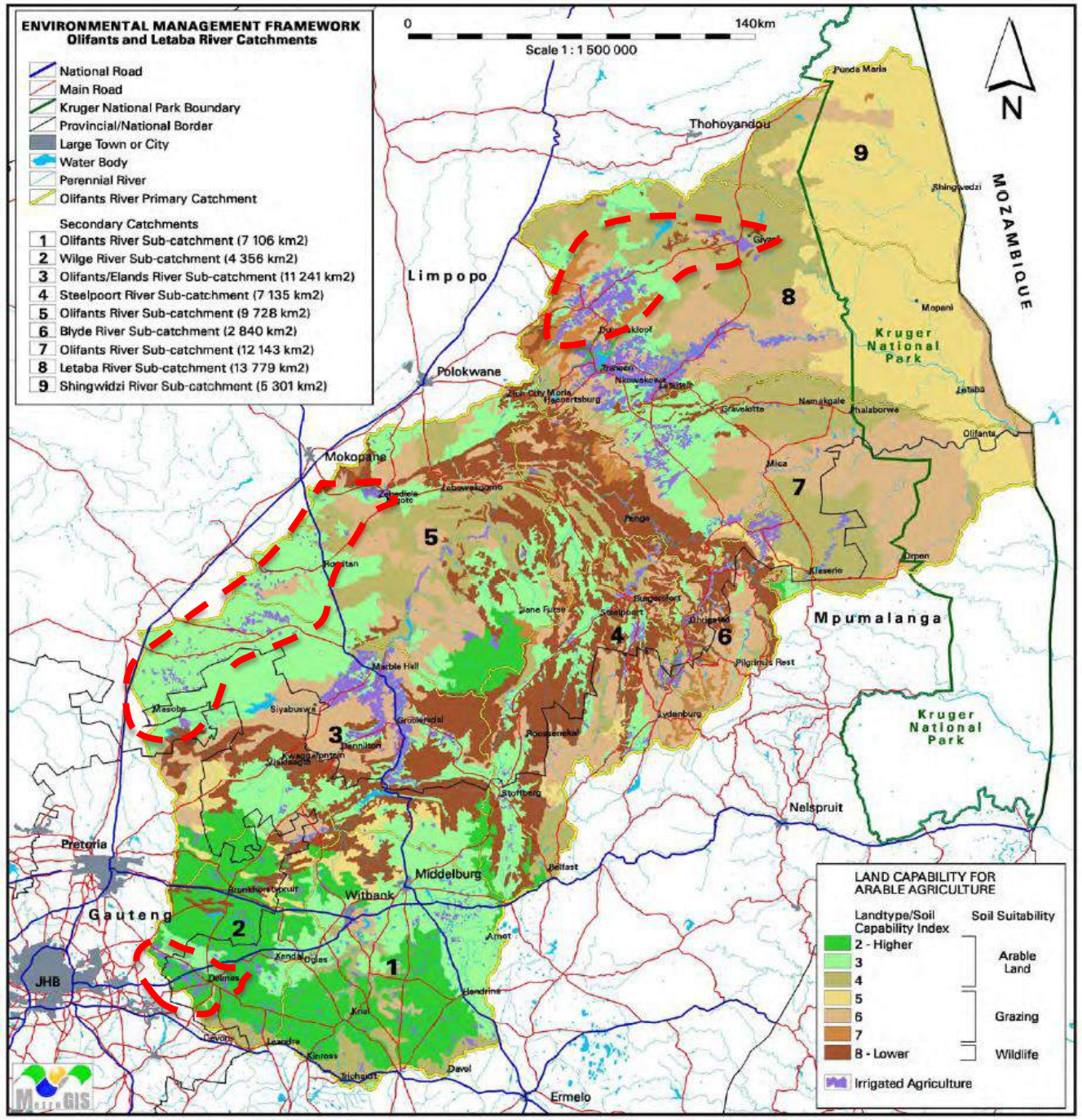
Showing the population density in the Olifants-Letaba study area.

In terms of the Groundwater Reserve setting, impacts on the ground water quality of local aquifer systems due to certain sanitation practices (toilet systems, uncontrolled waste disposal and stock kraals) will have a negative effect on the groundwater quality (NO_3-N, TDS and Cl) concentrations.
These areas where population concentrations above 60 persons per km^2 should undergo a high-level of sanitation upgrades to levels such as Dual UDS system as a requirement for protecting the groundwater systems which may be used during extended dry periods.

Source OLEMF, DEA, DWA, LimPG & The Dedet, 2009

GROUNDWATER ASSESSMENT

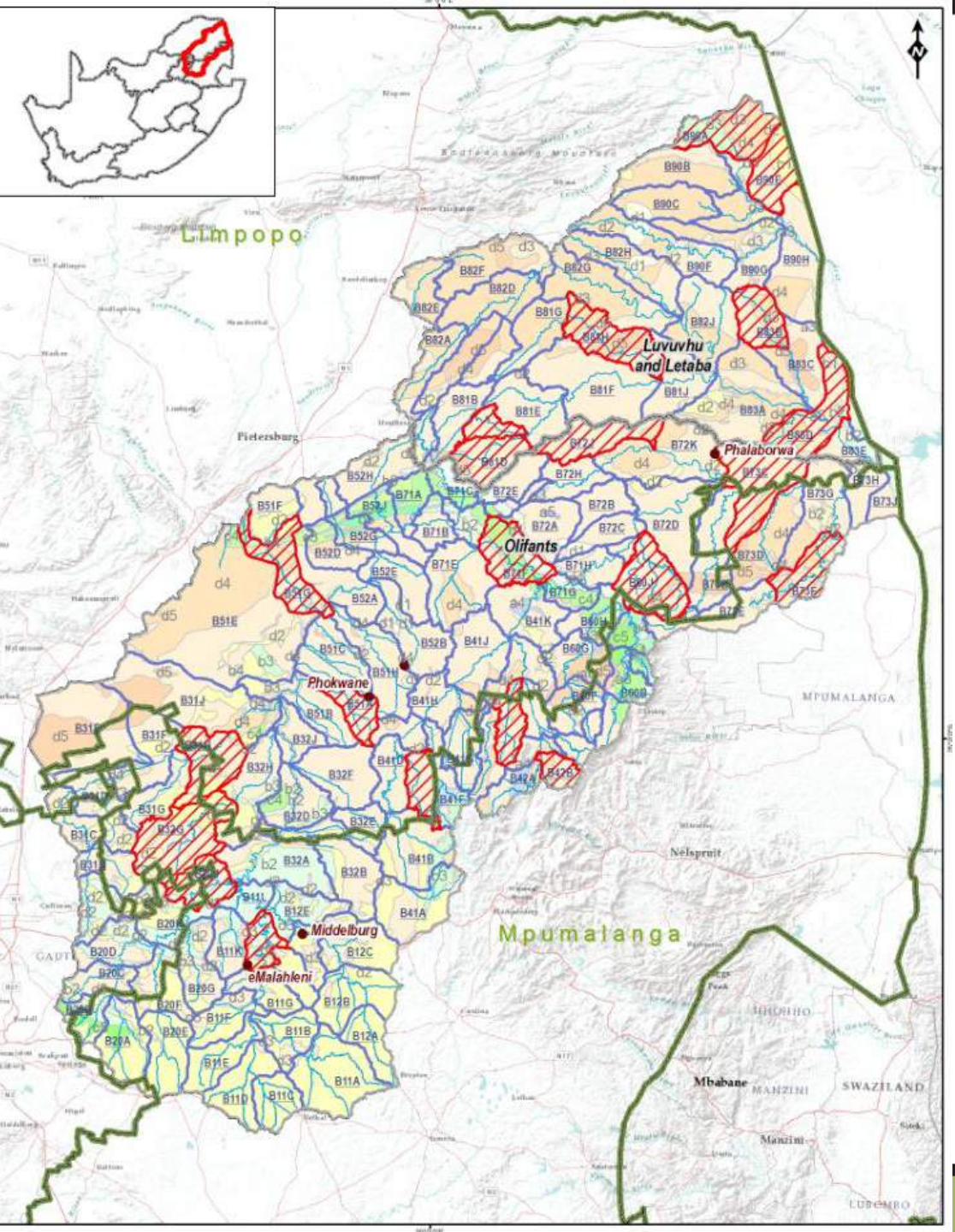
Showing the Quaternary Catchments in the Olifants-Letaba Study Area where agricultural irrigation is practised.



Groundwater irrigation schemes

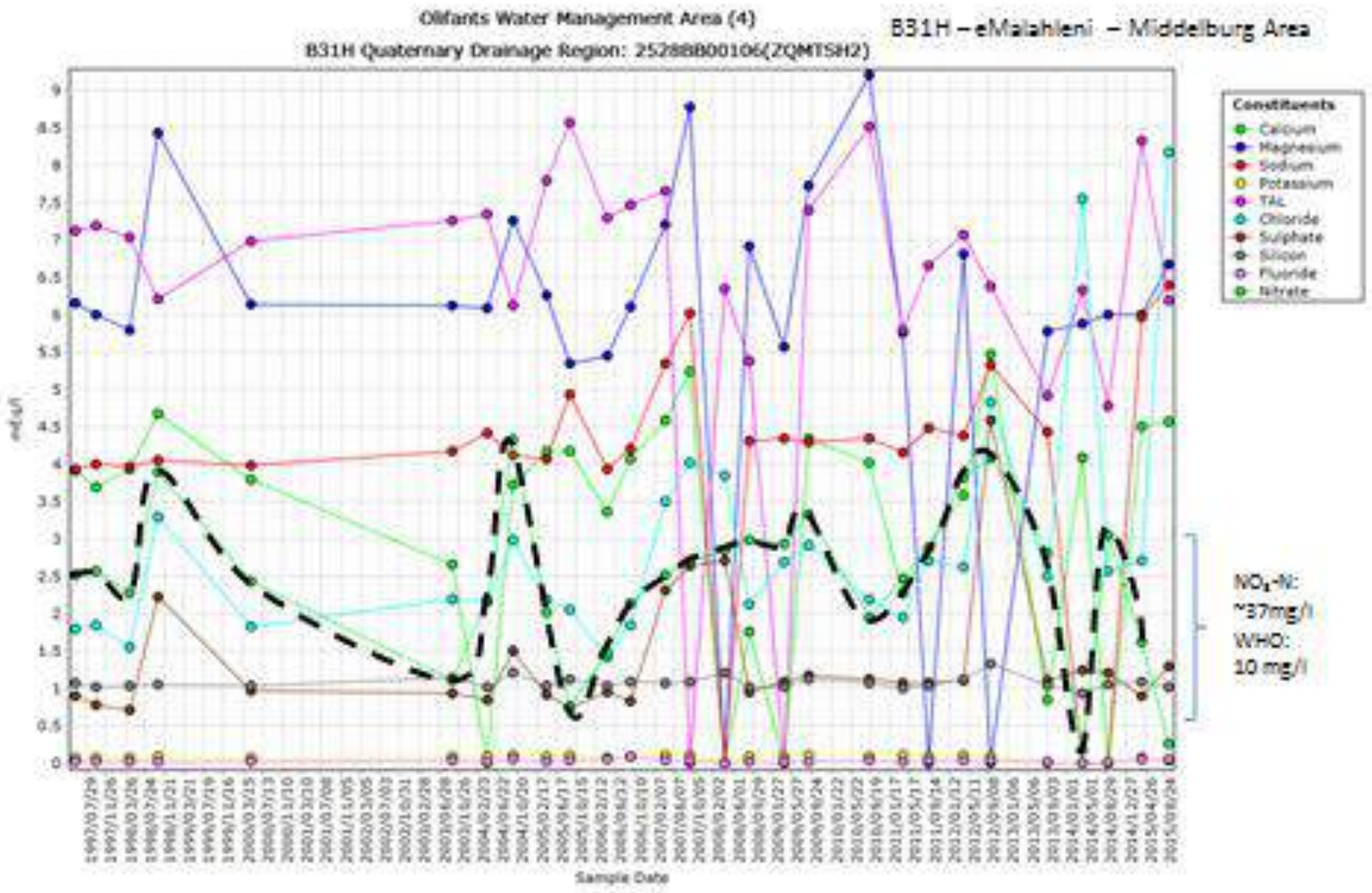
Source OLEMF, DEA, DWA, LimPG & The Dedet, 2009

GROUNDWATER ASSESSMENT

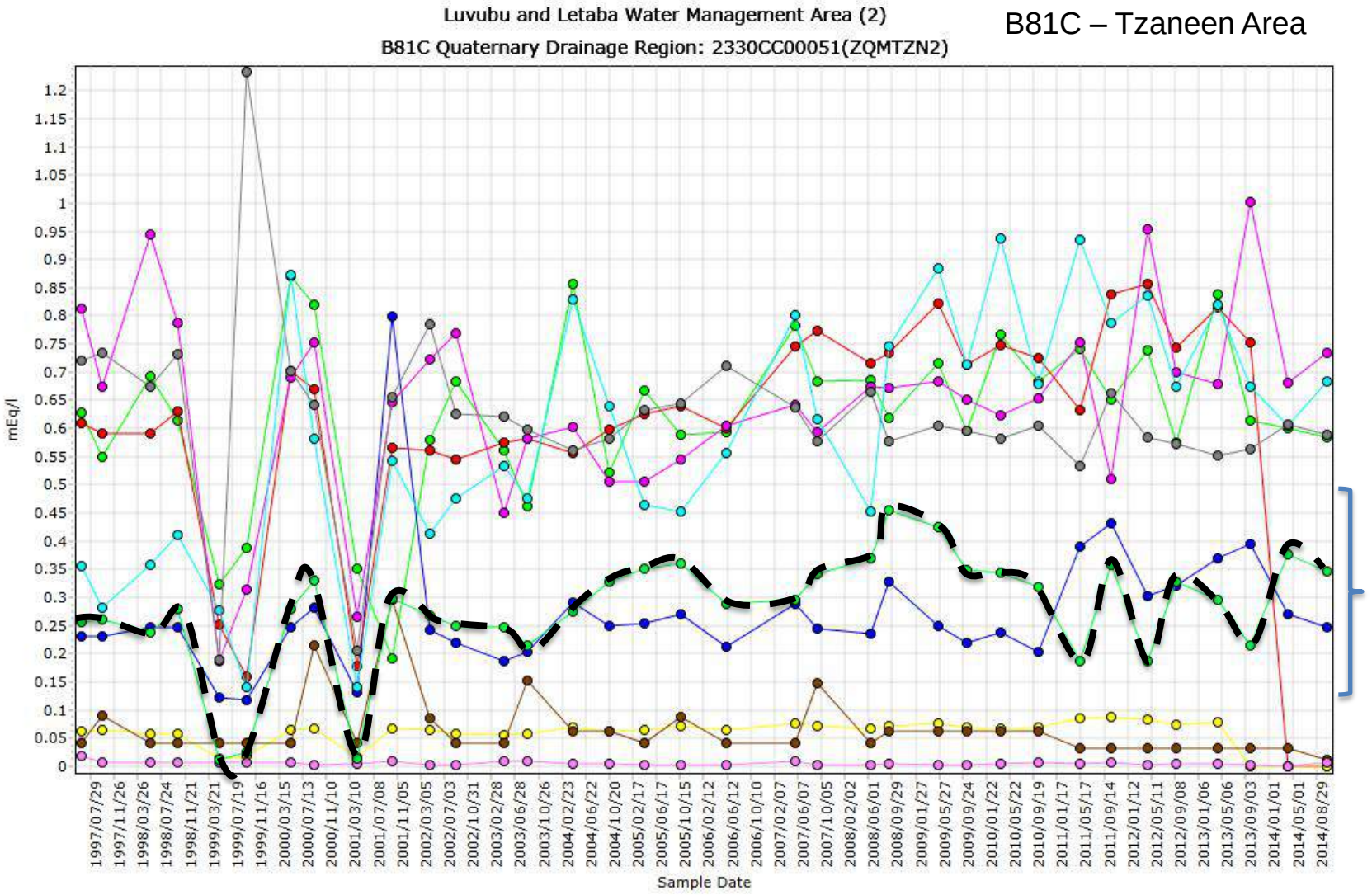


Showing the Quaternary Catchments in the Olifants-Letaba Study Area where long-term groundwater quality monitoring is taking place (*viz*. 1996 to Recent).

GROUNDWATER ASSESSMENT: QUALITY



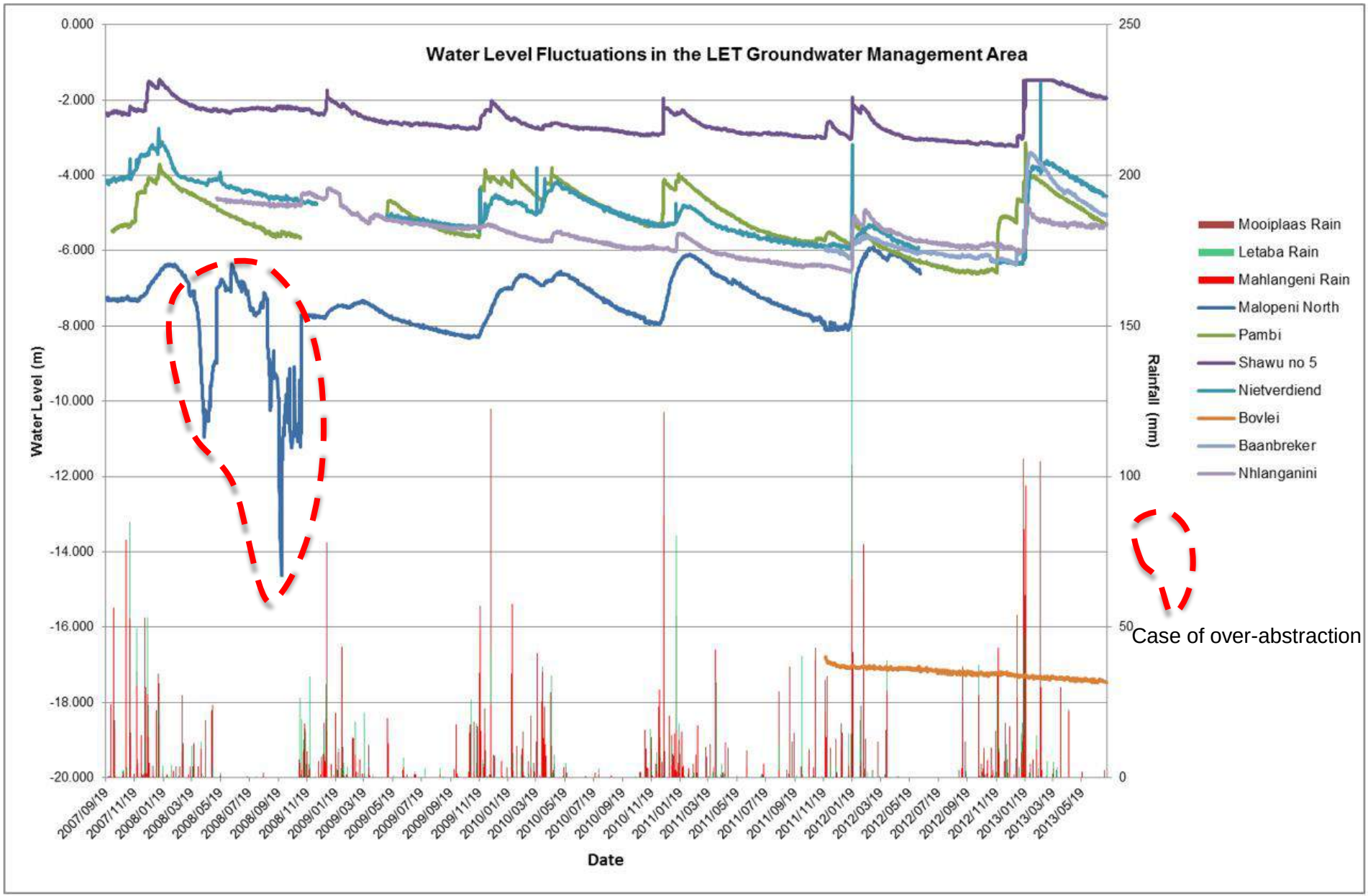
GROUNDWATER ASSESSMENT: QUALITY



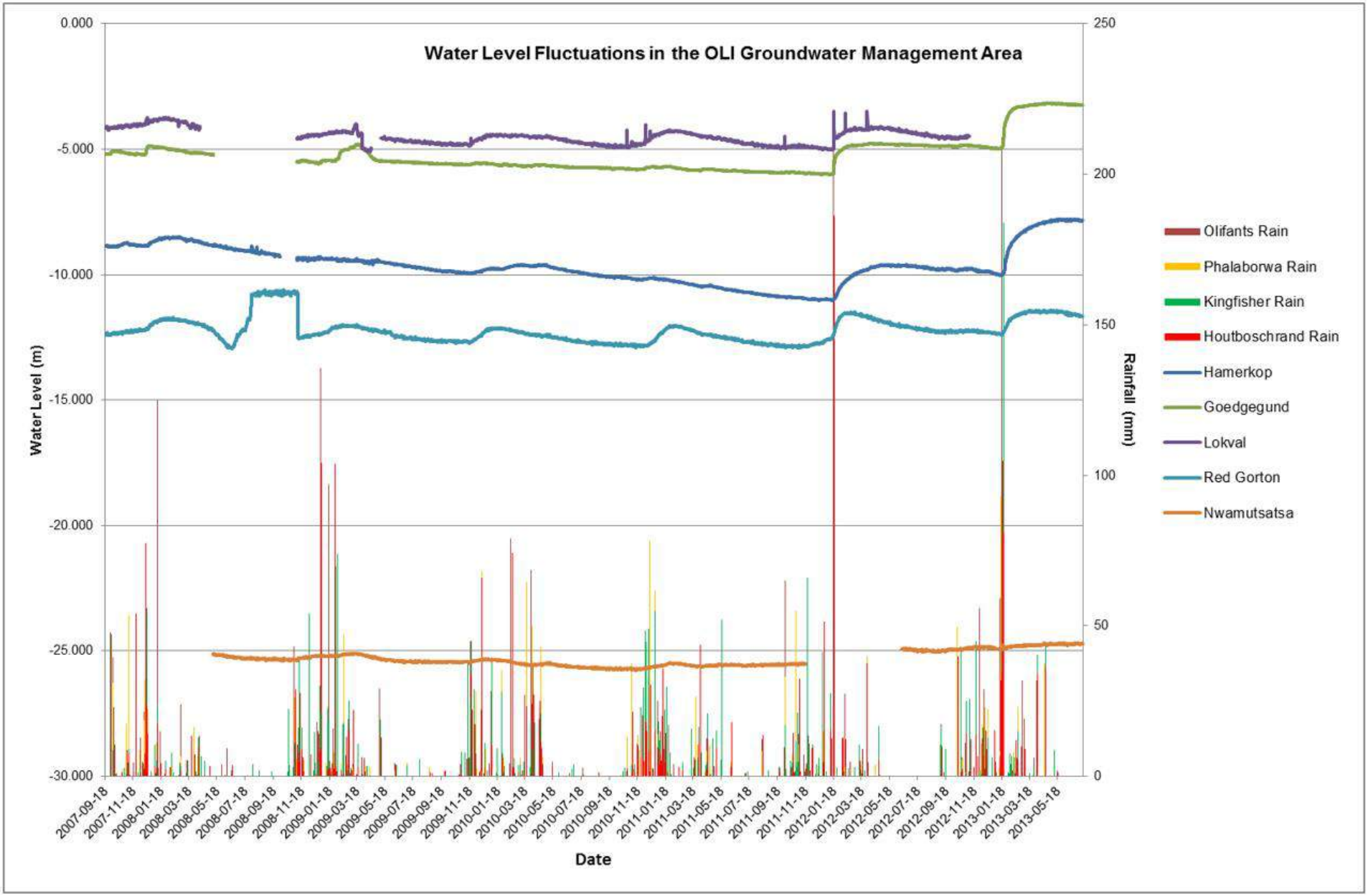
B81C – Tzaneen Area

NO_3-N:
~3-5mg/l
WHO:
10 mg/l

GROUNDWATER ASSESSMENT



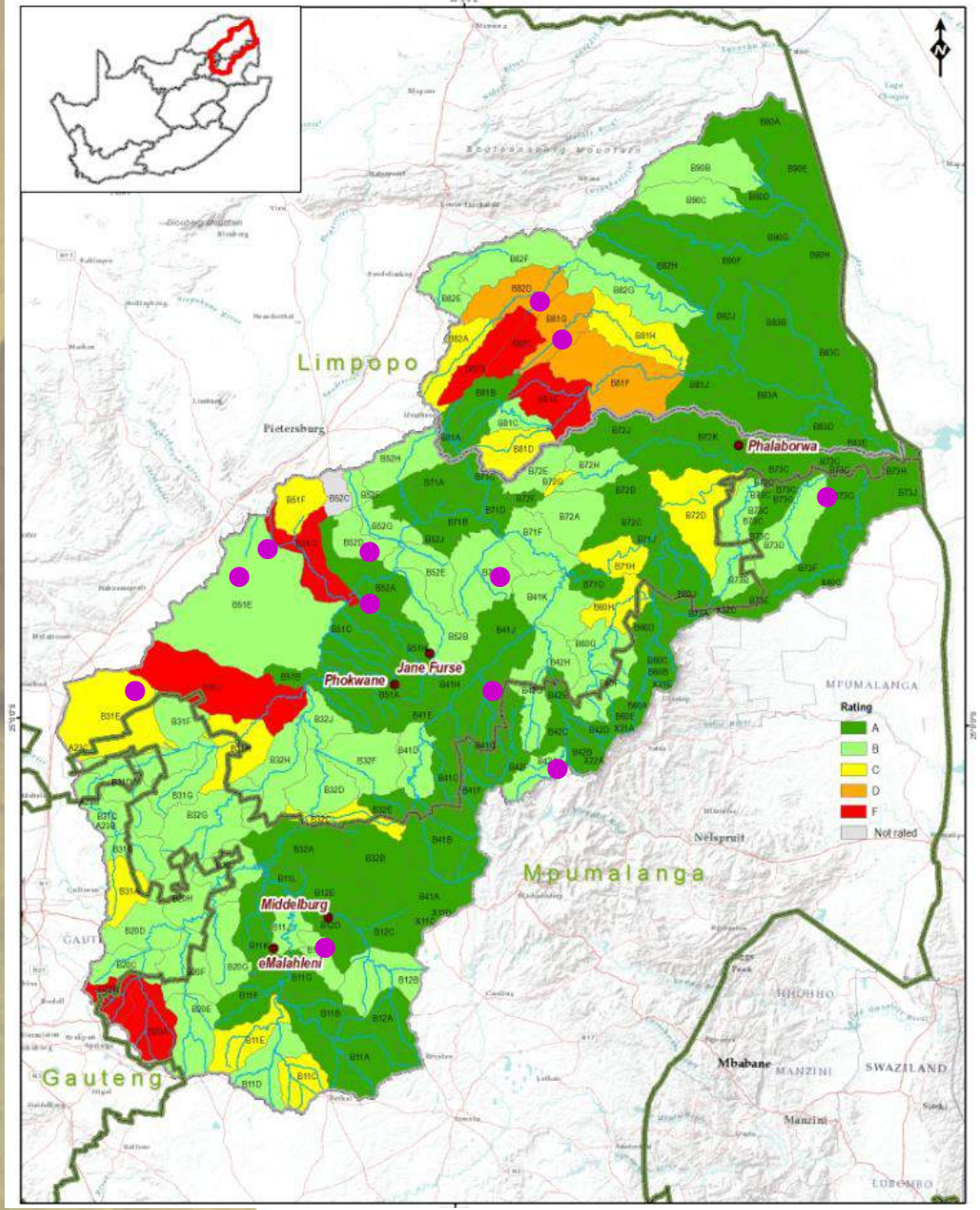
GROUNDWATER ASSESSMENT



GROUNDWATER ASSESSMENT

- **Reserve Status (rating) of Quaternary Catchments in the Olifants-Letaba:**
  - **Groundwater Reserve Component: Basic Human Needs**
    - Resource quantity (Qn):
      - Impacted by large mining and irrigations schemes (lowering of water levels);
      - Interaction between Gwater and Swater components (quantification not possible without dedicated monitoring);
      - QC's mapped i.t.o. Over- , Heavily, and Under- Utilised QC's/IUA's.
    - Resource quality (Ql):
      - Impacted by poor mine water management − mostly the smaller water users (S1, GA's) impacted; and
      - Expansion of rural villages without proper sanitation systems …….Upgrading to VIP standards (UDS).
      - Regional, long-term groundwater quality monitoring at 25 Monitoring Sites (places where groundwater are abstracted and supplied for domestic applications provides an idea of the long-term integrity of the groundwater resources.
  - **Ecological Requirements:**
    - Groundwater supported baseflow requirements to be address as follows:
      - Review of QC's/IUA where groundwater use may have a HIGH, MODERATE, LOW or NEGLIGIBLE impact on local Swater Resources;
      - HIGH and MODERATE cases to be addressed through "controlling" measures, for example strict control over any new allocations (i.e. Delmas-Zebedila DLMT's & Springbok Flats)

GROUNDWATER ASSESSMENT



Showing the Reserve for Olifants-Letaba study area as per the following rating[1]:

A. Unmodified;
B. Largely natural (local impacts);
C. Moderately modified (local impacts);
D. Largely modified (widespread impacts);
E. Serious modified (local impacts – not included due to lack of site specific status on this level);
F. Critically modified (widespread impacts).

- Specific areas of concern (2011[2]);

[1]Present Status Category for QC based on SRK, 2009); and
[2]Mapped by Aurecon based on information submitted by the Ages Group.

GROUNDWATER ASSESSMENT

Summary (per QC/IUA): Gwater status, Reserve criteria and recommendations

QC/IUA	Current Groundwater Status	Reserve	Recommendation
B32B	Gwater recharge: 34.3 MCM/a; Groundwater resource under-utilised (Stress Index <0.01 or 1%); Gwater Use: 0.25 MCM/a Groundwater quality indicators: TDS <450 mg/l Impact on Swater resource: Moderate. Major water use Ql impact: Sanitation systems	Reserve BHN Qn: 0.04 MCM/a; Reserve BHN Ql: 100% comp to all constituents – Domestic Status; Gw Allocation MAX: 11 MCM/a (max 30% of Re); Baseflow estimates: 10.83 MCM/a; Ecological Requirement: ~32%; and Low Flow Maintenance: Na. **Present Status Category: A**	BHN use can be significantly increased (300%) of 2007 BHN requirement (viz: 0.28 MCM/a) for a period of 5 yrs; Sanitation: Upgrading of sanitary systems (UDS); and Limit groundwater abstractions to ~ 1000 m from specified base flow systems at site specific sites.
B20A	Gwater recharge: 16.3 MCM/a; Groundwater resource over-utilised (Stress Index 1.08 or 108%); Groundwater Use: 17.83 MCM/a Groundwater quality indicators: TDS >450 mg/l Impact on Swater resource: Low Major water use Ql impact: Water treatment discharges.	Reserve BHN Qn: 1.6 MCM/a; Reserve BHN Ql: 95% comp to all constituents – Domestic Status; Gw Allocation MAX: -9.3 MCM/a = 48% ; Baseflow estimates: 6.35 MCM/a; Ecological Requirement: ~49%; and Low Flow Maintenance: Na. **Present Status Category: E**	Restriction on water allocation; Waterlevel recovery required to reset aquifer saturation level to ~30% of full capacity; Sanitation: Waste water treatment facility needs to be upgraded/monitored; Monitoring programme should include ground stability observations at all public sectors and residential areas.

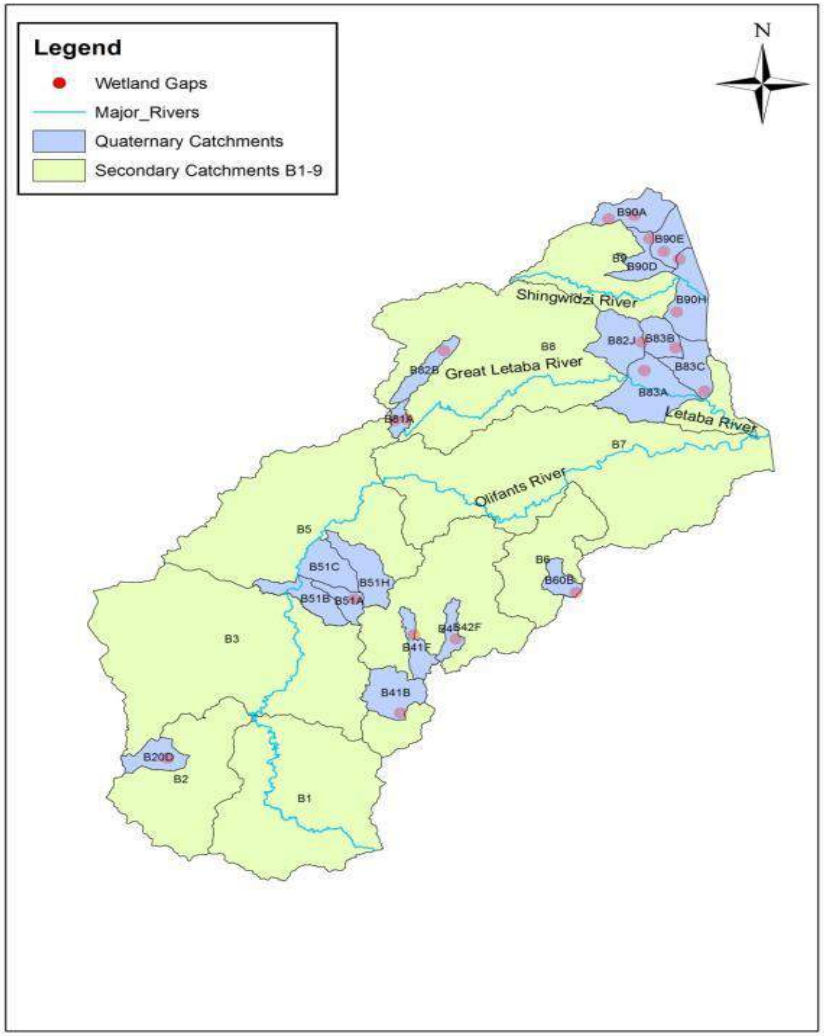
Wetland Assessment

Wetland Assessment

- **Available information**
  - Baseline wetland data is available from various sources including several DWS and other reports on the wetlands as well as wetland inventory databases – Most comprehensive for the UORC area and Steenkampsberg plateau.
  - Important update - Revised wetland data layer for the Mpumalanga Highveld region (Mbona et. al., 2015).

- **Limitations**
  - Inherent inaccuracies in remotely mapped wetland data.
  - Limited verified ecological categorisation information for most of the systems for which there is coverage.
  - Possible other data sources may exist – Do not know about.
  - Limited site access – Not easy to undertake field verification.

Gap Analysis



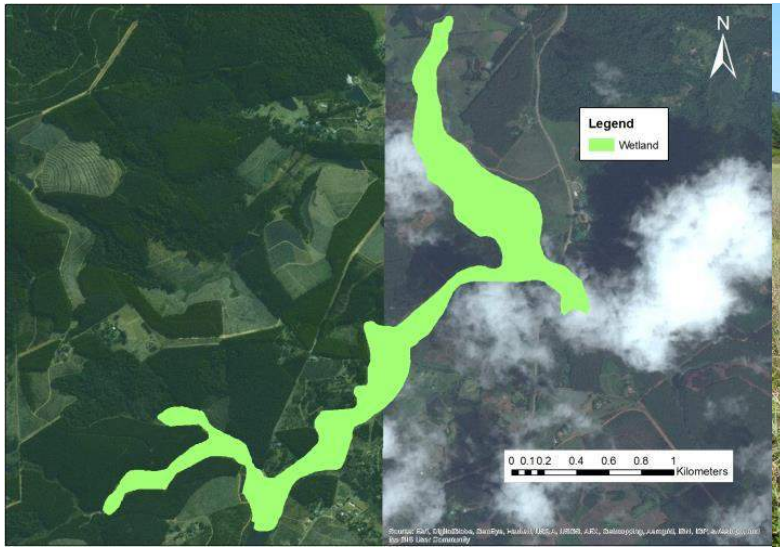
Gap Analysis

- **Filling in the Gaps Identified**
  - Where gaps were identified, desktop mapping was used to capture (coarsely delineate) a sub-set of the wetlands. Was dependent on the resolution of the imagery - generally captured at a mapping scale of approximately 1:5 000. Every attempt was made to at least capture a sample of the additional wetland systems identified.
  - Where possible, selected wetlands (as time and road access allowed for) were visited for verification purposes and to at least get a coarse baseline estimate of the condition of the wetland systems in the area in general.
  - The basemap was then updated following the rapid field verification using desktop mapping only.

Gaps Identified

- **Examples (QC B81A)**

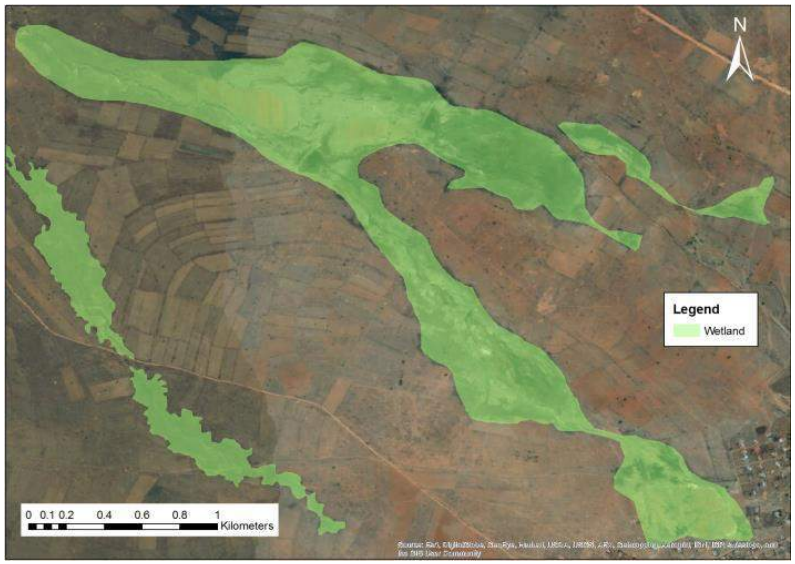
  Valley bottom wetland – Tributary upstream of Ebenezer Dam



Gaps Identified

- **Examples (QC B51C)**

  Granite wetlands – such as in the headwaters of the Makotswane River



Gaps Identified

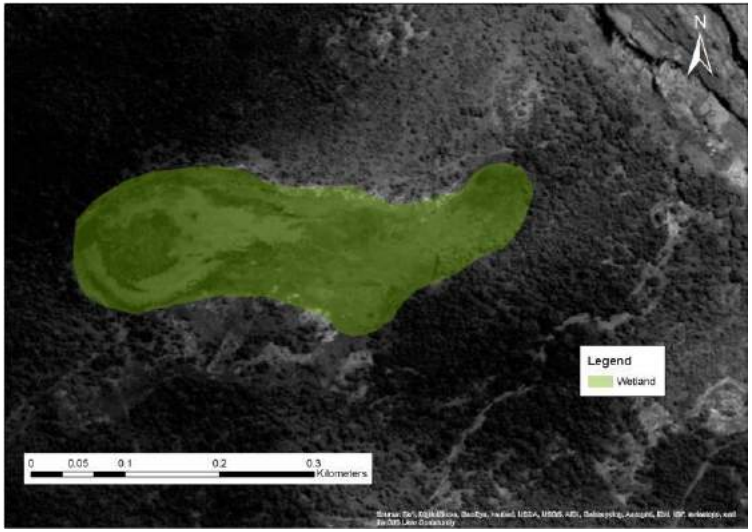
- **Examples (QC B81D)**

  Valley bottom wetland – Thabina River

Wetlands Revisited

- **QC B82G**

Baleni geothermal hot spring – Klein Letaba



Gaps Identified

- **Examples (QC B90B)**

  Wetlands in the KNP – Malahlapanga spring mire (Studied by Grootjans *et. al*., 2010)






Gaps Identified

- **Examples (QC B90A, B90E, B90H)**

  Wetlands in the KNP – Valley bottom wetlands on basalt

Gaps Identified

- **Examples (QC B83C and B83D)**

  Wetlands in the KNP – Valley bottom wetlands on basalt

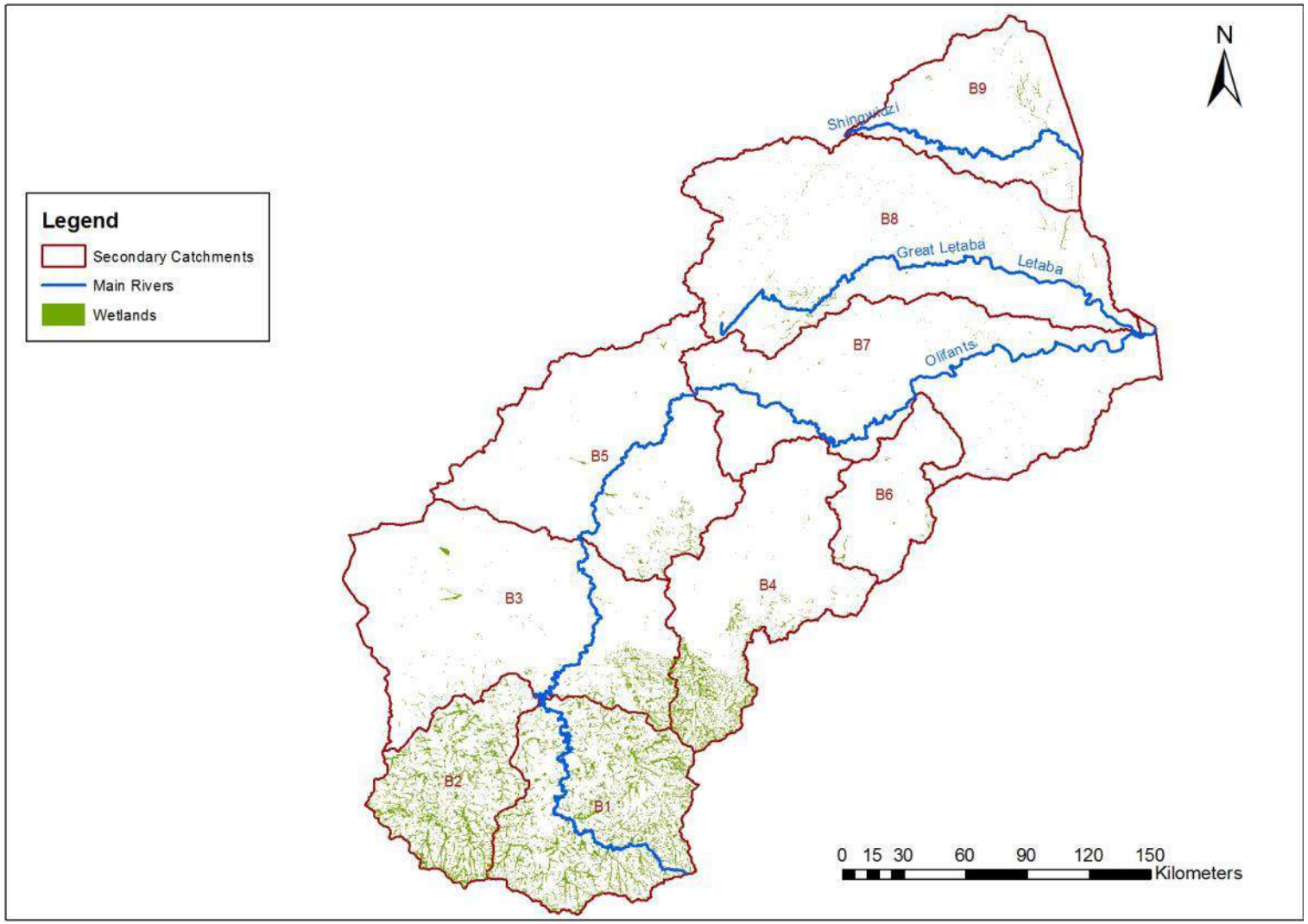
Gaps Identified

- **Examples (QC B90A and B90E)**

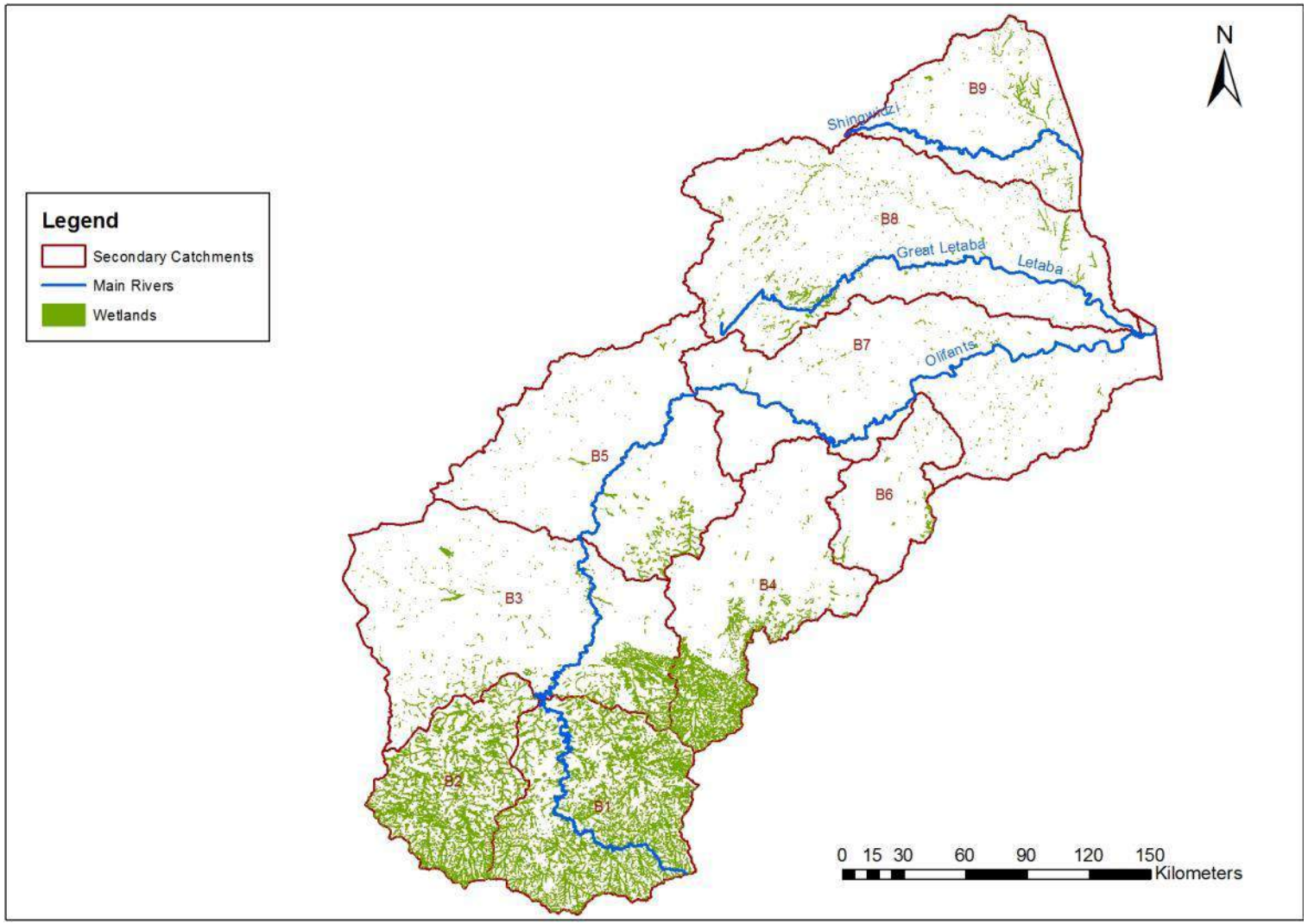
  Wetlands in the KNP – Pans and other springs



Wetlands


Legend
Secondary Catchments
Main Rivers
Wetlands
N
B9
Shingwidzi
B8
Great Letaba
Letaba
B7
Olifants
B5
B6
B4
B3
B2
B1
0 15 30 60 90 120 150
Kilometers

Wetlands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Shingwidzi
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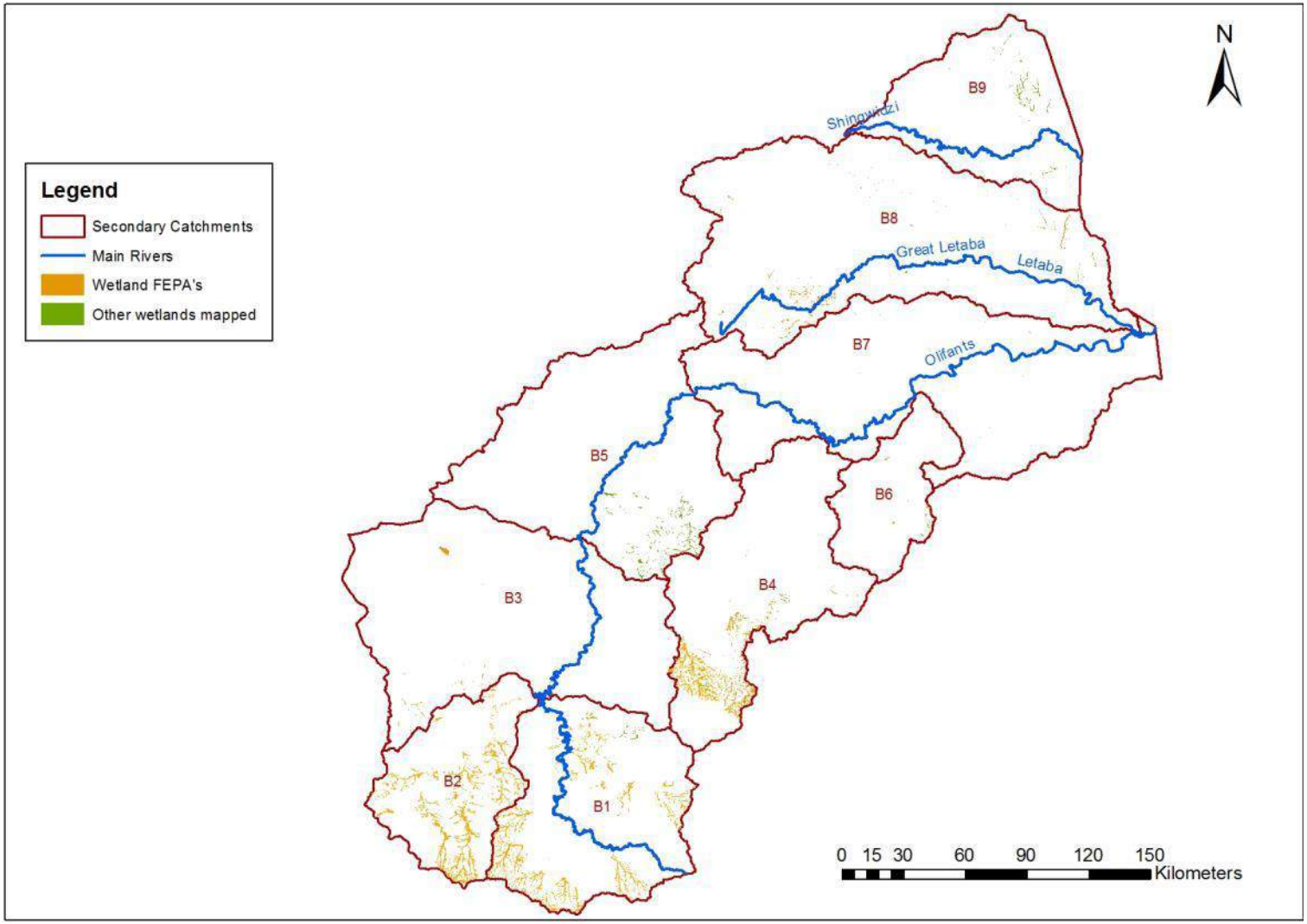
Letaba
Olifants
0 15 30 60 90 120 150
Kilometers

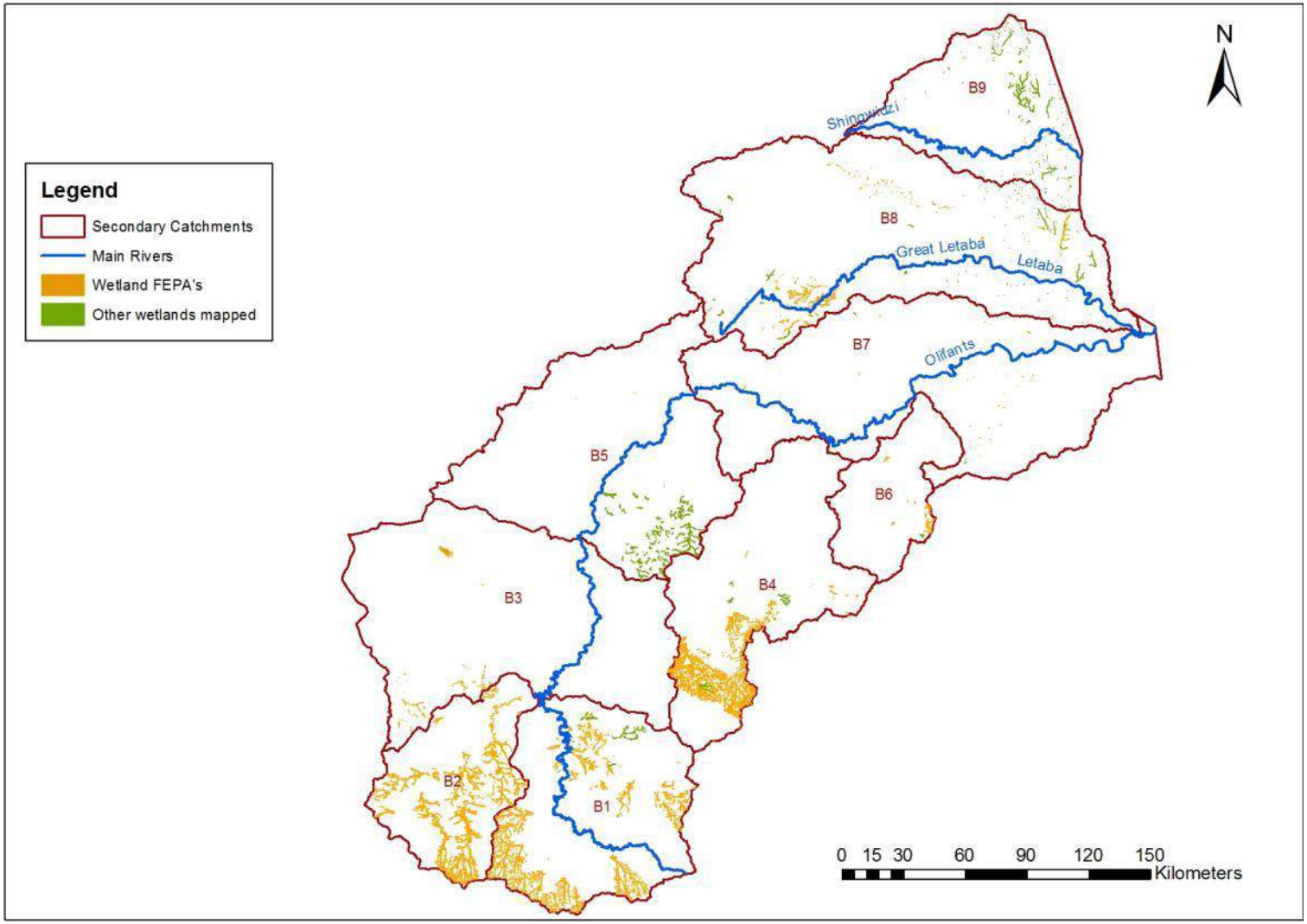
Wetlands

- **Wetland FEPA's and other wetlands mapped**



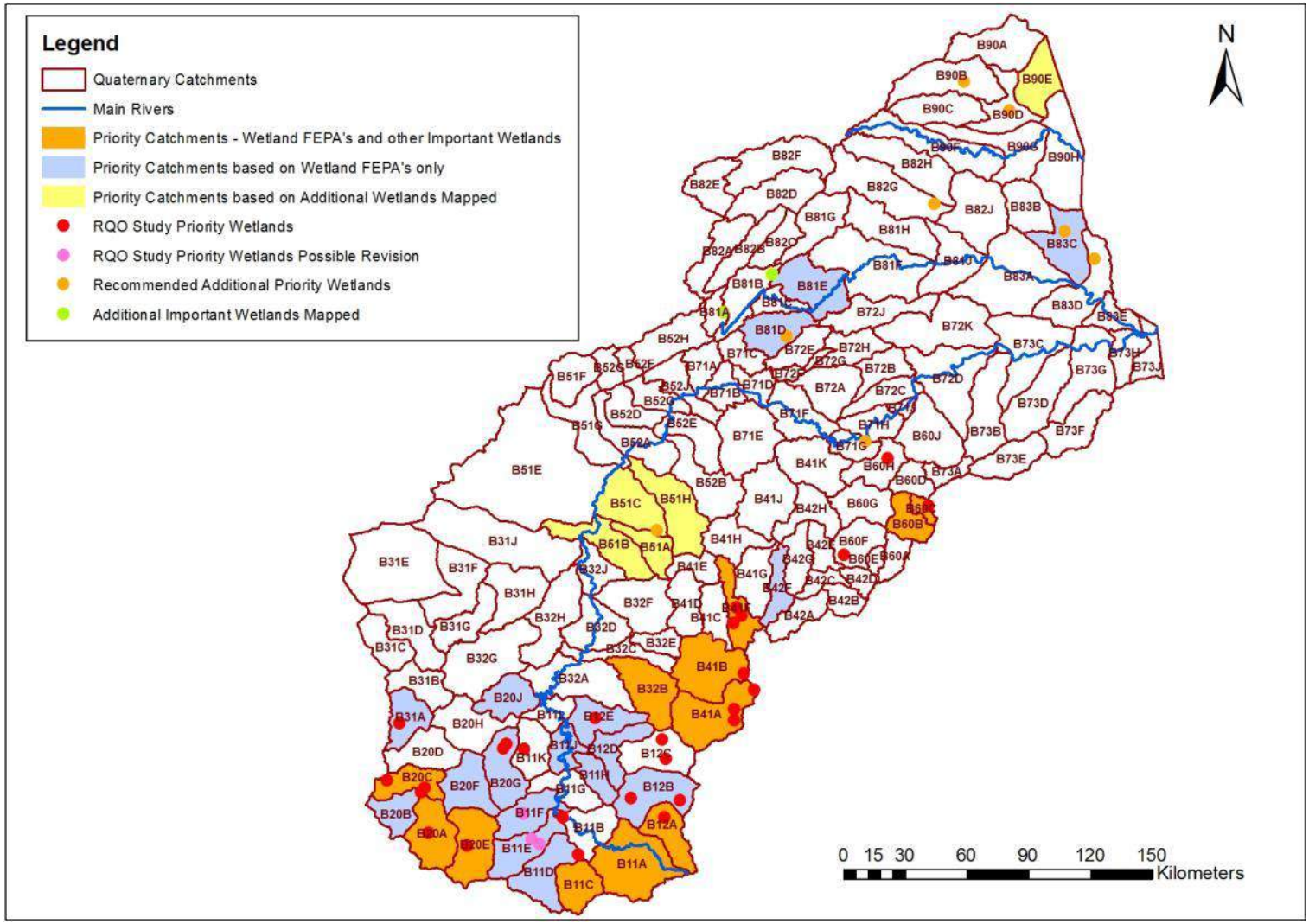
Wetlands

- **Wetland FEPA's and other wetlands mapped**



Wetlands

- **Draft/Provisional Priority Map - Wetlands**



Wetlands: Prevalent Issues

- Mining and commercial agricultural impacts in the UORC (related to QC's B11's, B12's and B20's) – direct and indirect loss of wetland habitats – Valley bottom, seepage and pan systems affected.
- Water quality issues in the UORC – extend to valley bottom systems and some pans affected. Also decant from mines – post closure and this also affects seepage wetlands.
- General water quality issues throughout the catchment affecting valley bottom systems.
- Communal grazing and subsistence agriculture in the granites associated with QC B51A, B51B, B51C and B51H.
- Afforestation, commercial agriculture, mining and urban development in parts of QC B41A.
- Afforestation in QC B60B and B60C.

Wetlands – Way forward

- Desktop review of the categorisation of the priority systems (condition and ecological importance and sensitivity) – for those where this information is available.
- Consider and recommend targeted Ecological Categories for the priority wetlands where possible. This will largely be based on information already available but revised based on the updated databases where possible.
- Recommend protection, management, mitigation and monitoring measures for the priority systems. At this stage it is considered likely that this will be based mostly on generic measures with reference to specific measures where appropriate or where suitable information exists for this purpose.

Study - Next Steps

- EWR refinement and flow determination at key nodes in the system
- Ecological consequences assessment– Analysis
- Draft Reserve for Gazetting – Consultation (August 2016)
- Development of ecological specifications and Reserve Template (September 2016)
- Management and implementation plan
- Gazette Reserve