water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

DEVELOPMENT OF THE RECONCILIATION STRATEGY FOR THE LIMPOPO WATER MANAGEMENT AREA (WMA) NORTH

Study Steering Committee (SSC)
Meeting No. 1

18 February 2015

ITEM 1: Welcome and introduction of attendees

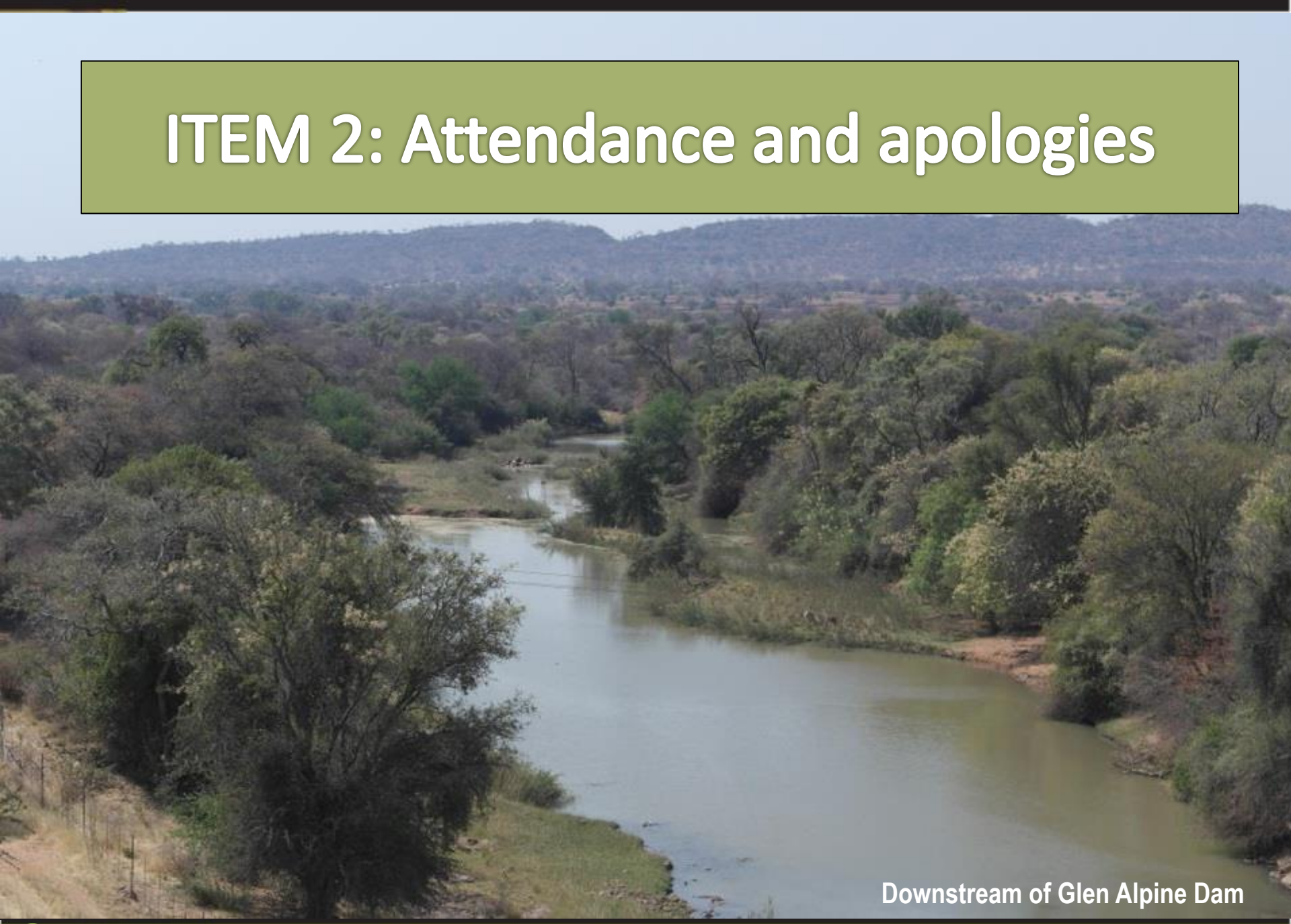
TEAM INTRODUCTION

- **Chair: Mr Tendani Nditwani**
- **DWS**
  - Study Manager: Mr Tendani Nditwani
  - Deputy Study Manager: Mr Witold Jeżewski
- **PSP: AECOM**
  - Study Leader: Ms Hermien Pieterse
  - Technical Leader: Mr Gerald de Jager
    (Supported by Specialists and Technical Team)
  - Stakeholder Participation: Ms Anelle Lotter and Ms Sibongile Bambisa

GENERAL ARRANGEMENTS

- **Facilities**
- **Tea, coffee and lunch**
- **Meeting arrangements**
  - Introduction of attendees
  - Discussions and questions times indicated on Agenda

ITEM 2: Attendance and apologies



Downstream of Glen Alpine Dam

ATTENDANCE REGISTER

- **Attendance register distributed**
  - Please return to Ms Sibongile Bambisa (Jones & Wagener)
- **Apologies**
  - Please provide

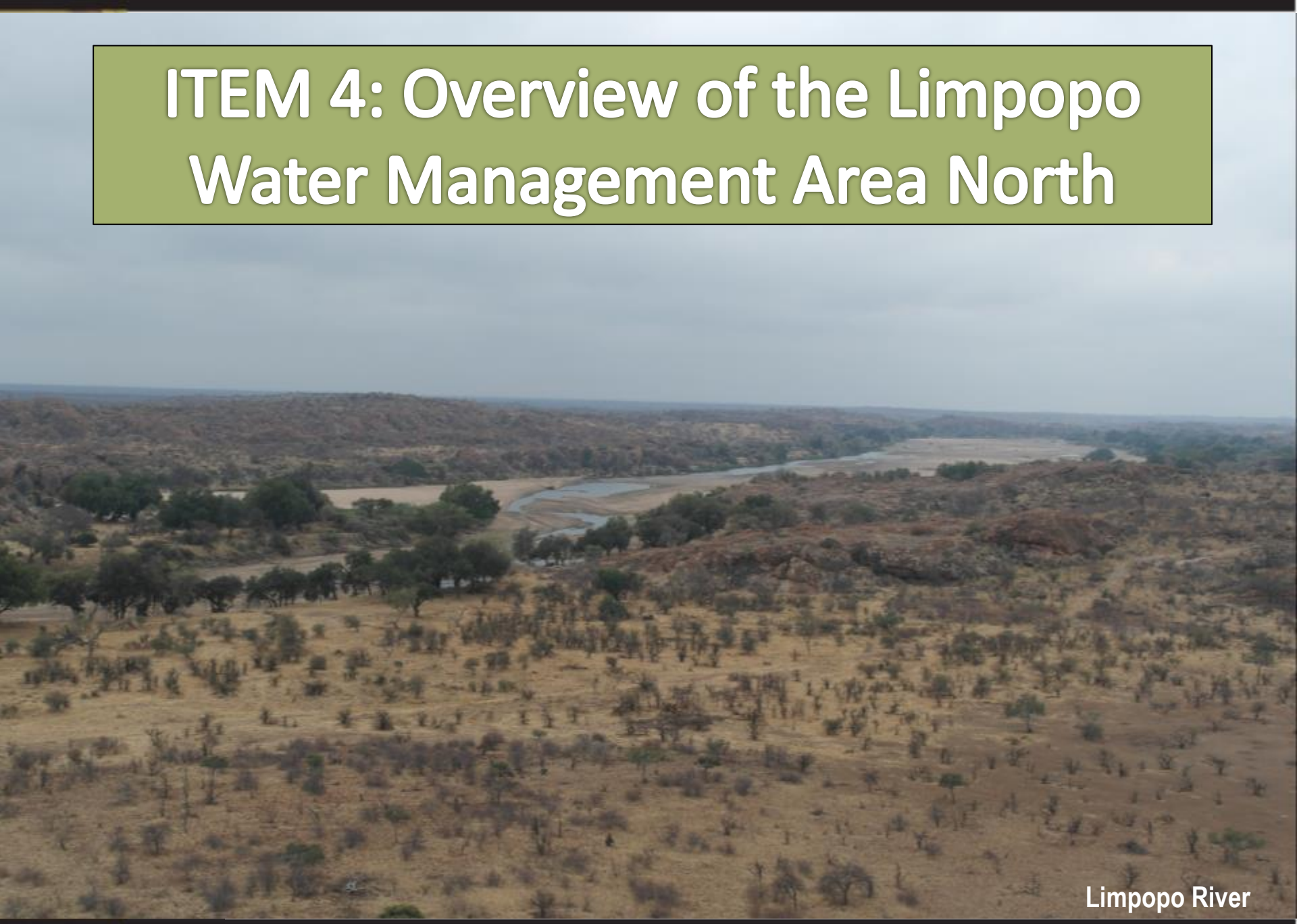
ITEM 3: Acceptance of the Agenda

Limpopo River

AGENDA ITEMS

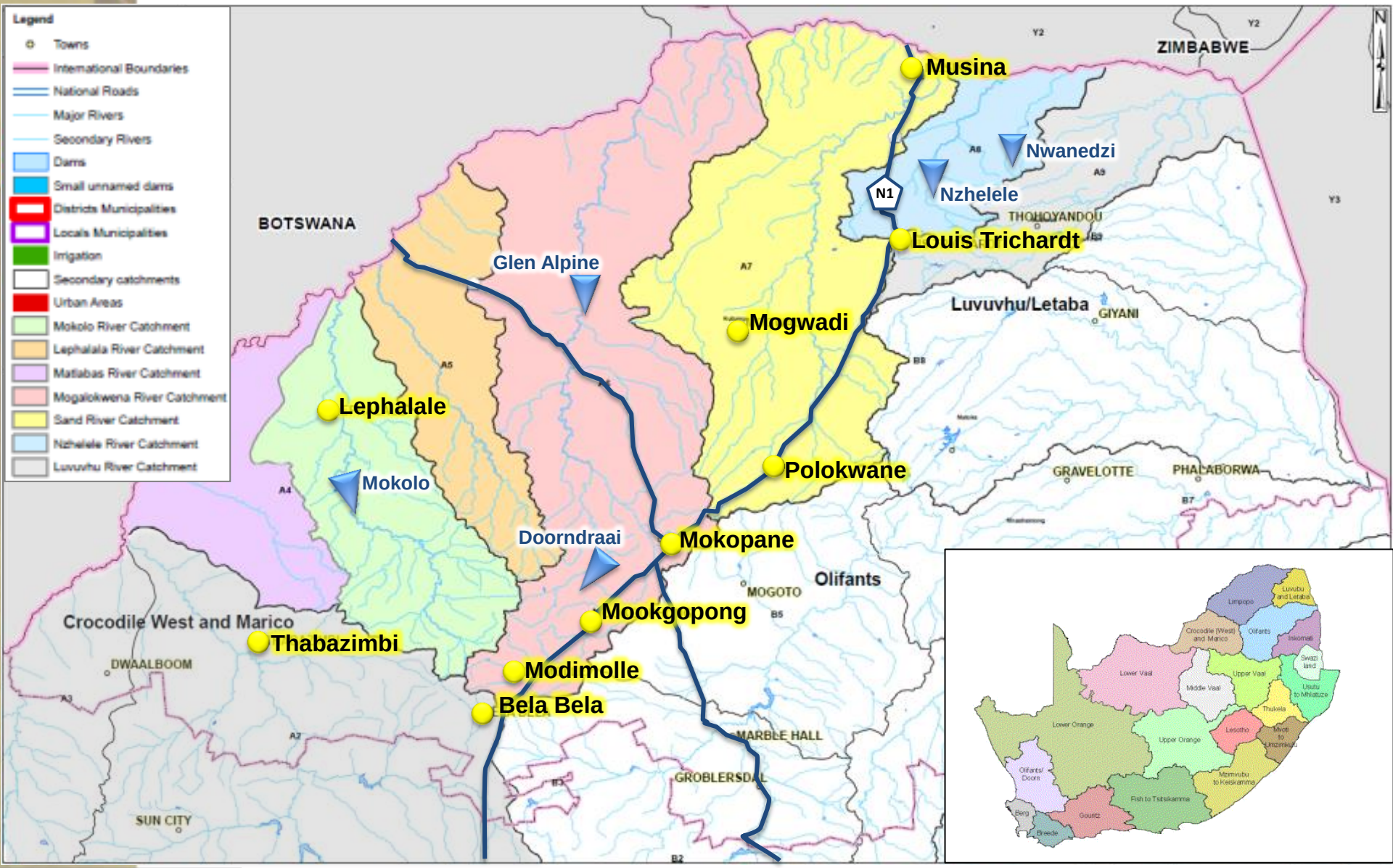
1. Welcome and introduction of all attendees
2. Attendance and apologies
3. Acceptance of the agenda
4. Overview of the Limpopo Water Management Area (WMA) North
5. Why is the Department developing reconciliation strategies for water supply systems in South Africa?
6. Approach to the development of the Limpopo Water Management Area (WMA) North Reconciliation Strategy
7. Functions of the SSC
8. Establishment of the Limpopo WMA North SSC
9. General
10. Way forward
11. Date of next meeting

ITEM 4: Overview of the Limpopo Water Management Area North

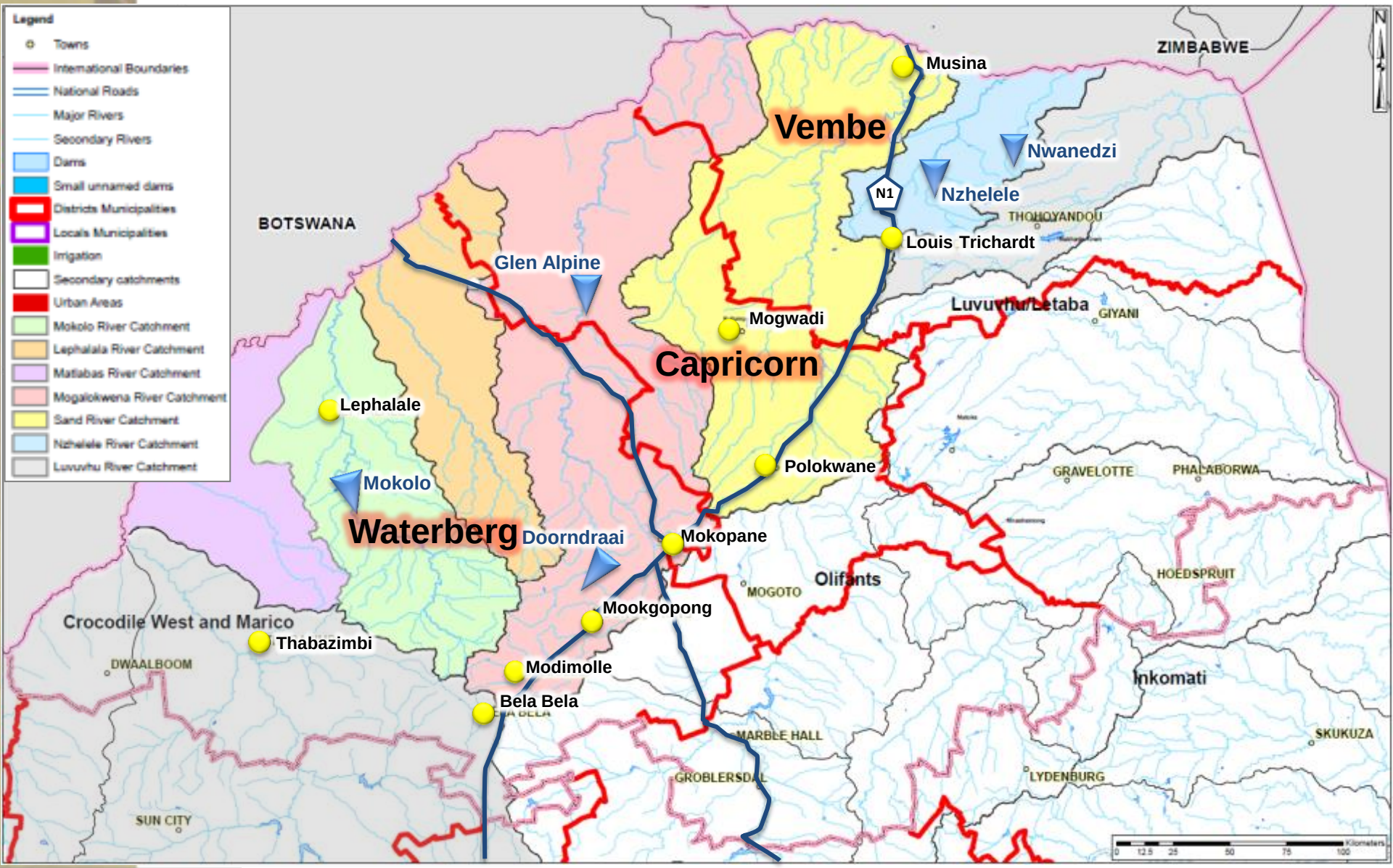


Limpopo River

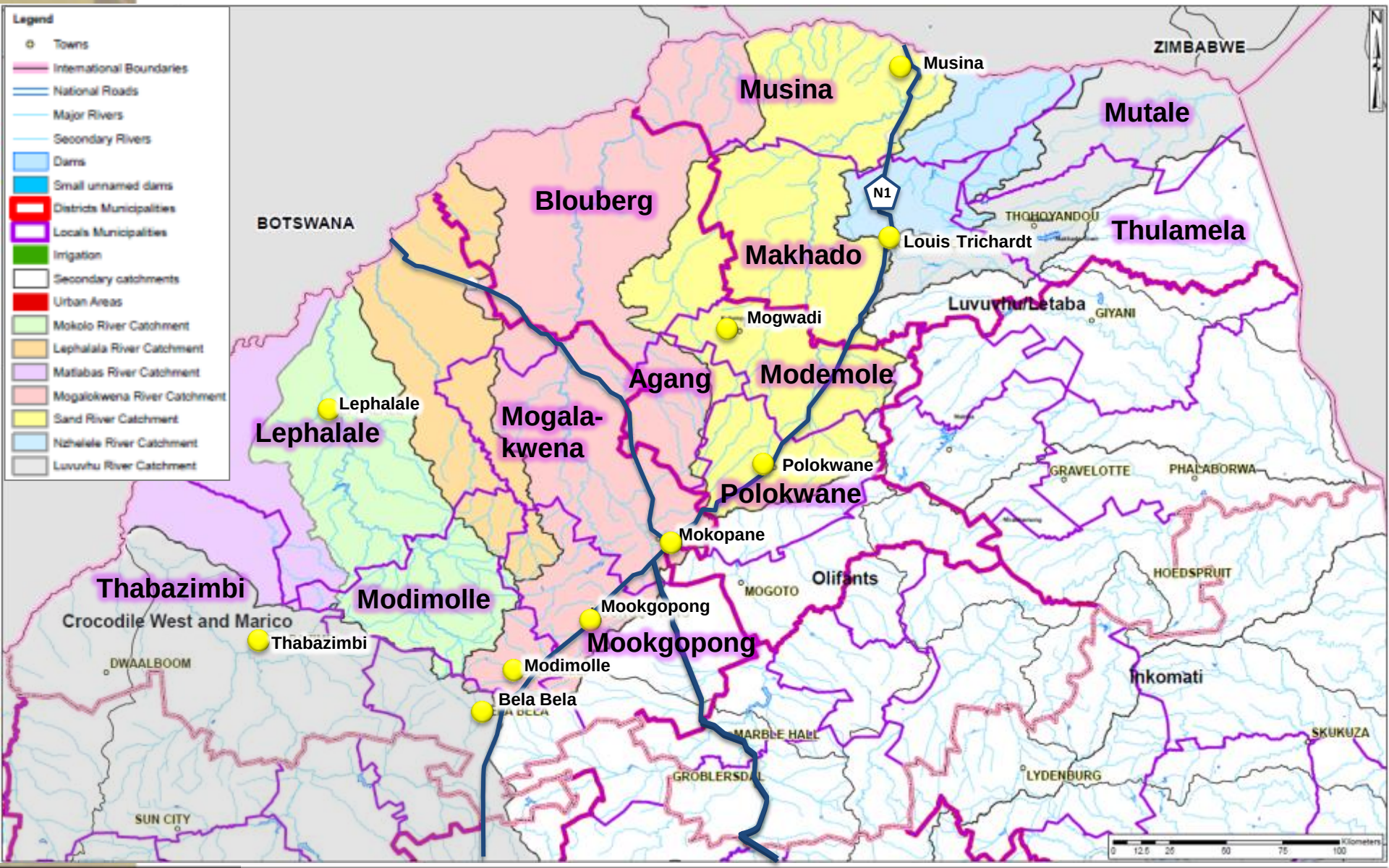
STUDY AREA


Legend
Towns
International Boundaries
National Roads
Major Rivers
Secondary Rivers
Dams
Small unnamed dams
Districts Municipalities
Locals Municipalities
Irrigation
Secondary catchments
Urban Areas
Mokolo River Catchment
Lephalala River Catchment
Matlabas River Catchment
Mogalakwena River Catchment
Sand River Catchment
Nzhelele River Catchment
Luvuvhu River Catchment
Musina
Nwanedzi
Nzhelele
Louis Trichardt
Glen Alpine
Mogwadi
Lephalale
Mokolo
Polokwane
Doorndraai
Mokopane
Mookgopong
Thabazimbi
Modimolle
Bela Bela
BOTSWANA
ZIMBABWE
N1
THOHOYANDOU
Luvuvhu/Letaba
GIYANI
GRAVELOTTE
PHALABORWA
MOGOTO
Olifants
Crocodile West and Marico
DWAALBOOM
SUN CITY
MARBLE HALL
GROBLERSDAL

STUDY AREA – DISTRICT MUNICIPALITIES



STUDY AREA – LOCAL MUNICIPALITIES

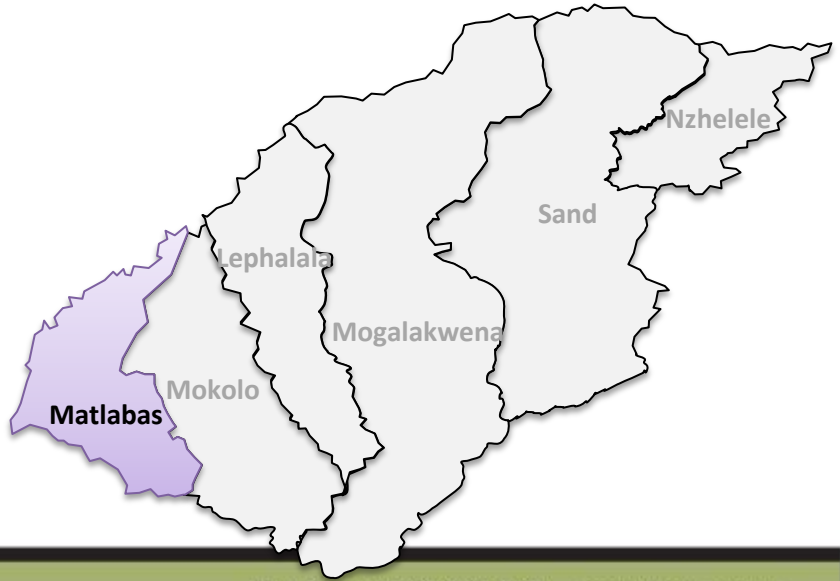


OVERVIEW OF THE LIMPOPO WMA NORTH

- **Main towns**
  - Mokopane, Polokwane, Mookgophong, Modimolle, Lephalale, Musina, Makhado
- **Approximately 760 rural communities.**
- **Main economic activities:**
  - Irrigation
  - Mining (increase in operations)
  - Power generation
  - Game and livestock farming
- **Part of the internationally shared Limpopo River Basin.**
- **Water resources, especially surface water resources, are heavily stressed.**

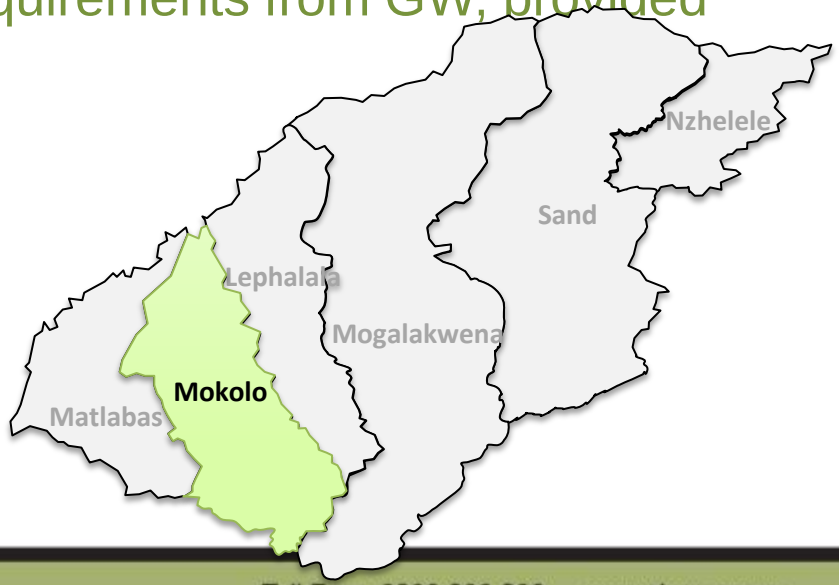
OVERVIEW OF THE MATLABAS CATCHMENT

- **Dry catchment** with **non-perennial flow**
  - No sustainable yield from surface water
- Limited water use is **mostly from groundwater**, which is under-exploited
- No major water resources or water supply issues.
- **Water availability:**
  - Groundwater
  - Possible construction of farm dams (additional yield)



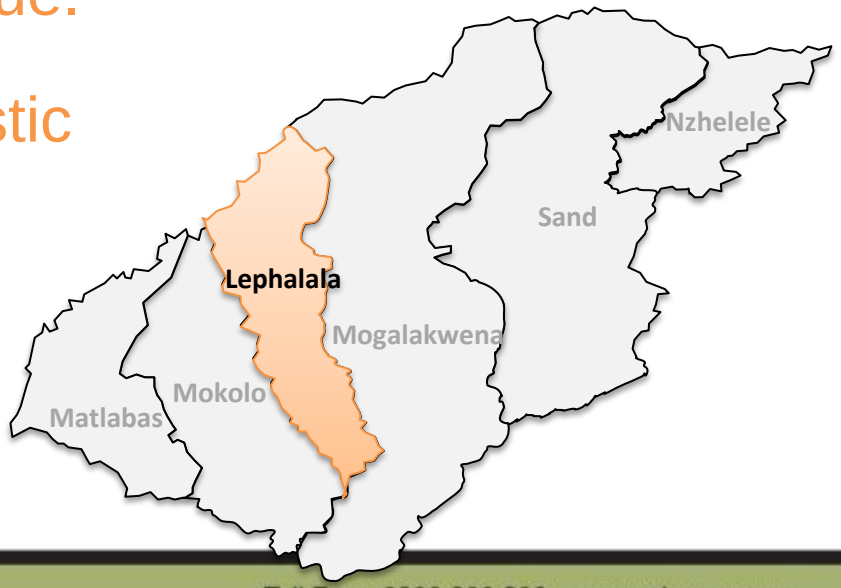
OVERVIEW OF THE MOKOLO CATCHMENT

- **Surface water resources** are mostly developed
  - Higher than average rainfall
  - **Mokolo Dam** provides water to:
    - Matimba Power Station, Grootegeluk coal mine, Lephalale town and downstream irrigators
- **Groundwater** is under-utilised
  - Although, large amount of irrigation from groundwater
  - Supply increased domestic requirements from GW, provided the water quality is acceptable
- **Water availability:**
  - Future transfers : **Crocodile West River System** to support development



OVERVIEW OF THE LEPHALALA CATCHMENT

- **Surface water resources**
  - Limited water resources but **high water requirements**
  - Most irrigation in the upper reaches (higher rainfall area) utilising farm dams
  - Irrigators in the lower catchments use water from alluvial aquifers.
- The middle reaches of the Lephalala are of high conservation value.
- **Additional water** for domestic purposes can be sourced from local **groundwater** sources



OVERVIEW OF THE MOGALAKWENA CATCHMENT

- Very **limited surface water** resources
  - Doorndraai Dam and Glen Alpine Dam are over allocated
  - Relatively low rainfall and runoff

- Large **groundwater** resources
  - Extensively exploited by irrigation sector

- Increasing economic importance due to **mining potential**
  - Securing of water supply is crucial

- **Water availability:**
  - Possible raising of Glen Alpine Dam / ORWRD transfer
  - Transfer from Crocodile West

OVERVIEW OF THE SAND CATCHMENT

- Dry catchment: **limited surface water resources**
- Exceptional **groundwater reserves**
  - Some areas may be over-exploited.
  - Musina abstract water from Limpopo River sand aquifers
- **Relies heavily on transfers** to meet the urban and industrial demands of Polokwane and Louis Trichardt
- Large water requirements
  - **Irrigation** is the largest user
  - Increasing economic importance - **mining potential**
  - Securing of water supply is crucial
- Possible water availability:
  - WC/WDM, Treated Effluent, transfers
  - Groundwater may still be an option in some areas for local supplies

OVERVIEW OF THE NZHELELE CATCHMENT

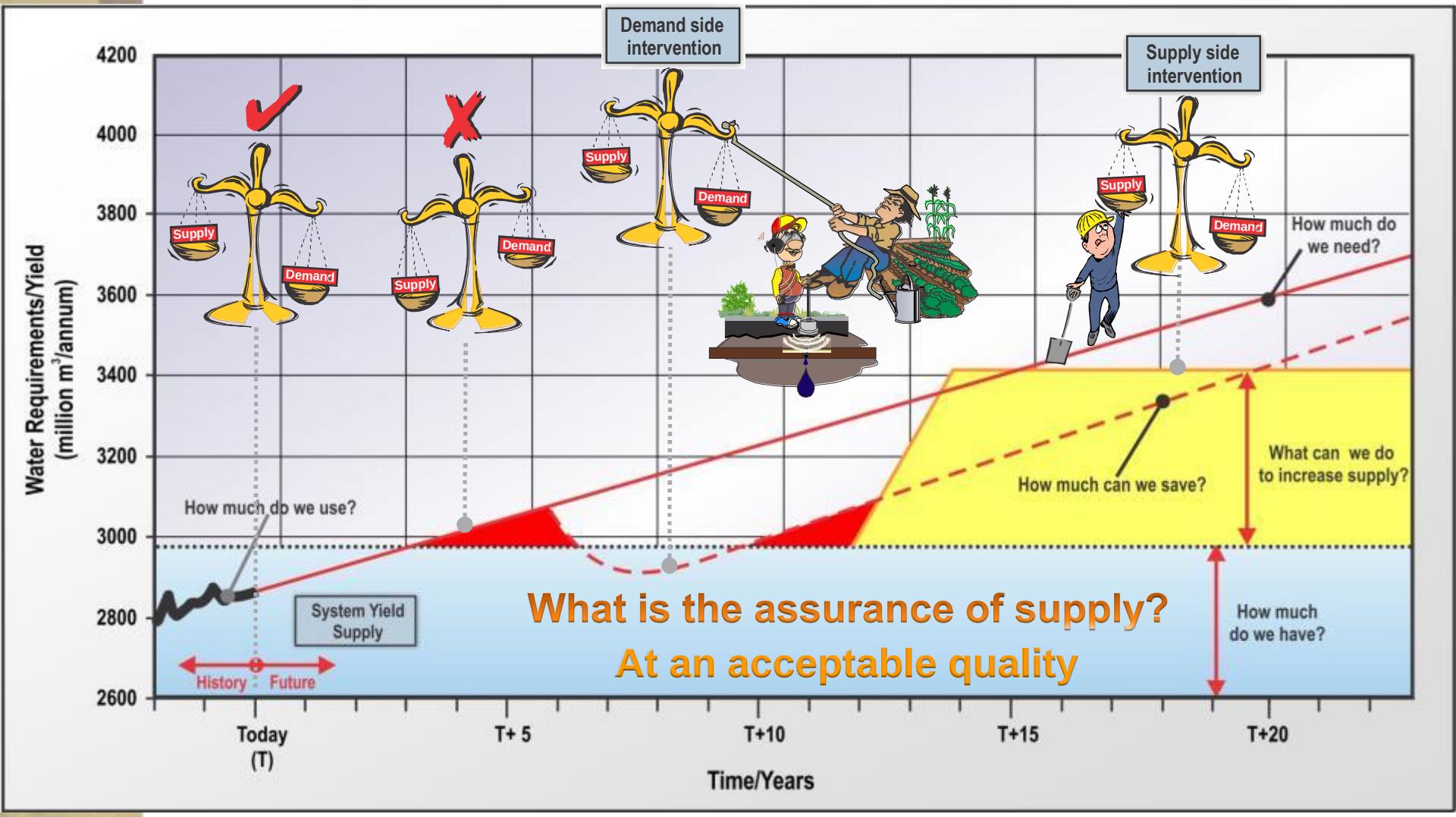
- Surface water resources:
  - Mutshedzi Dam Regional Water Supply Scheme
  - Nzhelele Dam Regional Water Supply Scheme
- Groundwater is extensively used
- Water requirements:
  - Dominated by irrigation
  - Significant afforestation in high rainfall regions - reduces runoff
- **High coal mining potential**
  - Securing of water supply is crucial
- **Water availability:**
  - Development of Upper Nzelele

ITEM 5: Why Reconciliation Strategies for water supply systems in South Africa?

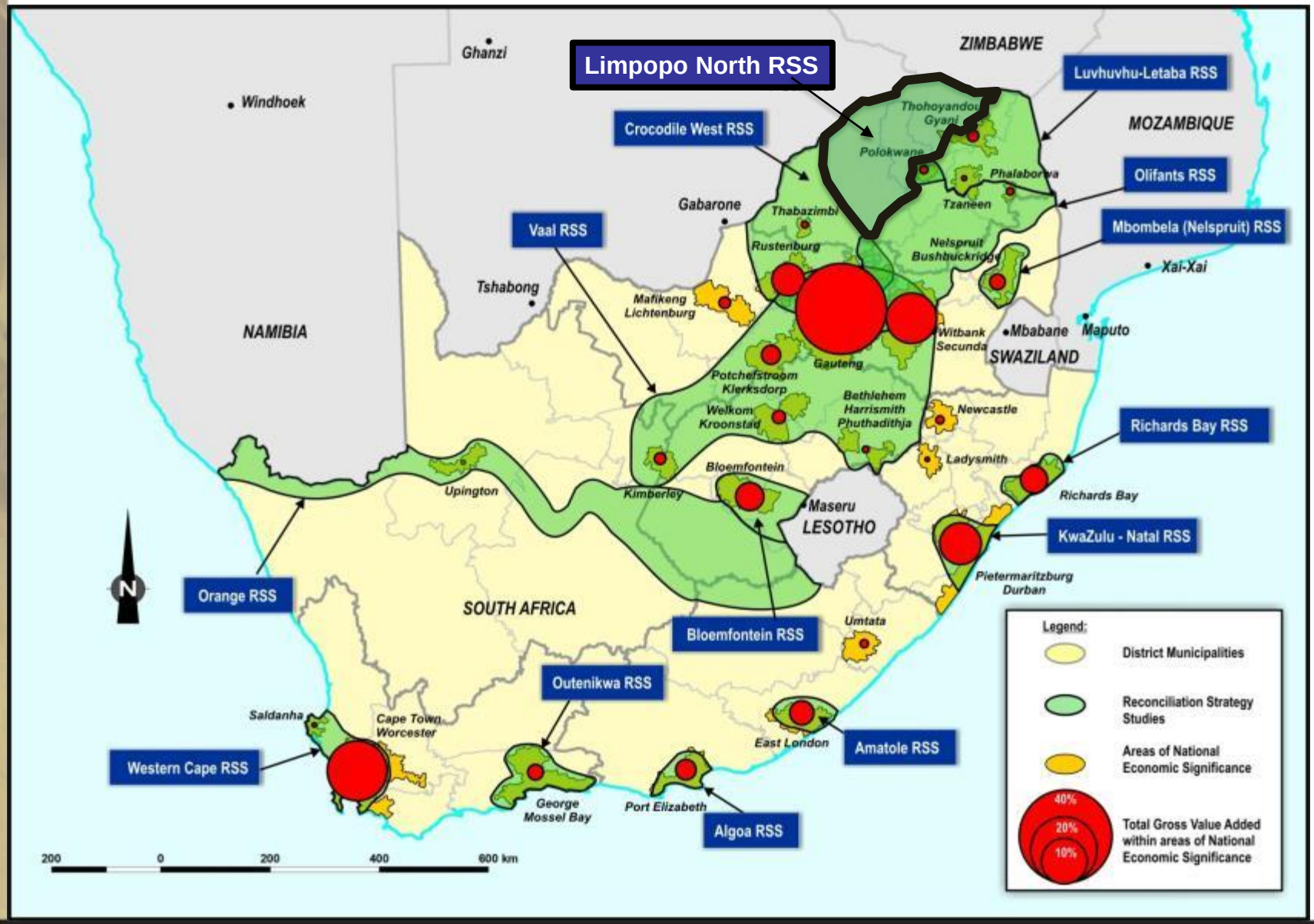
WHAT IS A RECONCILIATION STRATEGY?

- **Strategy or plan to ensure current and future water requirements are in balance with available water resources over planning period**
- **Basic assessments answering the following questions:**
  - Is water availability adequate to meet demands?
  - Until when will water demand and water availability be in balance?
  - Do we at this stage/time already need to make provision or plan for interventions?
  - What can be done to balance water demand and water resources availability?

TYPICAL EXAMPLE OF A RECONCILIATION STRATEGY



WATER RECONCILIATION FOR MAJOR GROWTH AREAS



MOTIVATION FOR THIS STUDY

- **DWS initiated the development of the Limpopo WMA North Reconciliation Strategy in 2013**
- **The Reconciliation Strategy aims to:**
  - Address growing water requirements
  - Identify water quality problems
  - Identify resource limitations
  - Provide reconciliation interventions in terms of:
    - Administrative / regulatory arrangements
    - Management options
    - Infrastructure development

LIMPOPO WMA NORTH RECONCILIATION STRATEGY MOTIVATION

- **Water resources in the Limpopo WMA North extensively developed**
- **Water balance projections showed increasing shortages thus:**
  - An integrated system and holistic approach are required
  - Need to relook at options already identified using updated information
  - Need to identify and develop different intervention options and combinations of possible options (scenarios) to achieve positive water balance over time

LIMPOPO WMA NORTH RECONCILIATION STRATEGY MOTIVATION

- **The available hydrology for the study area was old (except for the Mokolo) and needed to be updated & extended:**
  - Groundwater – surface water interaction not previously addressed
  - Effect of alien invasive plants (IAP) not previously included
  - Hydrological records for different catchments varied in length – need to be extended to the 2010 hydrological year
- **Groundwater is an important resource – needs to be assessed to identify future utilization scenarios**

LIMPOPO WMA NORTH RECONCILIATION STRATEGY MOTIVATION

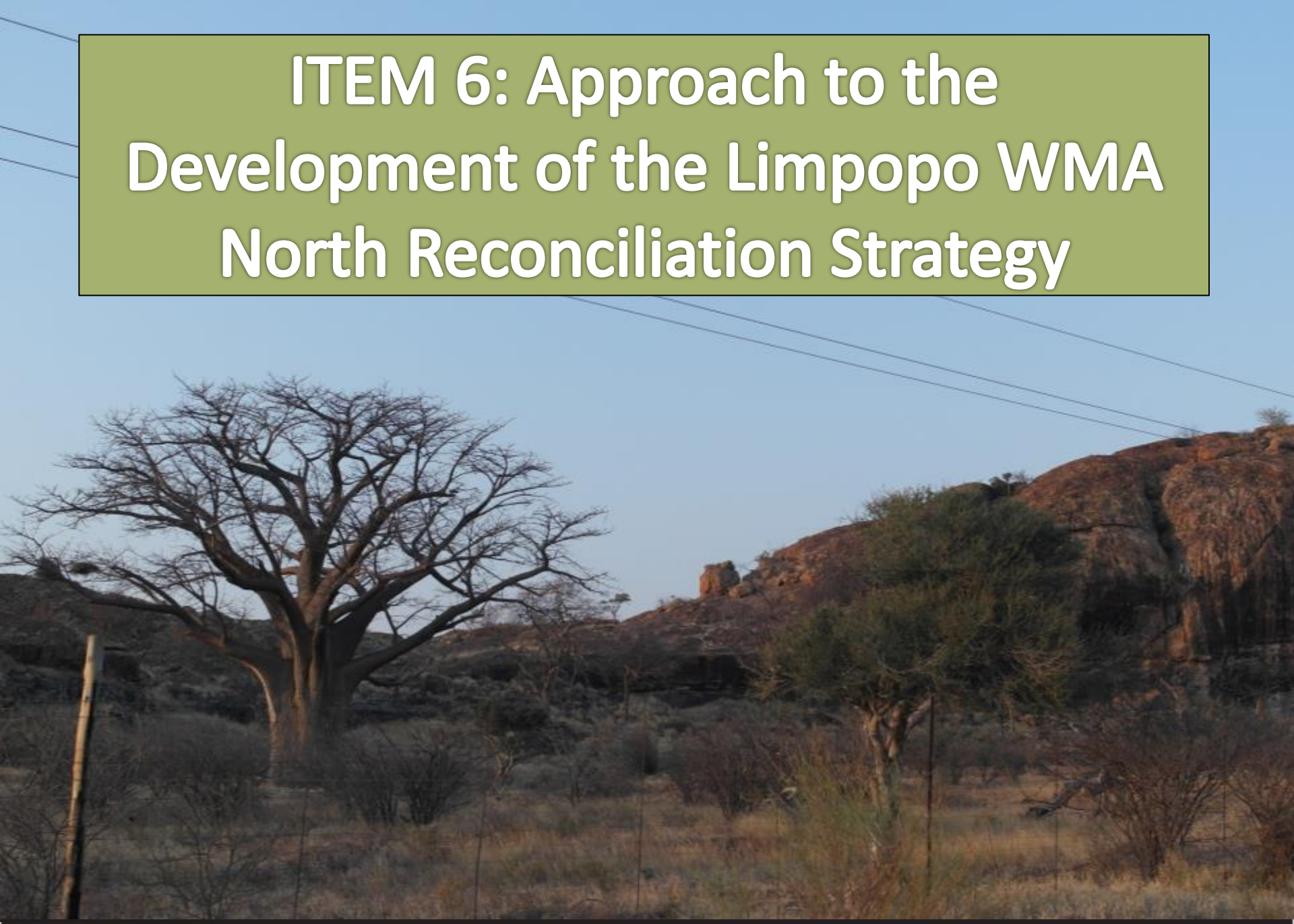
- **System models needed to be integrated and updated:**
  - Yields to be updated for existing dams
  - Improved understanding and capabilities of current and possible future transfer systems
  - Assess the increased yield from new possible intervention options and operating rules

PARALLEL INITIATIVES AND LINKAGES

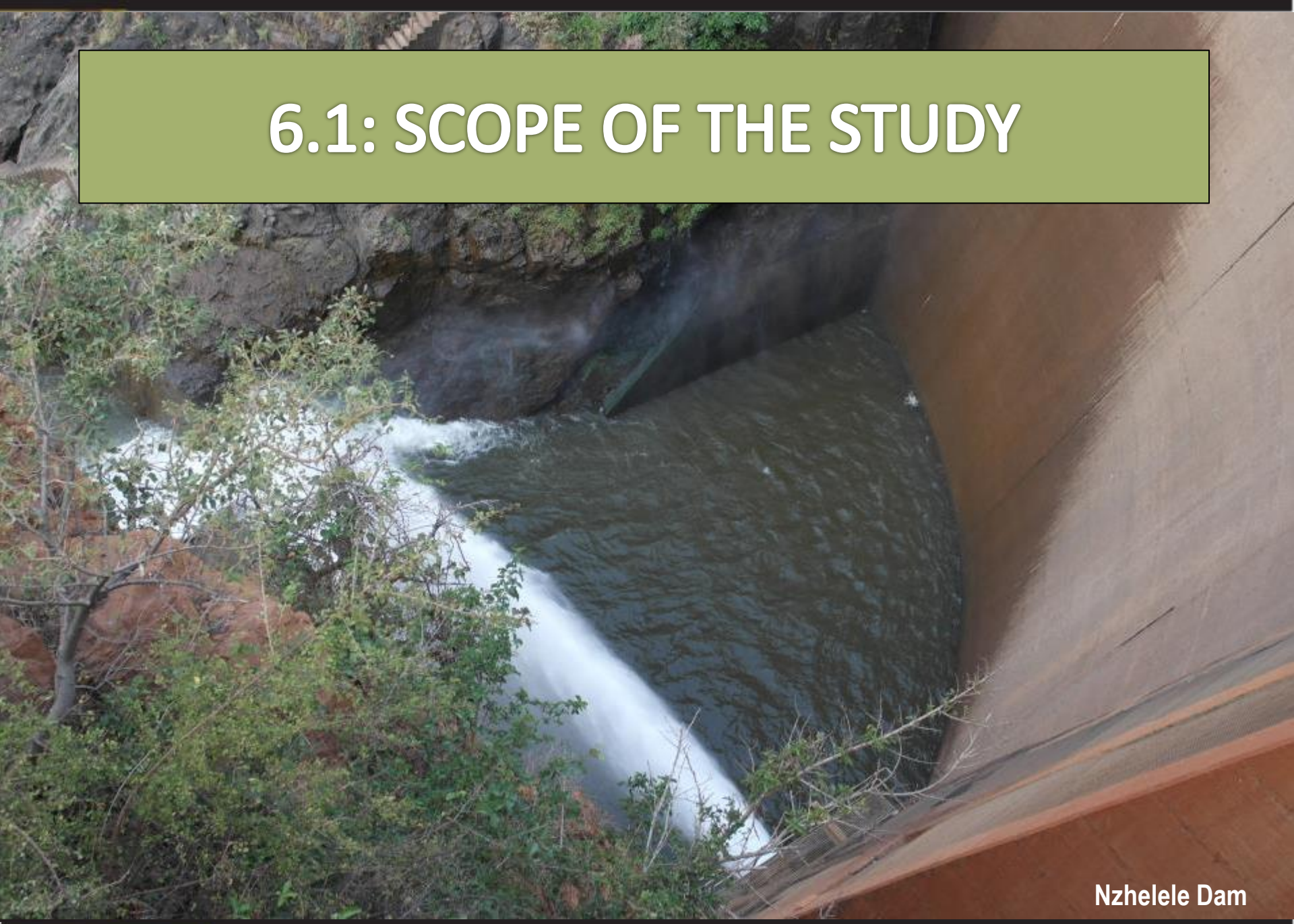
- **Validation and Verification of water use**
- **Reconciliation Strategies for All Towns North and the continuation thereof**
- **Mokolo-Crocodile Water Augmentation Project (MCWAP)**
- **Olifants Reconciliation Strategy**
- **Luvuvhu/Letaba Reconciliation Strategy (Dap Naudé and Ebenezer dams, Makhado, Nandoni transfers)**
- **Crocodile West Reconciliation Strategy**
- **Relevant Strategic Infrastructure Projects (SIP)**
- **Regional Bulk Infrastructure Grant (RBIG) studies**
- **Musina Special Economic Zones (SEZ)**
- **Zimbabwe to RSA transfer**

  (*A study to understand the water resources potential of river basins in Zimbabwe to supply water to RSA*)

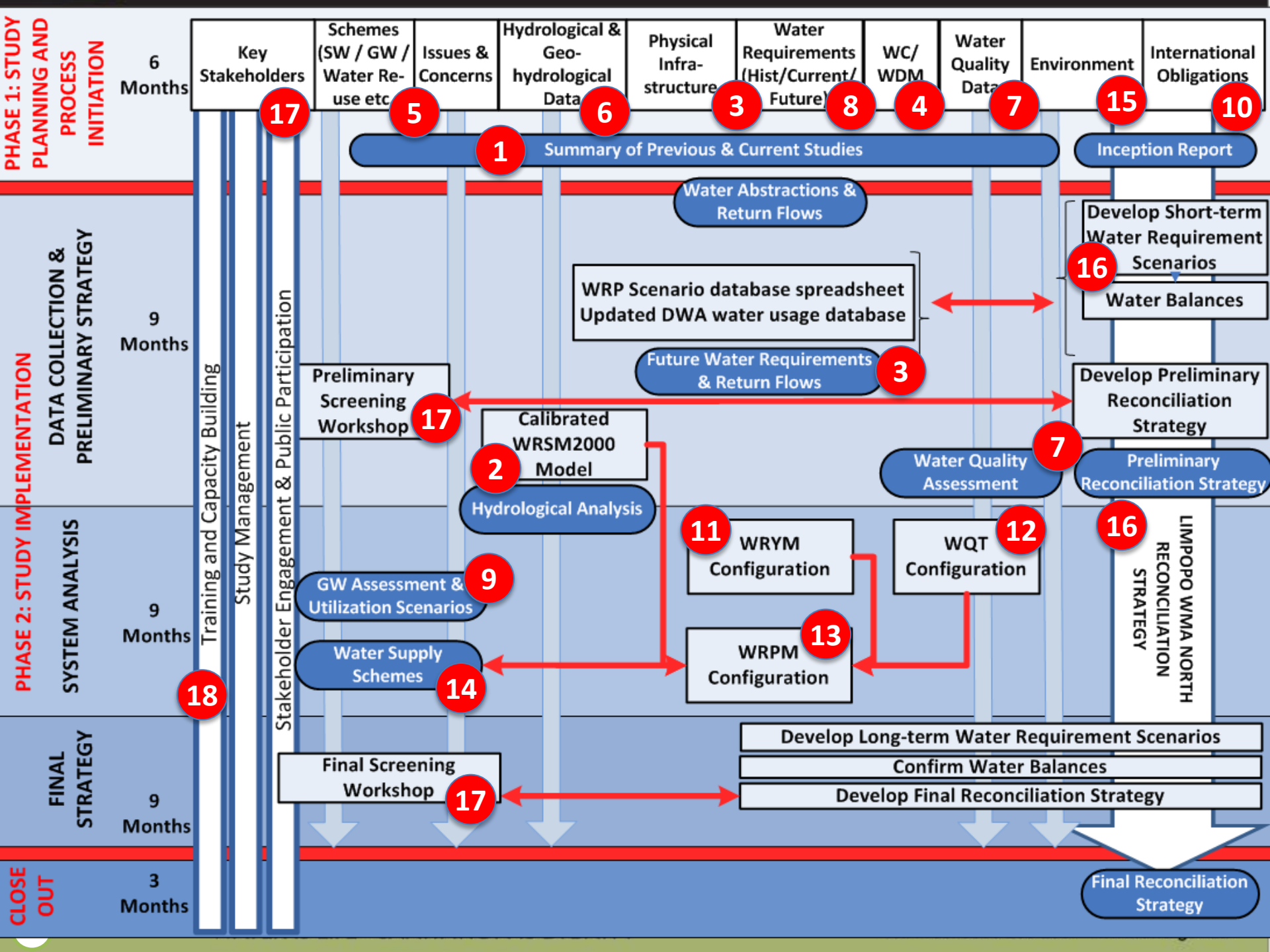
ITEM 6: Approach to the Development of the Limpopo WMA North Reconciliation Strategy



6.1: SCOPE OF THE STUDY



Nzhelele Dam


PHASE 1: STUDY PLANNING AND PROCESS INITIATION
6 Months
Key Stakeholders
Schemes (SW / GW / Water Re-use etc
Issues & Concerns
Hydrological & Geo-hydrological Data
Physical Infra-structure
Water Requirements (Hist/Current/ Future)
WC/ WDM
Water Quality Data
Environment
International Obligations
17
5
6
3
8
4
7
15
10
1
Summary of Previous & Current Studies
Inception Report
PHASE 2: STUDY IMPLEMENTATION
DATA COLLECTION & PRELIMINARY STRATEGY
9 Months
Water Abstractions & Return Flows
Develop Short-term Water Requirement Scenarios
16
Water Balances
WRP Scenario database spreadsheet
Updated DWA water usage database
Future Water Requirements & Return Flows
3
Preliminary Screening Workshop
17
Develop Preliminary Reconciliation Strategy
Calibrated WRSM2000 Model
2
Hydrological Analysis
Water Quality Assessment
7
Preliminary Reconciliation Strategy
SYSTEM ANALYSIS
9 Months
11
WRYM Configuration
12
WQT Configuration
16
LIMPOPO WMA NORTH RECONCILIATION STRATEGY
GW Assessment & Utilization Scenarios
9
13
WRPM Configuration
Water Supply Schemes
14
18
Training and Capacity Building
Study Management
Stakeholder Engagement & Public Participation
FINAL STRATEGY
9 Months
Develop Long-term Water Requirement Scenarios
Confirm Water Balances
Develop Final Reconciliation Strategy
Final Screening Workshop
17
CLOSE OUT
3 Months
Final Reconciliation Strategy

SCOPE OF THE STUDY - TASKS AND PROGRESS

Task	Description	Status
Task 1	Summary of previous and current studies/ Literature Review	Completed
Task 2	Hydrological Analysis	In progress – Rainfall completed, WRSM2000 near completion
Task 3	Current and Future Water Requirements and Return Flows	In progress
Task 4	Water Conservation and Water Demand Management	-
Task 5	Opportunities for Water Reuse	-
Task 6	Invasive Alien Plants	Completed
Task 7	Water Quality Assessment	In progress
Task 8	Reserve Requirement Scenarios	-
Task 9	Groundwater Utilisation Scenarios	In progress

STUDY TASKS AND PROGRESS

Task	Description	Status
Task 10	International Obligations	-
Task 11	Yield Analysis (WRYM-MF)	-
Task 12	Water Quality Modelling (WQT)	Task initiated
Task 13	Planning Analysis (WRPM-MF)	-
Task 14	Review Schemes and Update Cost Estimates	-
Task 15	Review or Assess Social and Environmental Impacts	-
Task 16	Assembly of information and formulation of Scenarios	-
Task 17	Stakeholder Engagement and Public Participation	Database and BID drafted
Task 18	Training and Capacity Building	-

TASK 1: LITERATURE REVIEW

Status: completed

- **Review work done in previous and current studies**
- **Liaison with known organisations to identify studies**
- **Identify stakeholders and review of stakeholder database**
- **Activities:**
  - Review previous reports & studies on demand projections
  - Establish current demand and seasonal variation
  - Contact municipalities, organised agriculture and industries regarding future demand growth
  - Develop demand projection scenarios

Deliverable: **Literature Review Report**

TASK 2: HYDROLOGICAL ANALYSIS

Status: In progress, rainfall completed, WRSM2000 near completion

- **Assess available hydro-meteorological data for Limpopo WMA North**
- **Extend hydrology per quaternary catchment up to 2010 hydrological year (September 2011)**
- **Activities:**
  - Data collection and collation,
  - Rainfall, evaporation and streamflow data analysis,
  - Investigate groundwater-surface water interaction
  - Calibration of the WRSM2000 model in selected catchments
  - Improved understanding and capabilities of current and possible future transfer systems
  - Assess the increased yield from new possible intervention options and operating rules

Deliverable: **Hydrological Analysis Report**
(incl. supporting analysis and model data)

TASK 3: CURRENT AND FUTURE WATER REQUIREMENTS AND RETURN FLOWS

Status: in progress

- **Formulation of current and future water requirement scenarios for all water use categories**
  - Domestic, industrial, power generation, mining, irrigation and commercial forestry
- **Calculations of return flows for all water use categories**
- **Take potential developments in study area into account**
- **Activities:**
  - Gather information from previous studies
  - Meetings and discussions with water authorities and informed people

Deliverable: **Water Requirements and Return Flows Report**

TASK 4: WATER CONSERVATION AND WATER DEMAND MANAGEMENT (WC/WDM)

- **Review existing information to establish the potential for WC/WDM in all user sectors**
- **WC/WDM policies, strategies and measures must address all the relevant issues**
- **Activities:**
  - Identify key demand centres
  - Status quo and priority assessment
  - Assess potential savings
  - Scenario development for savings
  - Collate all existing Strategies

Status: -

Deliverable: **WCWDM Status Report** (Supporting document)

TASK 5: OPPORTUNITIES FOR WATER REUSE

- **Investigate opportunities for reuse of treated sewage and industrial effluent**
- **Activities:**
  - Collate info from WTW
  - Verify info
  - Assess potential for reuse

Status: obtained data on WTWs

Deliverable: **Opportunities for Water Re-use Report** (Supporting document)

TASK 6: INVASIVE ALIEN PLANTS (IAP)

- **Estimate current impact of IAP infestation on water availability**
- **Consider possible benefit of IAP eradication**
- **Activities:**
  - Determine water savings due to removal of IAPs.
  - Develop reconciliation scenarios

Status: completed

Deliverable: **Invasive Alien Plants Summary**
(Section in Hydrological Analysis Report)

TASK 7: WATER QUALITY ASSESSMENT

- **Conduct water quality assessment of study area outlining current situation and all potential impacts from new developments**
- **Actions:**
  - Collate water quality information
  - Risk assessment in Water Supply Systems
  - Rate risks
  - Outline mitigating factors

Status: In progress, initial data obtained

Deliverable: **Water Quality Assessment Report**

TASK 8: RESERVE REQUIREMENT SCENARIO

Status: -

- **Assess all currently available Reserve information for rivers and groundwater and previously evaluated scenarios for rivers**
- **Reserve requirements also utilized in yield modelling for strategies**
- **Activities:**
  - Assess existing Reserve information
  - Develop Reserve scenarios and determine implications on yield

Deliverable: **Reserve Requirement Scenarios Report** (Supporting document)

TASK 9: GROUNDWATER UTILISATION

Status: in progress, data obtained and analysed

- **Determine most favourable groundwater options as possible intervention**
- **Activities:**
  - Determine groundwater options in terms of management, conjunctive utilization, estimated yield, water quality aspects, unit and infrastructure costs, Reserve requirements and environmental impacts

Deliverable: **Groundwater Assessment and Utilisation Report**

TASK 10: INTERNATIONAL OBLIGATIONS

Status: -

- **Limpopo River Basin**
  - Shared by South Africa, Botswana, Zimbabwe and Mozambique
- **Undertake detailed appraisal of international water-related aspect**
- **Summarise possible impacts of water resource management on water quality and quantity in Limpopo River.**
- **Activities:**
  - Meet with DWS representatives to SADC, Limpopo JPTC and discuss latest Treaties and Protocols incl. international obligations & rights
  - Collate planning analysis results on impacts of water demand on Limpopo River

Deliverable: **International Obligations Report**
(incl. database of relevant international agreements)

TASK 11: YIELD ANALYSIS (WRYM-MF)

- **Determine the water supply potential (yield) from the large dams using updated hydrological data**
- **Activities:**
  - Obtain and verify existing model configuration
  - Update and test model configuration
  - Undertake systems analysis
  - Post-process and interpret results

Status: initiated

Deliverable: **Yield Analysis Report**
(incl. model data and short term YRCs)

TASK 12: WATER QUALITY MODELLING (WQT)

- **Configure the Water Quality and Sulphates (WQT) hydro-salinity model at quaternary catchment scale**
- **Serves as input to planning model (WRPM)**
- **Activities:**
  - Gathering, evaluation & patching of water quality data
  - Set-up & test WQT model

Status: initiated

Deliverable: **Water Quality Modelling Report** (incl. model data)

TASK 13: PLANNING ANALYSIS (WRPM-MF)

- **Compile integrated WRPM model configuration of all catchments in the study area**
- **To determine the need for and timing of interventions**
- **Activities:**
  - Assess WRYM data
  - Discuss water use criteria
  - Set-up & test WRPM
  - Scenario development and implementation
  - Interpretation of results

Status: -

Deliverable: **Planning Analysis Report**
(incl. model data and annually revised water balances)

TASK 14: REVIEW SCHEMES AND UPDATE COST ESTIMATES

Status: obtain existing schemes

- **Review configuration schemes identified as part of Preliminary Screening Workshop**
- **Prepare updated cost estimates**
- **Activities:**
  - Gather information
  - Investigate the current state of infrastructure
  - Update cost estimates for selected schemes
  - Prepare URVs

Deliverable: **Water Supply Schemes Report**

TASK 15: REVIEW OR ASSESS SOCIAL AND ENVIRONMENTAL IMPACTS

Status: -

- **Review the information from previous studies**
- **Social and Environmental Status Quo Assessment and first order due diligence assessment of all options to identify any potential fatal flaws**
- **Activities:**
  - Environmental Status Quo Assessment
  - Due Diligence Review

Deliverable: **Reserve Requirement Scenarios Report** (Supporting document)

TASK 16: ASSEMBLY OF INFORMATION AND FORMULATION OF SCENARIOS

Status: -

- **Develop reconciliation strategy that is inherently cooperative, with plausible assumptions and realistic proposals that can be reviewed from environmental, technical, economic and institutional points of view.**

  Activities:

  - Develop short-term and long-term water requirement scenarios
  - Assess intervention options
  - Develop short-term reconciliation study
  - Develop final reconciliation
  - Record the process
  - Identify all issues and concerns
  - Compile the final reconciliation Strategy

Deliverable: - **Preliminary Reconciliation Report**
- **Final Reconciliation Strategy Report**

TASK 17: STAKEHOLDER ENGAGEMEN
PUBLIC PARTICIPATION

Status: stakeholder database, BID, DWS website, 1st SSC

- **Key element – stakeholders need to buy in and support to implement strategy**
- **Provide stakeholders with information to assist in providing meaningful contributions**
- **Activities:**
  - Identify Stakeholders and during study, confirm stakeholders
  - Project announcement and BID information and response sheets distribution
  - SSC meeting/workshop and public meeting arrangements, recording, compilation of documents, agendas and minutes
  - Compile and distribute newsletters (x2 editions)
  - Arrange for Limpopo WMA Web site to keep DWS and stakeholders informed

Deliverable: **Background Information Document**
(incl. stakeholder database, meeting arrangements, newsletters and DWS website input)

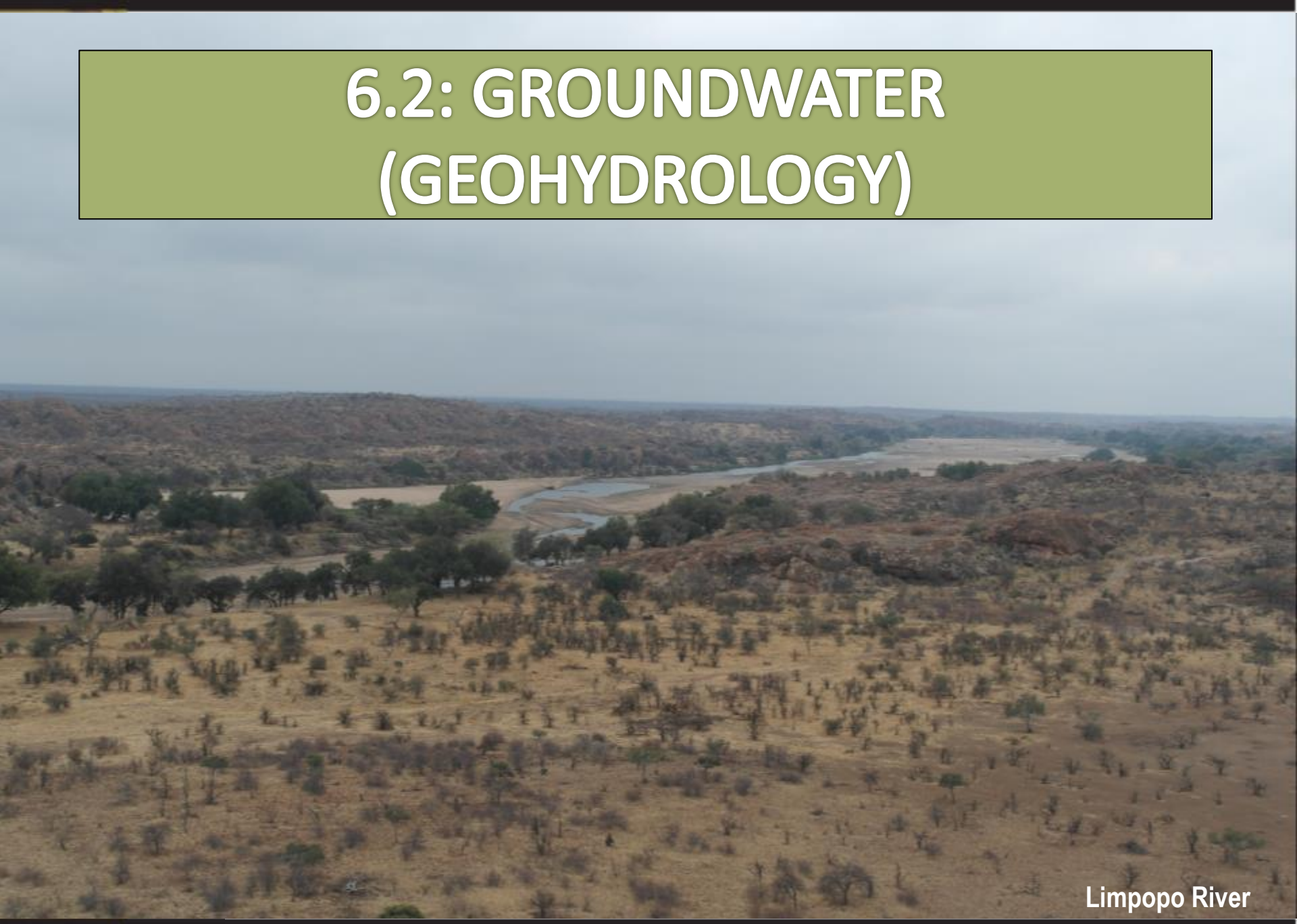
TASK 18: TRAINING AND CAPACITY BUILDING

- **To develop competence and expertise of DWS staff**
- **To establish common understanding of technical aspects between Client and Study Team – to contribute to overall success of study**
- **Activities:**
  - Identify trainees
  - Develop training material
  - Conduct training
  - Analyses impact of training
  - Document the training process

Status: liaised with DWS

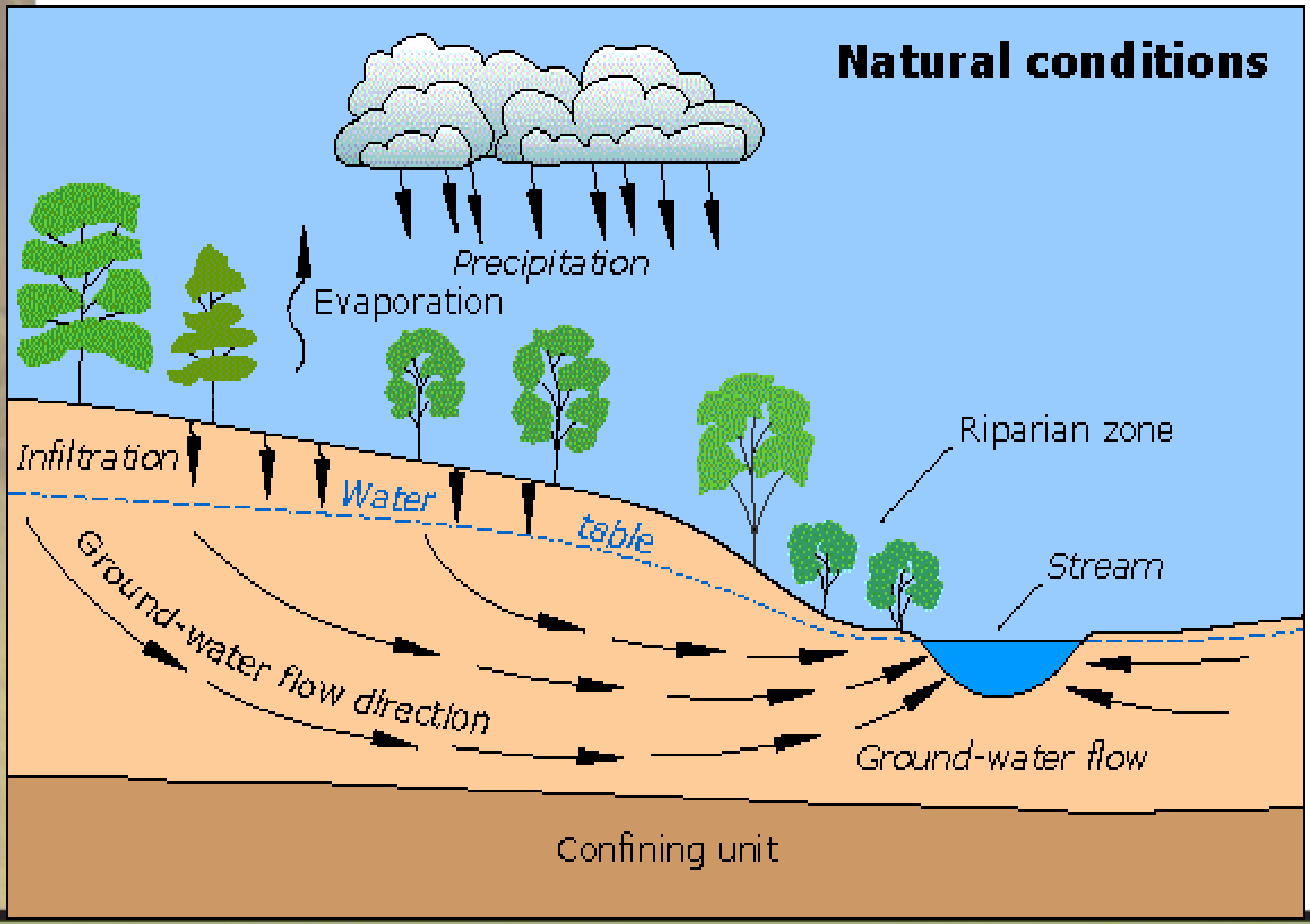
Deliverable: **Training Report**
(incl. training material for 2-day training course)

6.2: GROUNDWATER (GEOHYDROLOGY)



Limpopo River

Hydrogeology (hydro is water, geology is the study of the Earth). Hydrogeology deals with the distribution and movement of groundwater in the subsurface.



GROUNDWATER – ESSENTIAL RESOURCE IN LIMPOPO WMA NORTH

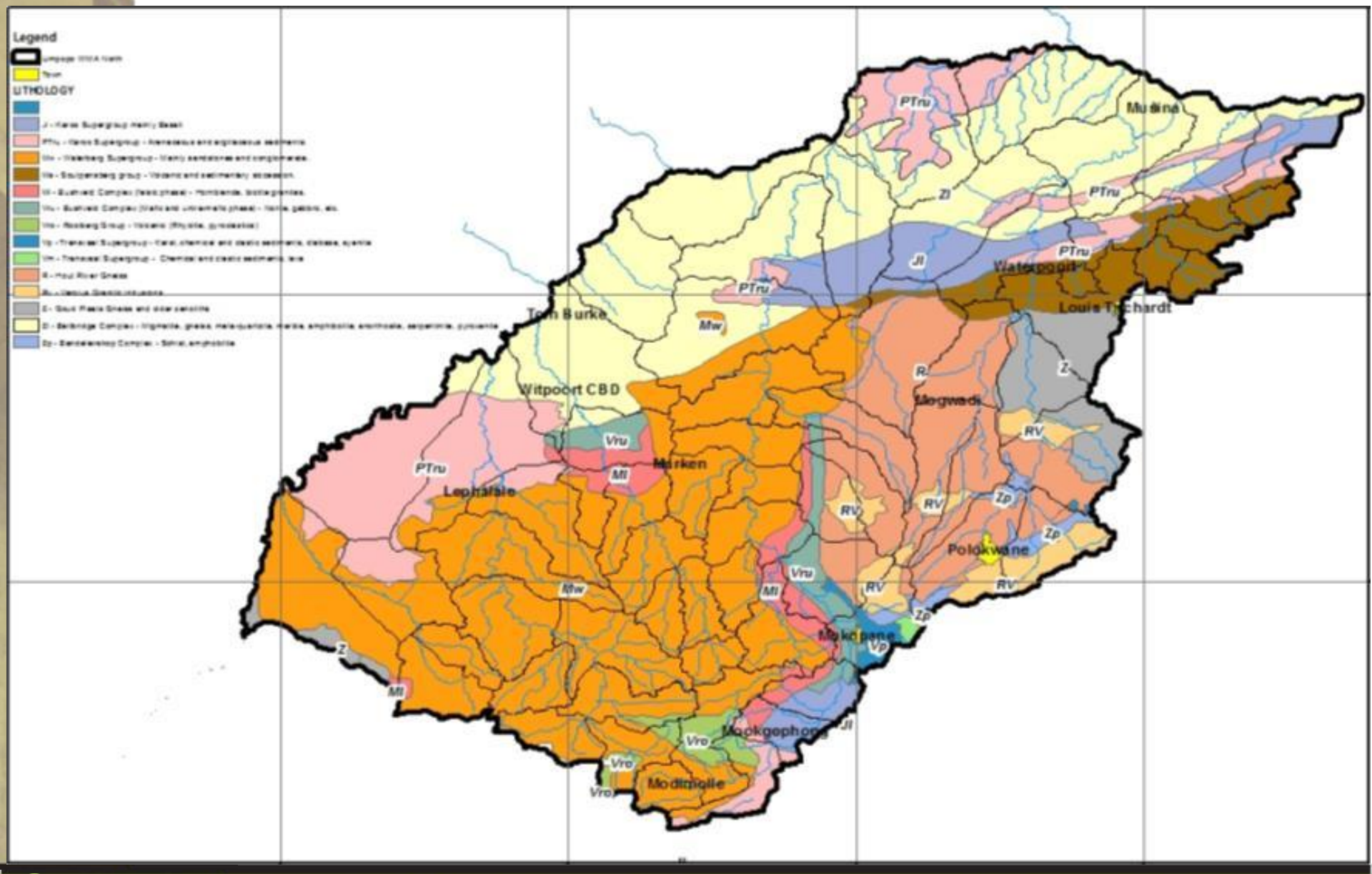
- **Large groundwater resources available**
- **Some already extensively exploited, some under-utilised**
- **Main source to meet future water requirements:**
  - Primary source
  - In conjunction with surface water

Impacts of groundwater use on surface water - NB

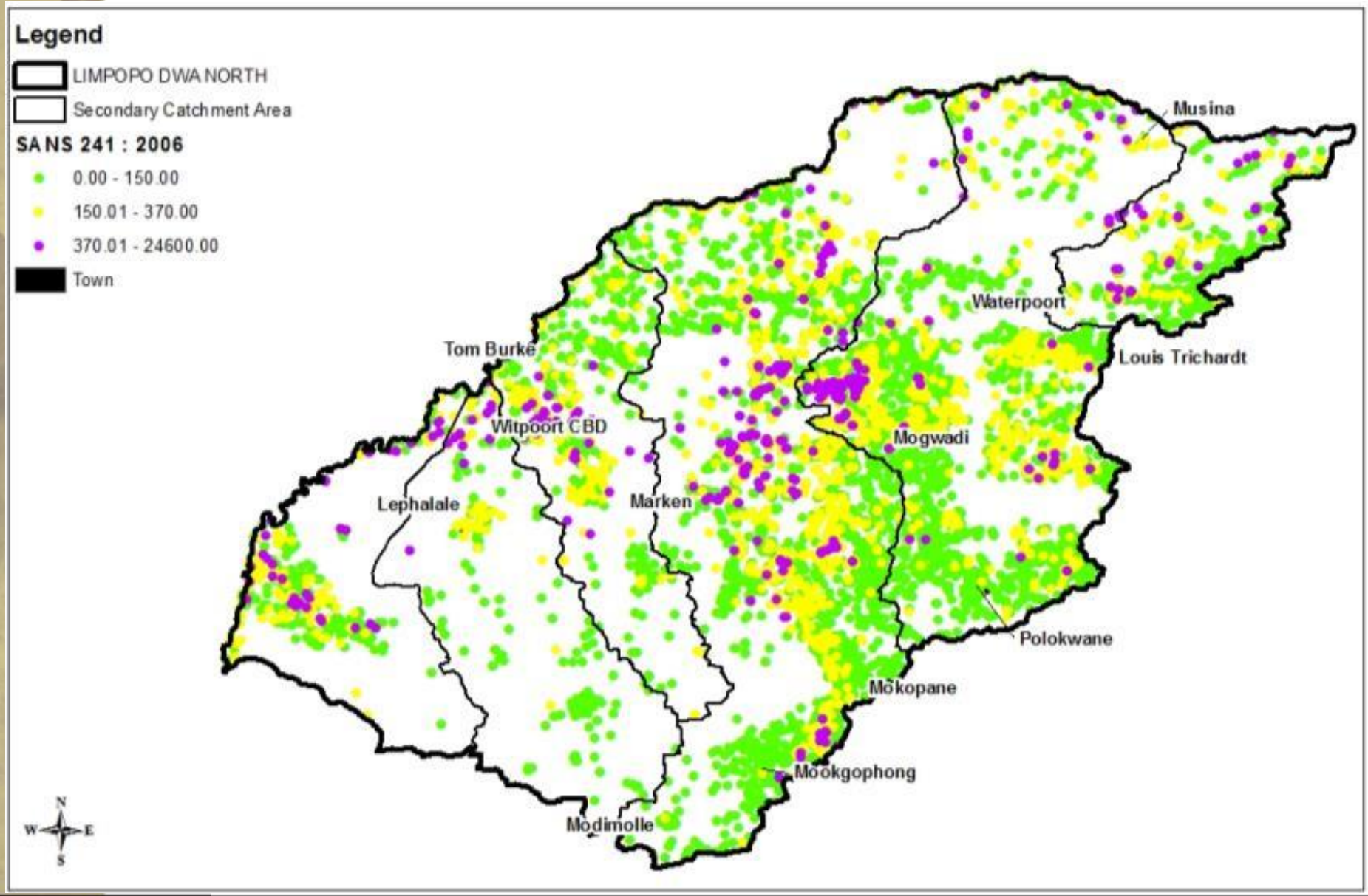
METHODOLOGY

- **Gather information on water quality, availability and Reserve information:**
  - WMS, NGA, GRIP, GRA 2, WARMS and Limpopo WMA V&V study, DWS and NWU research, VSA Rebotile Metsi Consulting Aquabase data, Hydrogeological and Geological Maps, Municipalities, Mines, Development and Infrastructure Plans, etc.
- **Assess water balances and allocable water**
- **Determine most favourable groundwater options as possible interventions:**
  - Management interventions
  - Groundwater infrastructure development
  - Conjunctive groundwater-surface water utilization
- **Cost estimates**

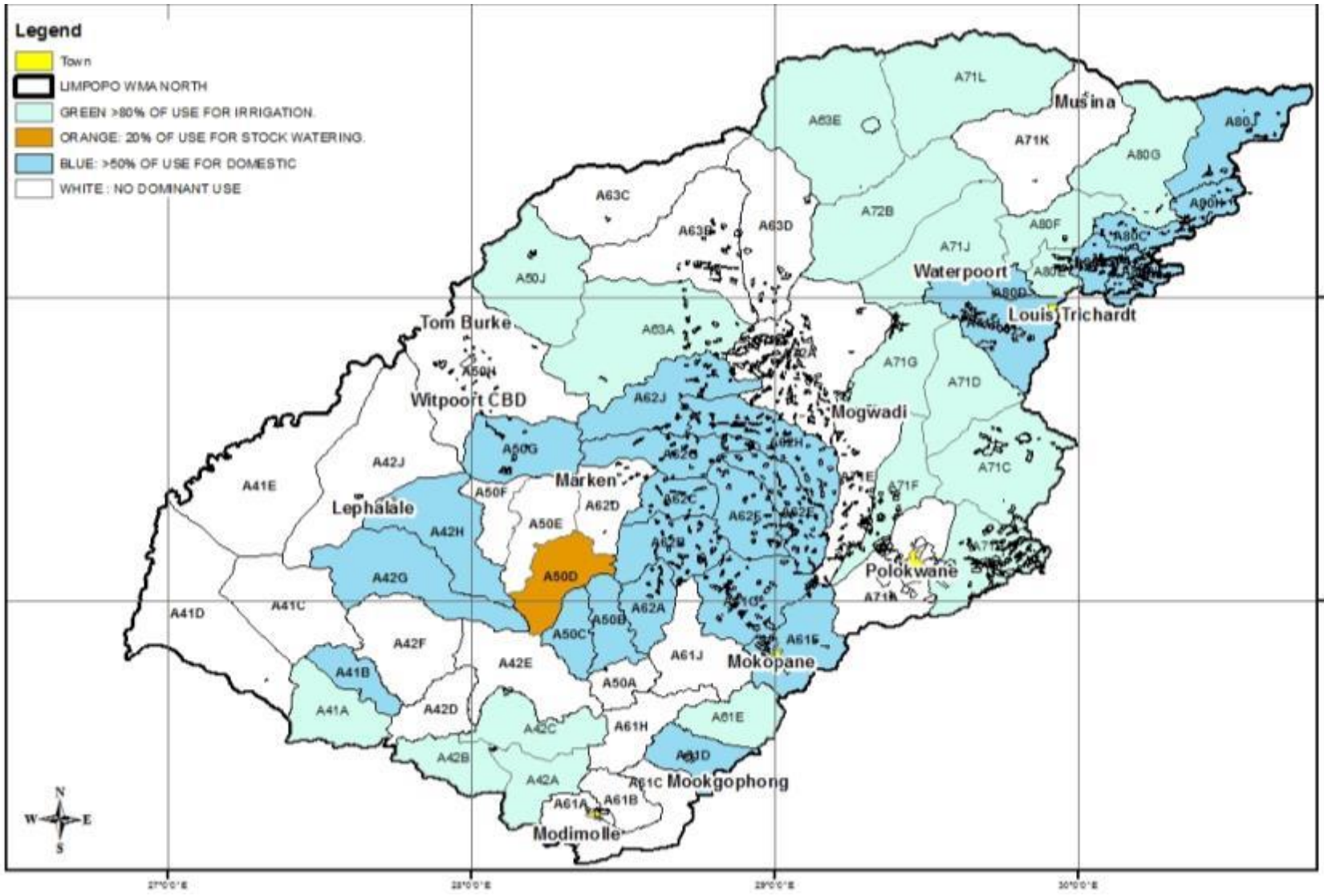
SIMPLIFIED REGIONAL GEOLOGY



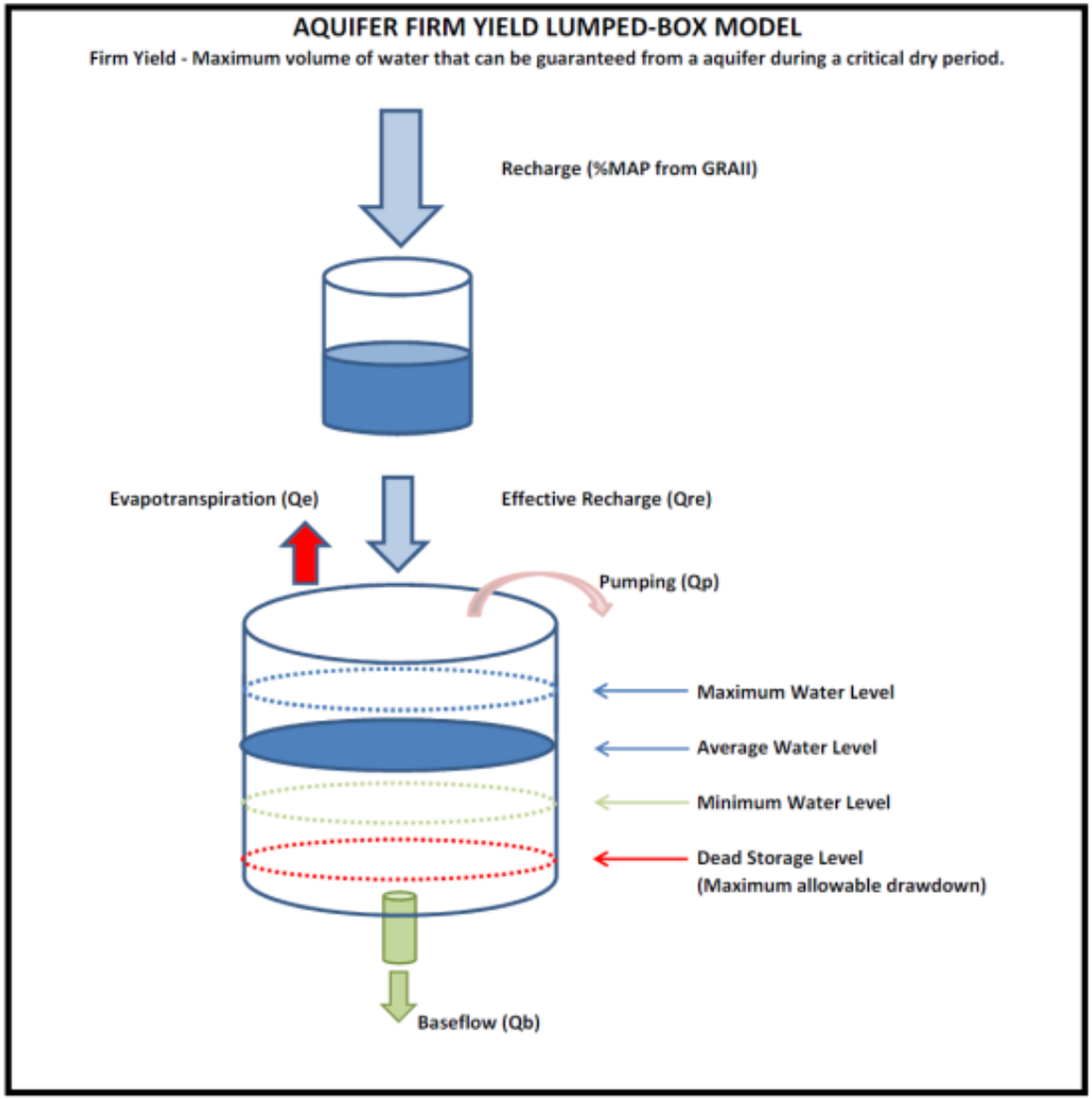
GROUNDWATER QUALITY (EC mS/m)



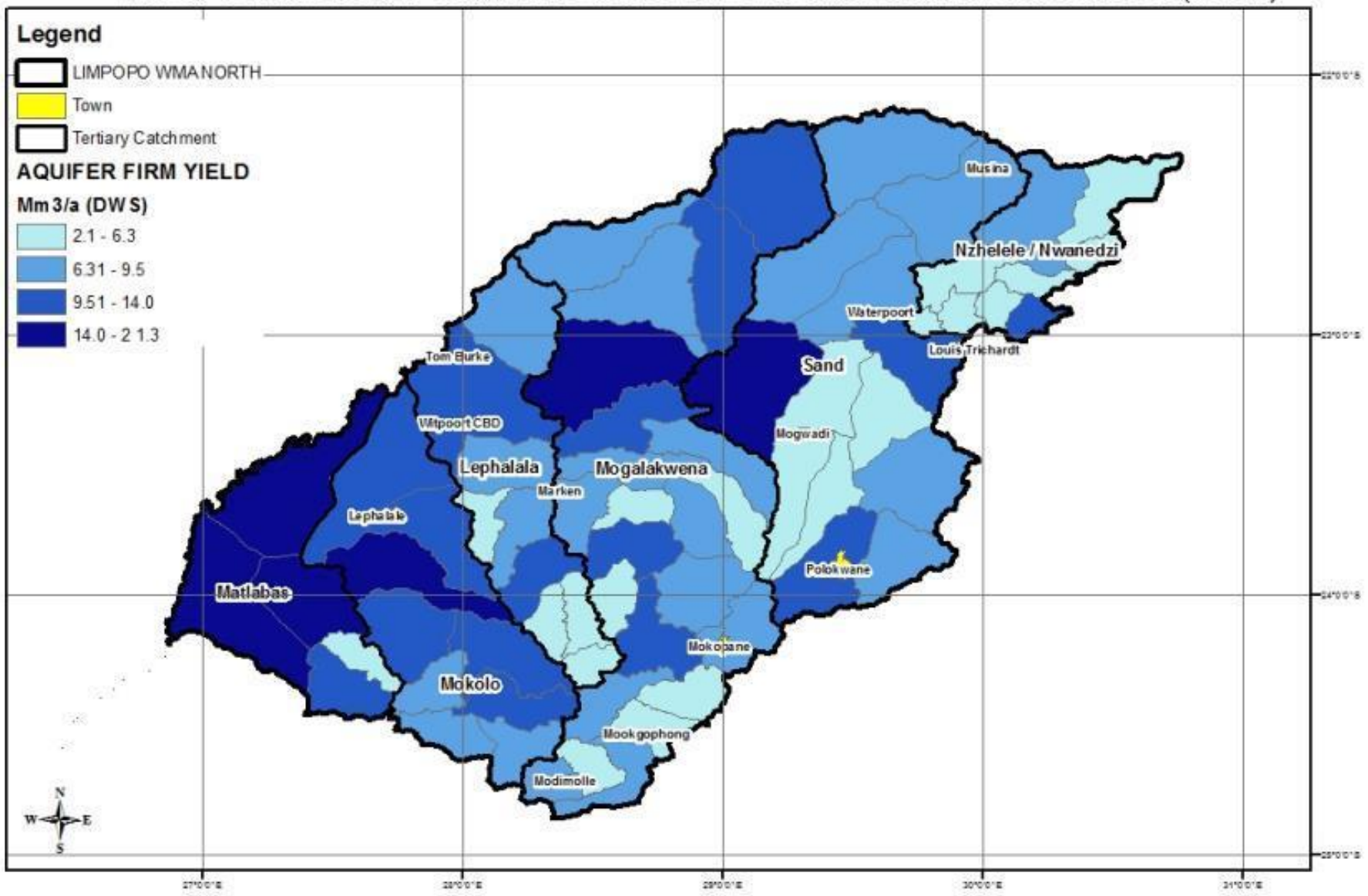
DOMINANT GROUNDWATER USE



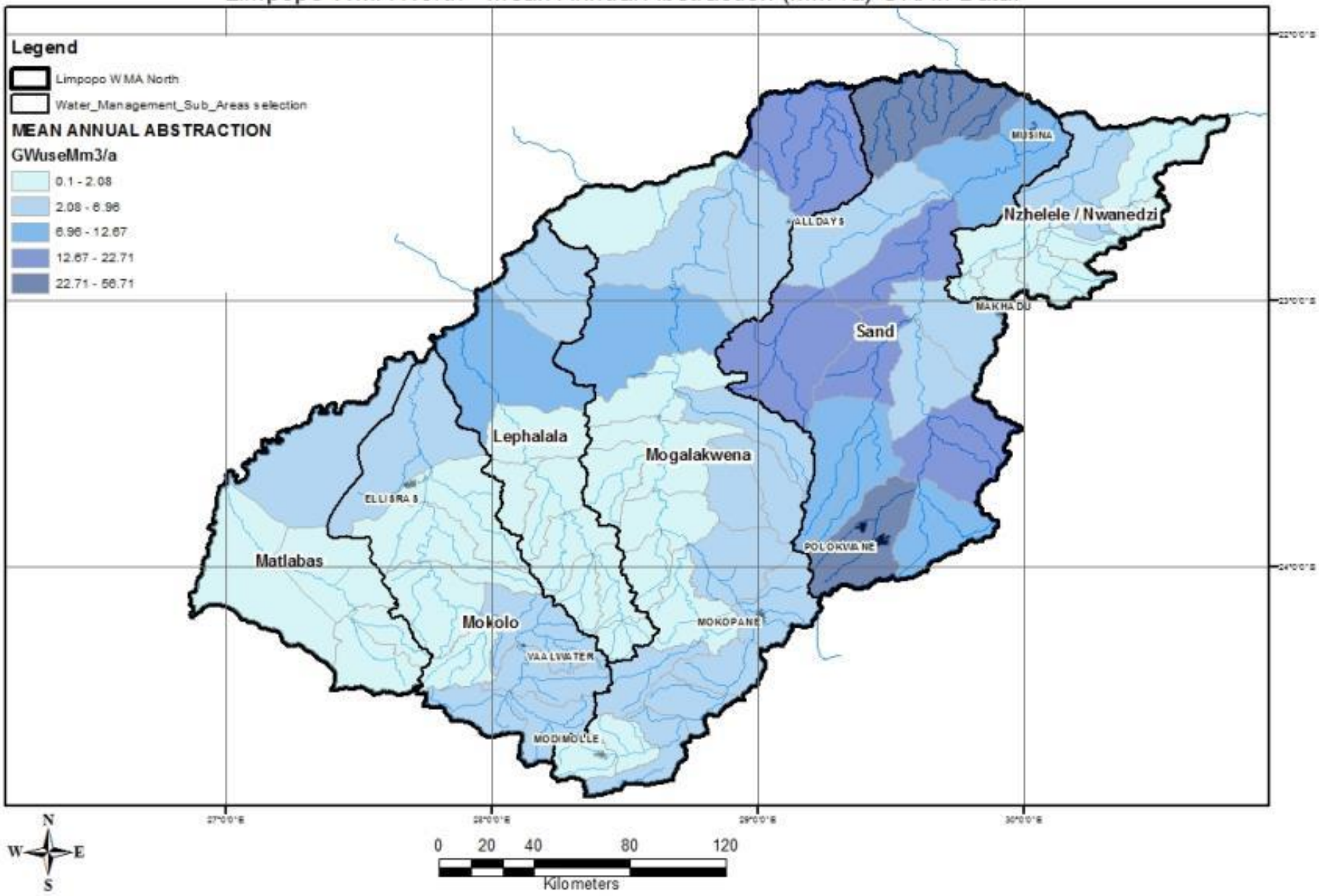
PLANNING TOOLKIT – CONCEPT OF AQUIFER FIRM YIELDS



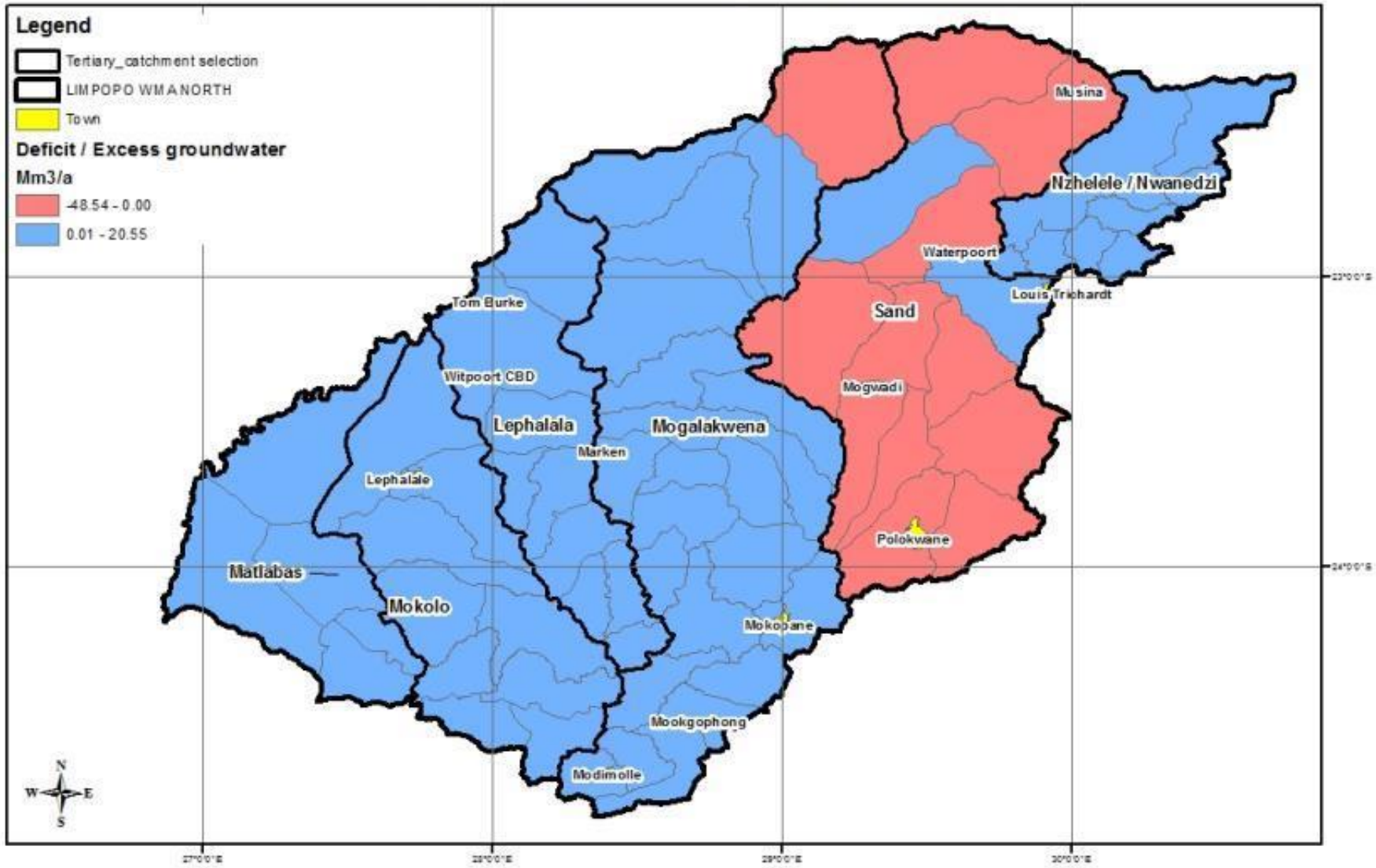
LIMPOPO WMA NORTH - AQUIFER FIRM YIELD PER QUATERNARY CATCHMENT. (Mm³/a)



Limpopo WMA North - Mean Annual Abstraction (Mm³/a) GRAII Data.



LIMPOPO WMA NORTH - Deficit / Excess Groundwater.
(Aquifer Firm Yield / Groundwater use GRAII data).



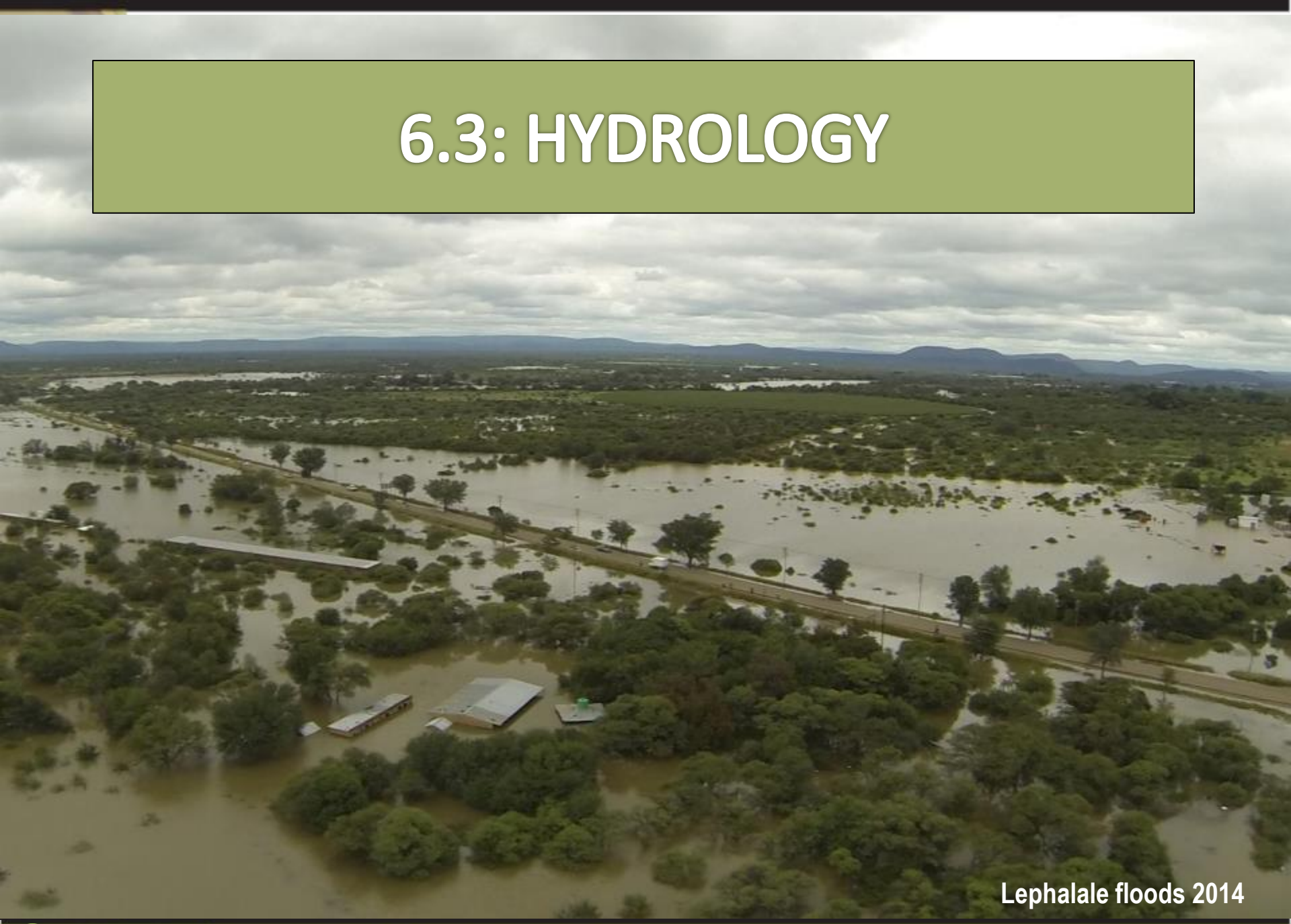
FINAL COMMENTS

- Per volume, groundwater is the worlds most extracted raw material, but unlike other resources it is constantly being replenished under natural conditions.

- The main requirement to ensure constant usage of groundwater is management. This includes continuous monitoring of the resource and protection against pollution.

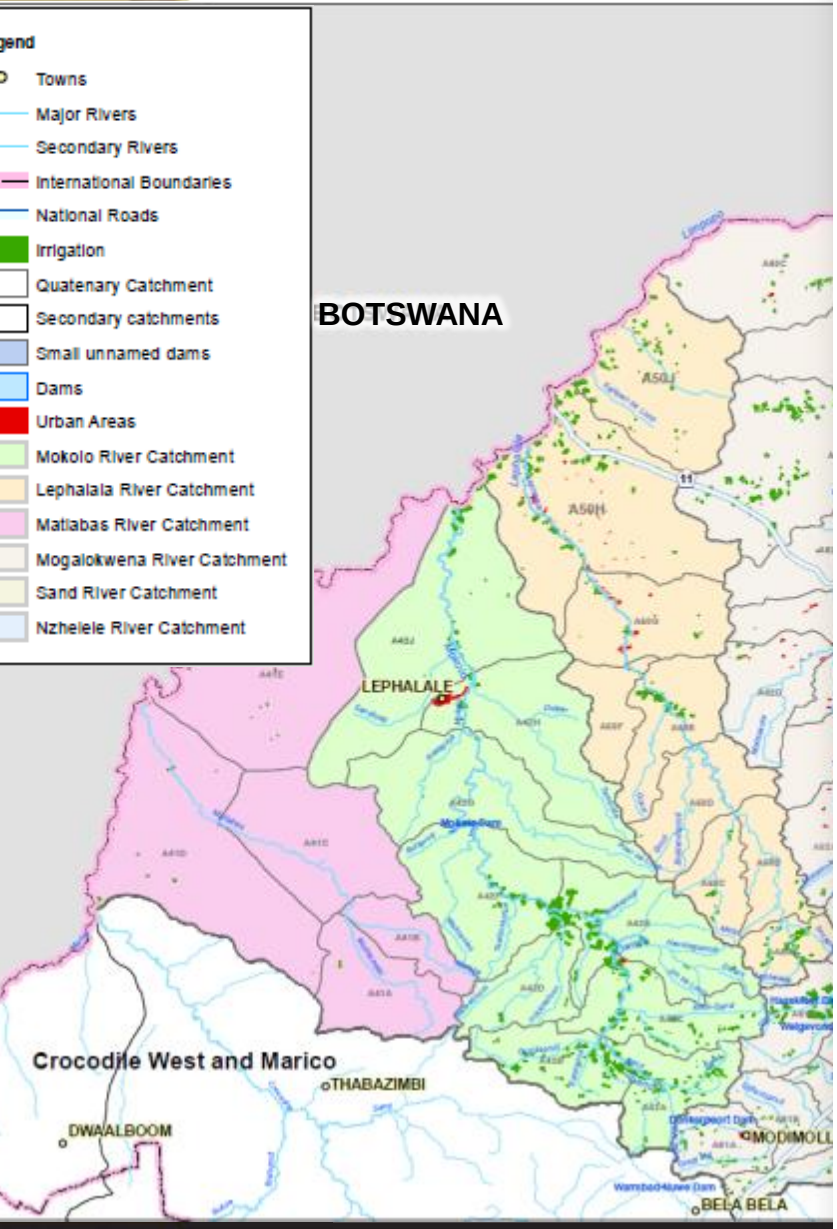
- The ever increasing demand on groundwater will require a high level of accuracy on the assessment of groundwater. The level of confidence is linked to the availability of data. DWS projects such as GRIP is essential to update groundwater information on a continues basis.

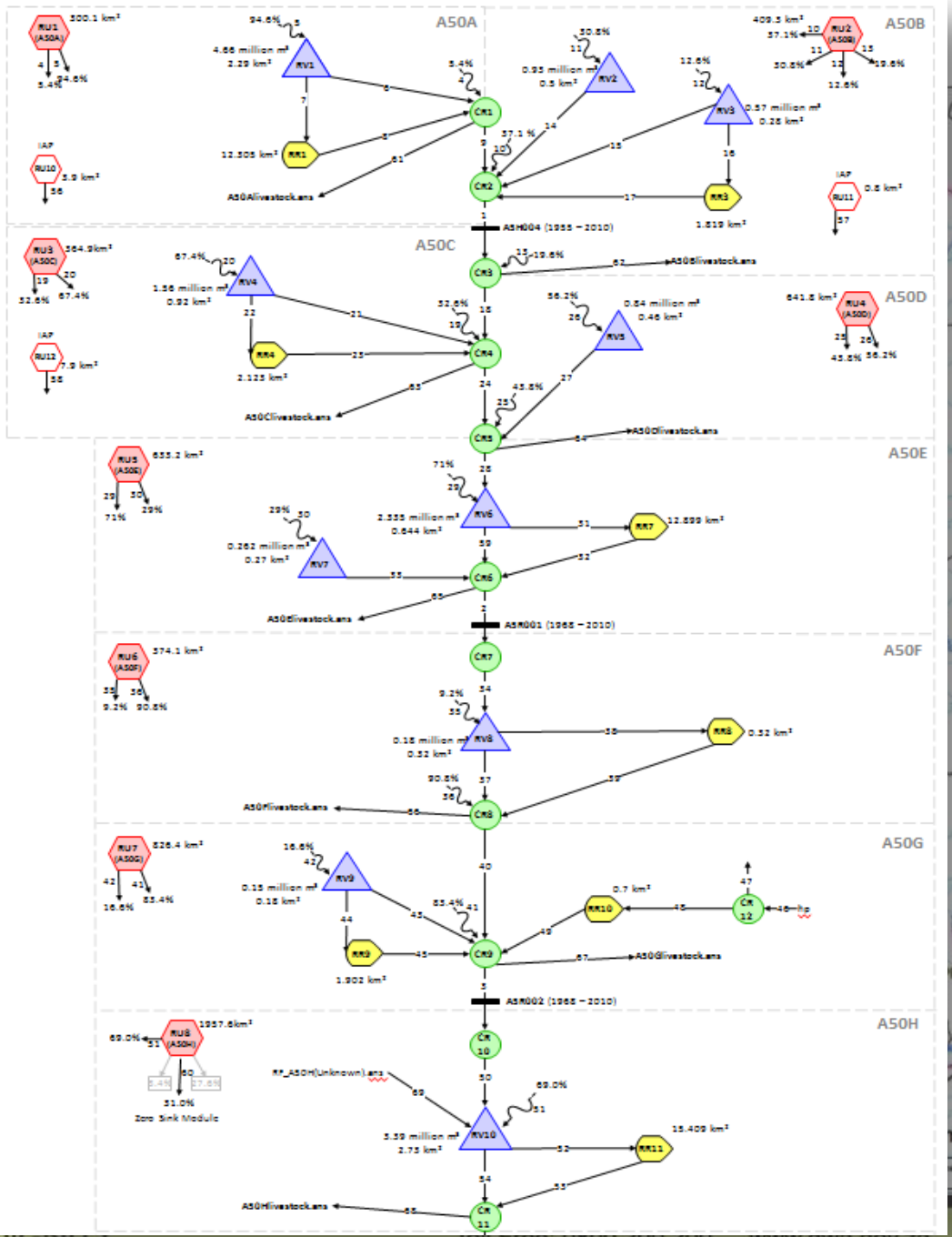
6.3: HYDROLOGY

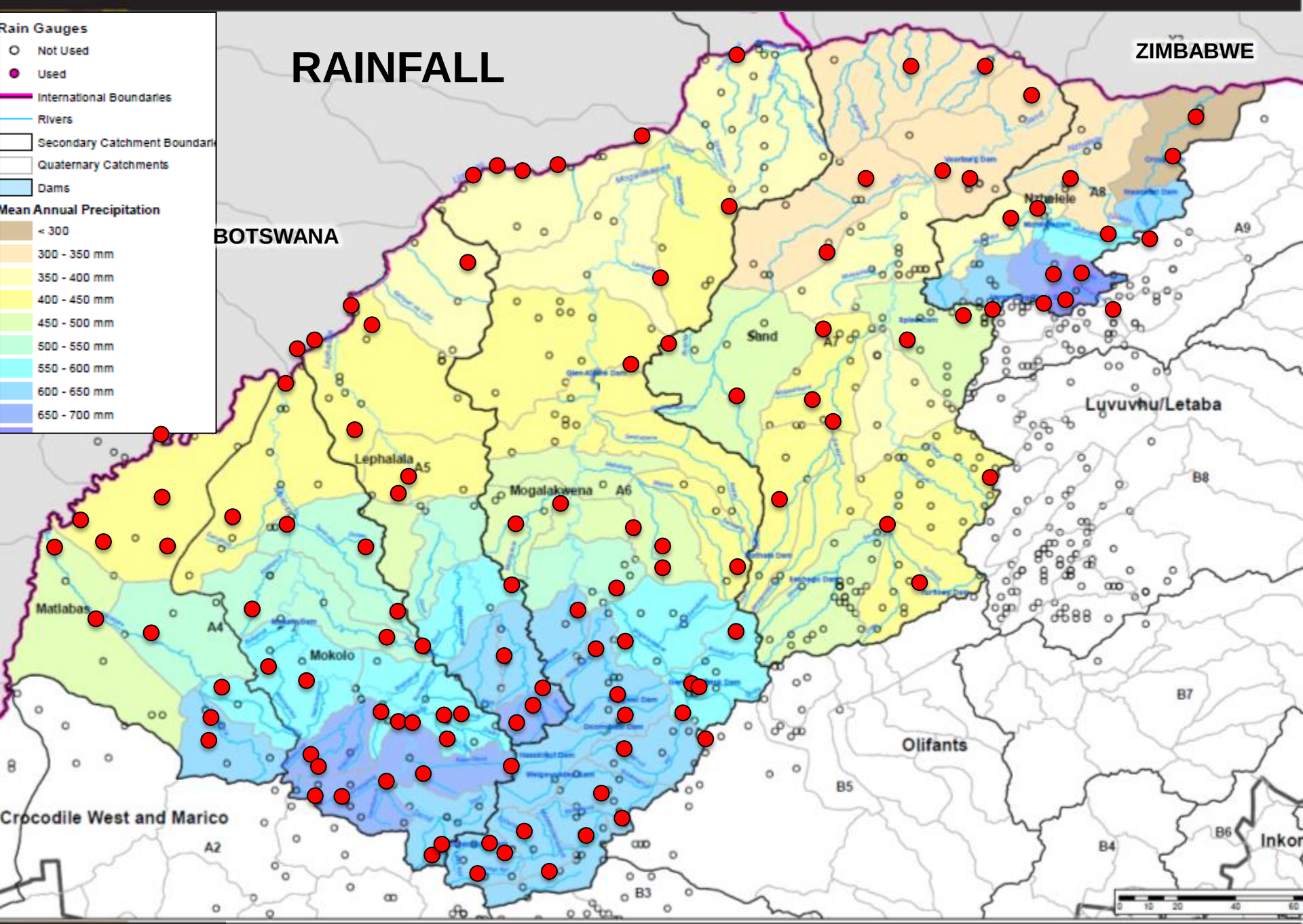


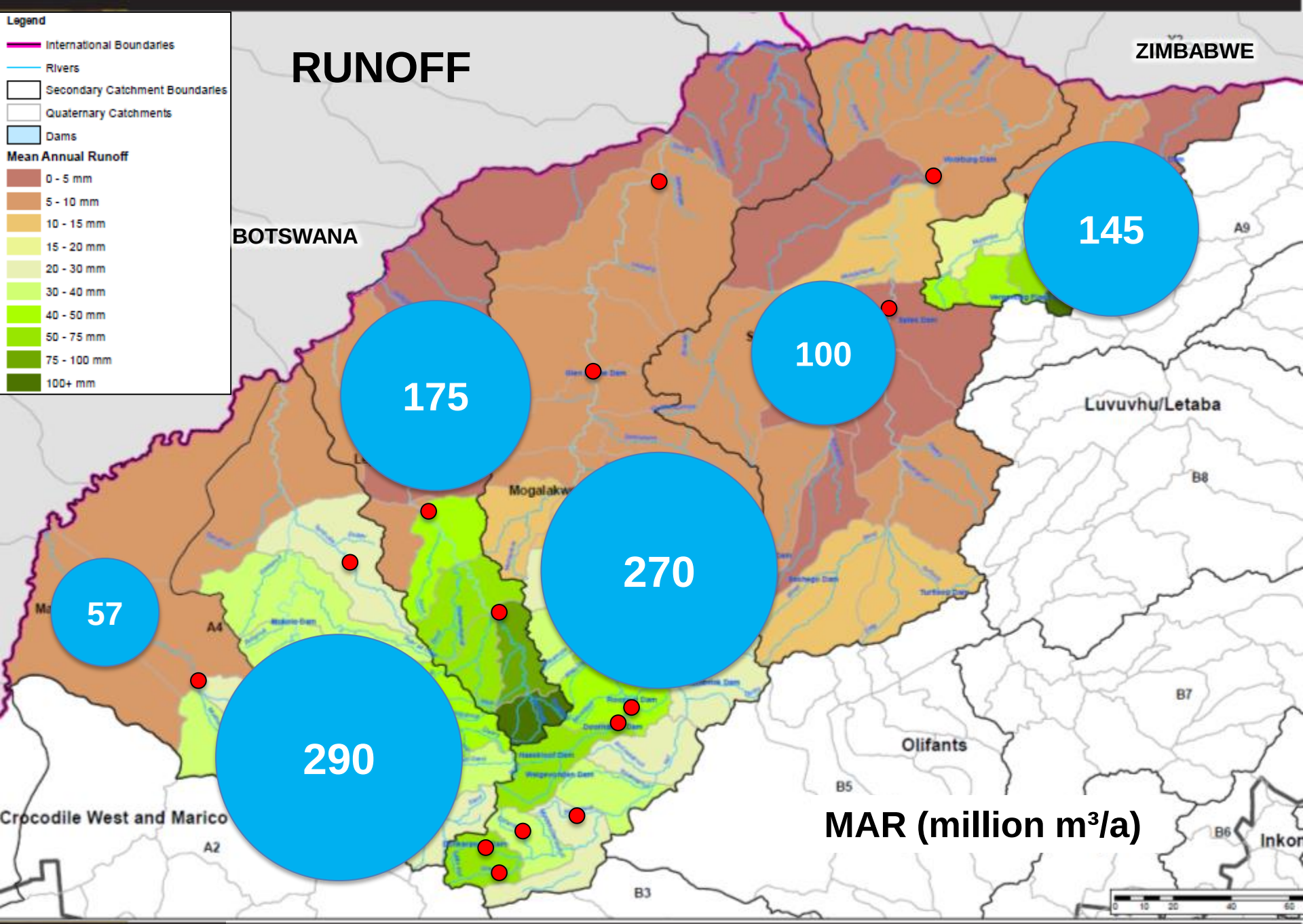
Lephalale floods 2014

CATCHMENTS

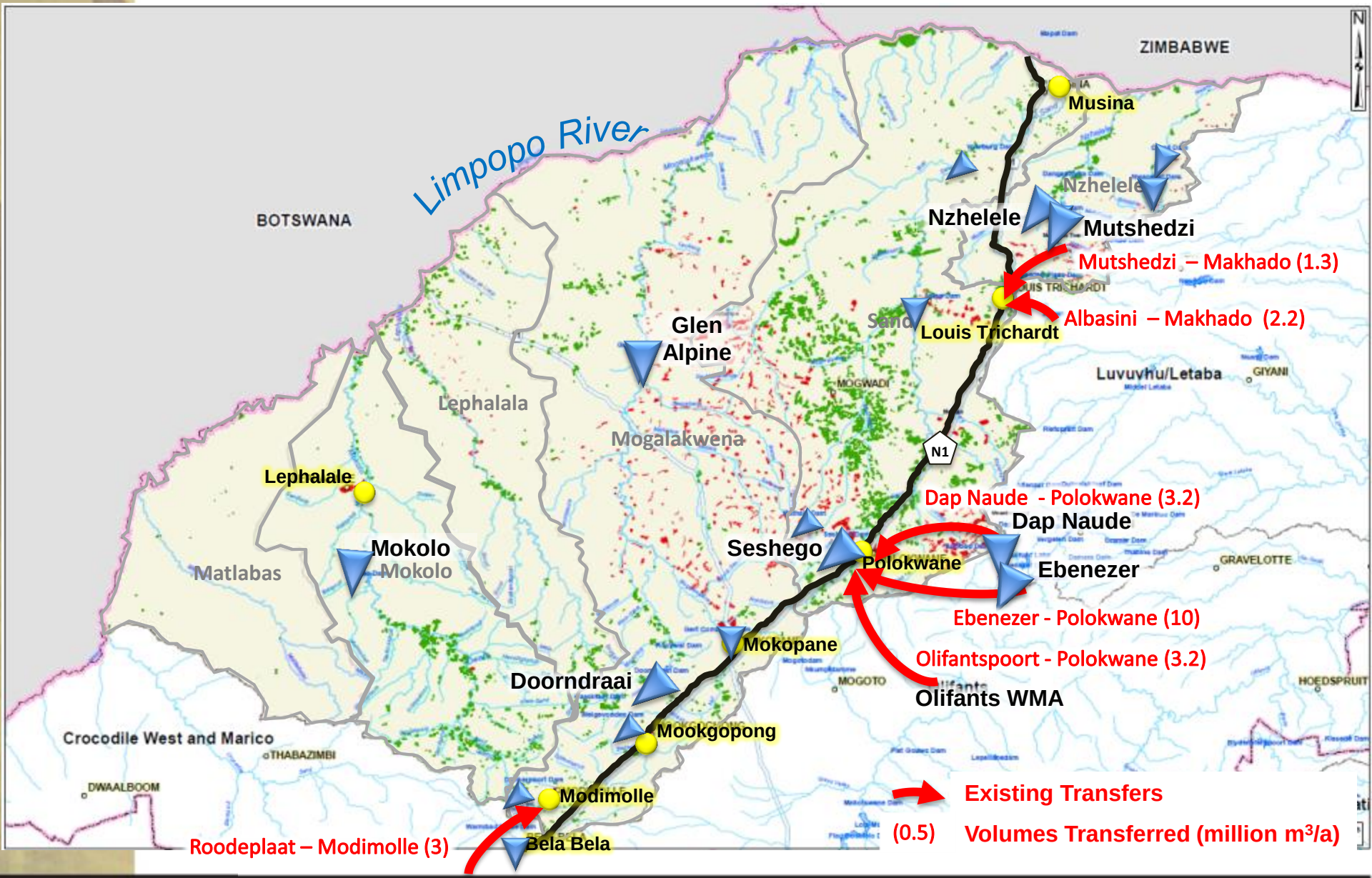





RAINFALL
ZIMBABWE
BOTSWANA
Rain Gauges
Not Used
Used
International Boundaries
Rivers
Secondary Catchment Boundarie
Quaternary Catchments
Dams
Mean Annual Precipitation
< 300
300 - 350 mm
350 - 400 mm
400 - 450 mm
450 - 500 mm
500 - 550 mm
550 - 600 mm
600 - 650 mm
650 - 700 mm
Nzhelele
A8
A9
Sand
A7
Luvuvhu/Letaba
B8
Lephalala
A5
Mogalakwena
A6
Matlabas
A4
Mokolo
B7
Olifants
B5
Crocodile West and Marico
A2
B3
B4
B6
Inkor

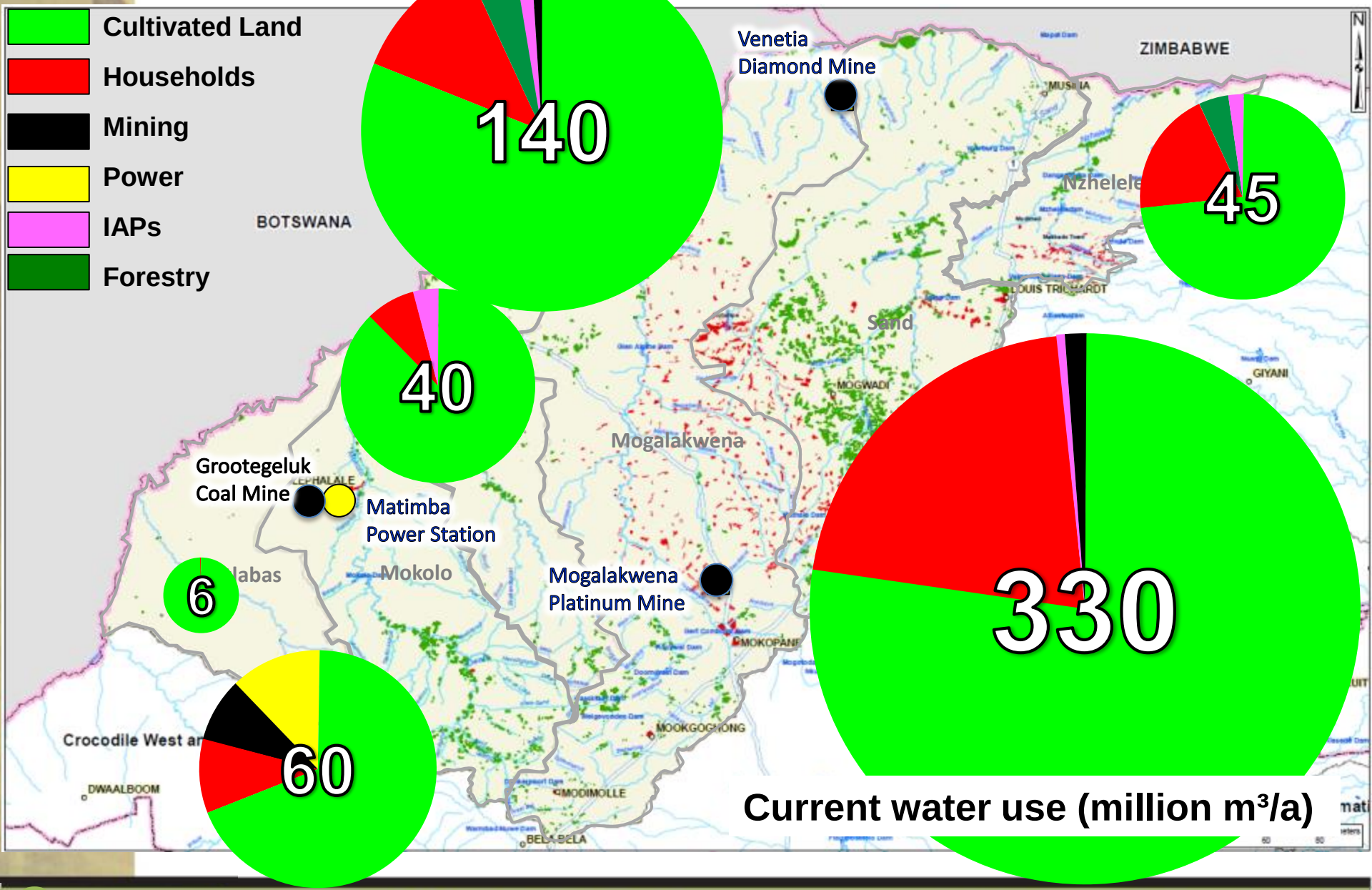

RUNOFF
Legend
International Boundaries
Rivers
Secondary Catchment Boundaries
Quaternary Catchments
Dams
Mean Annual Runoff
0 - 5 mm
5 - 10 mm
10 - 15 mm
15 - 20 mm
20 - 30 mm
30 - 40 mm
40 - 50 mm
50 - 75 mm
75 - 100 mm
100+ mm
BOTSWANA
ZIMBABWE
145
100
175
270
57
290
Luvuvhu/Letaba
Olifants
Crocodile West and Marico
A2
A4
A9
B3
B5
B6
B7
B8
MAR (million m³/a)

EXISTING TRANSFERS

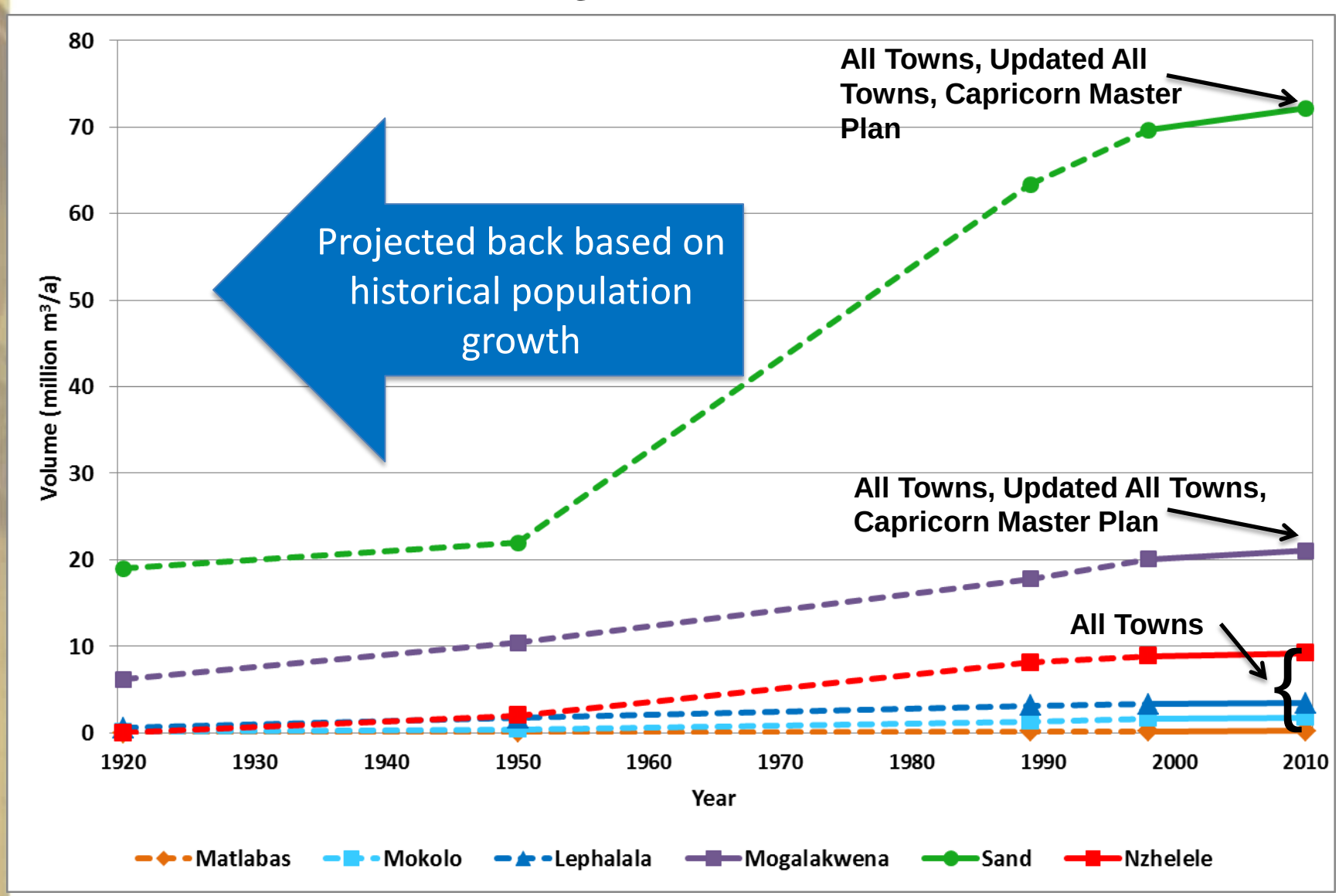


6.4: CURRENT AND FUTURE WATER REQUIREMENTS

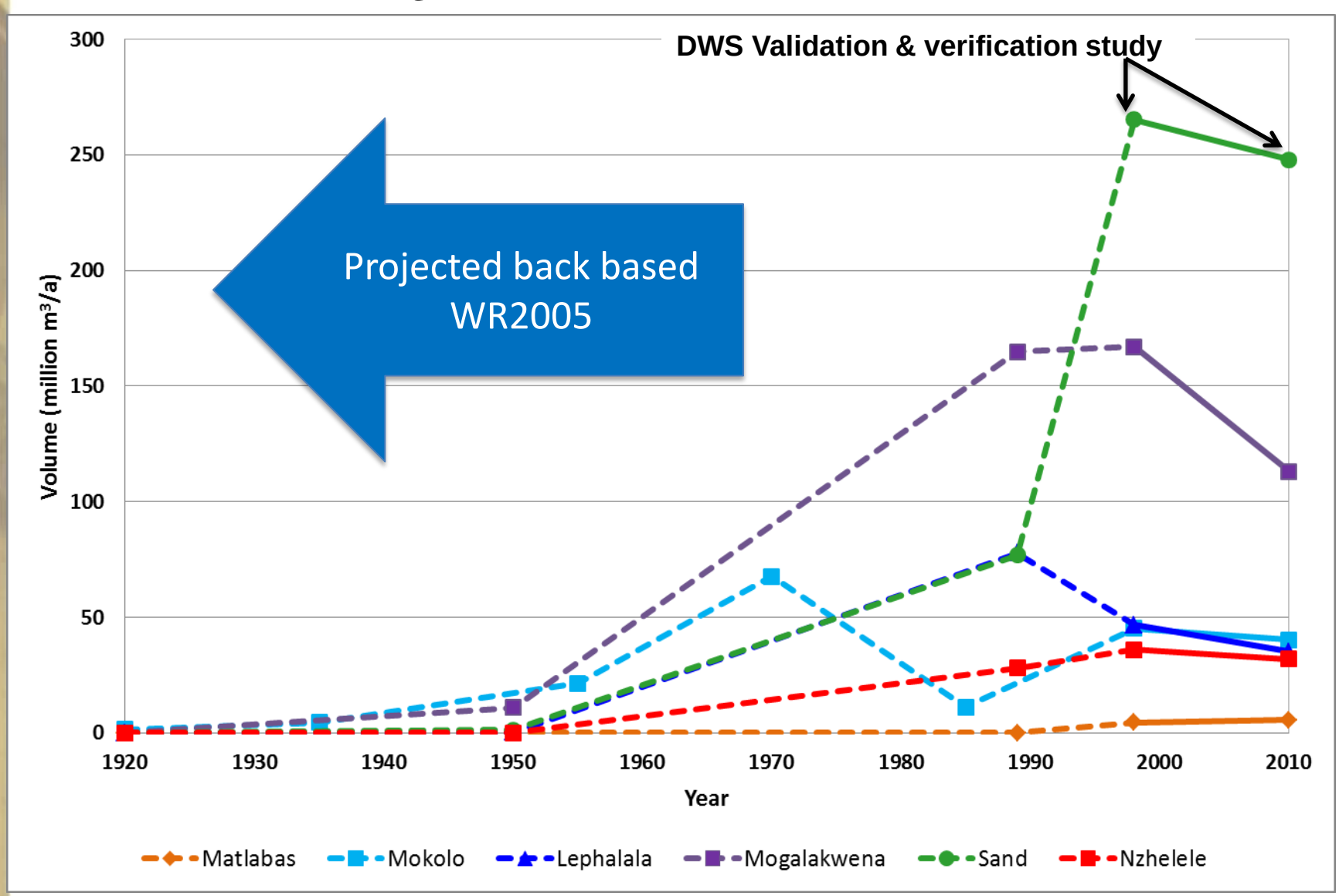
WATER USE (2


Cultivated Land
Households
Mining
Power
IAPs
Forestry
140
45
40
330
6
60
Venetia
Diamond Mine
Grootegeluk
Coal Mine
Matimba
Power Station
Mogalakwena
Platinum Mine
BOTSWANA
ZIMBABWE
Mogalakwena
Mokolo
Sand
MOGWADI
GIYANI
MOKOPANE
MODIMOLLE
DWAALBOOM
BELA-BELA
Current water use (million m³/a)

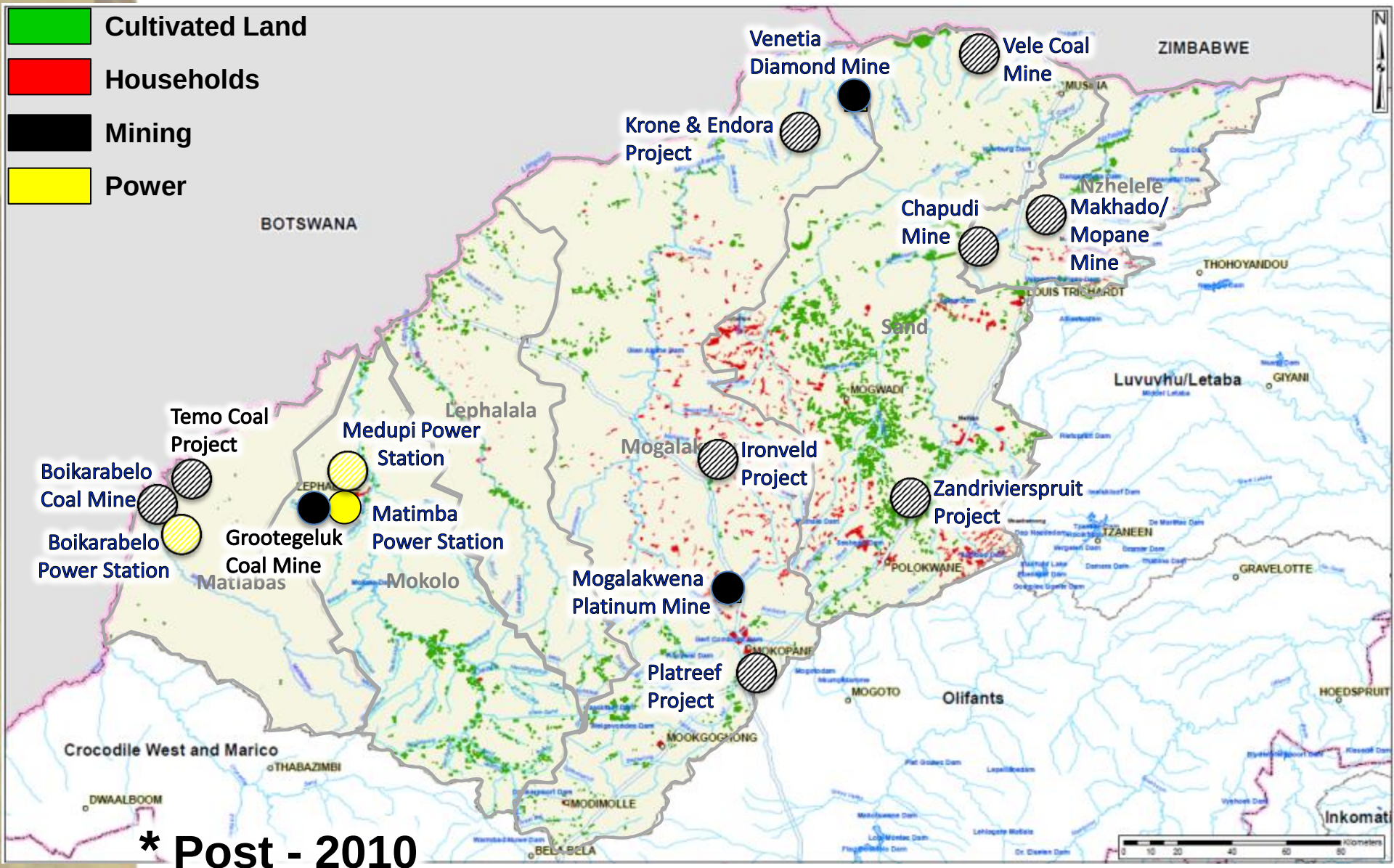
DOMESTIC WATER REQUIREMENTS



IRRIGATION REQUIREMENTS



FUTURE MINING & POWER DEVELOPMENT*



Coal of Africa Limited (CoAL)
Mining development around Makhado

COAL of AFRICA LIMITED

Coal of Africa Limited (CoAL)

Limpopo Water Management Area

PRESENTATION

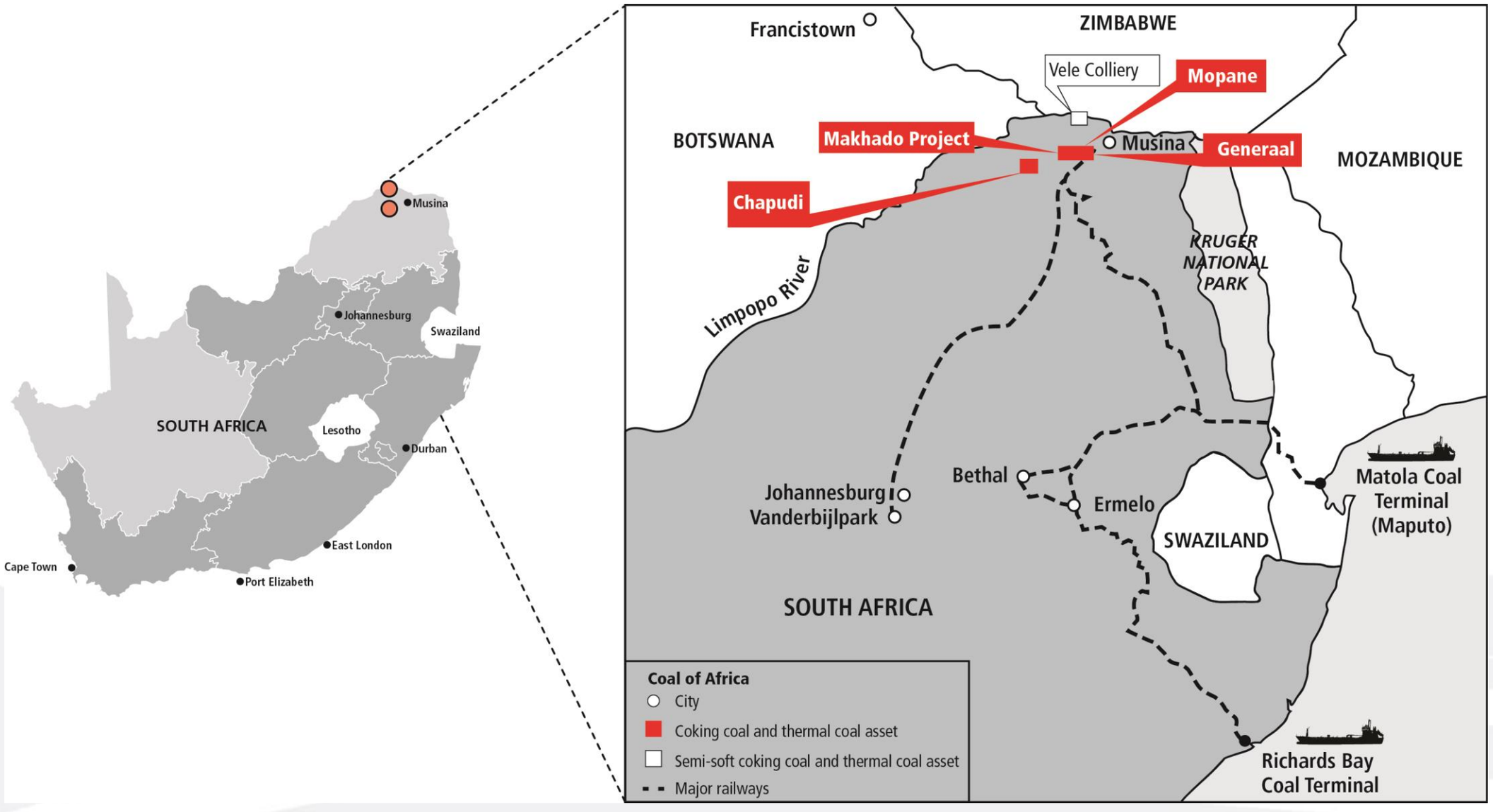
18 February 2015

www.coalofafrica.com

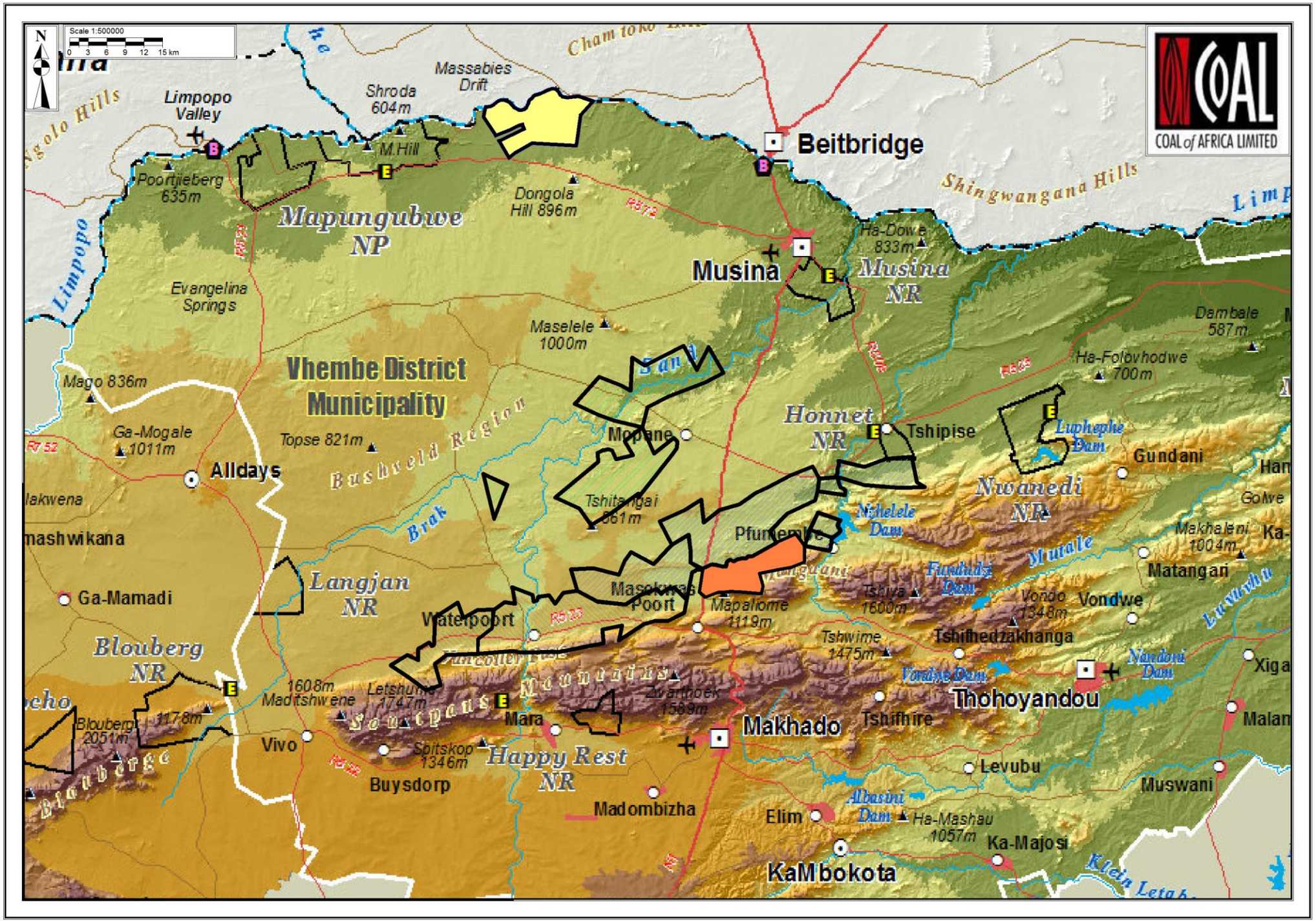
Repositioned mining development company

- **Vision to responsibly produce 6.7 million tonnes of coal per annum**
  - pipeline of high quality coking and thermal coal projects - Vele, Makhado and Greater Soutpansberg
  - identification of strategic investors to develop Vele and Makhado
  - In excess of 2 billion mineable tonnes in situ

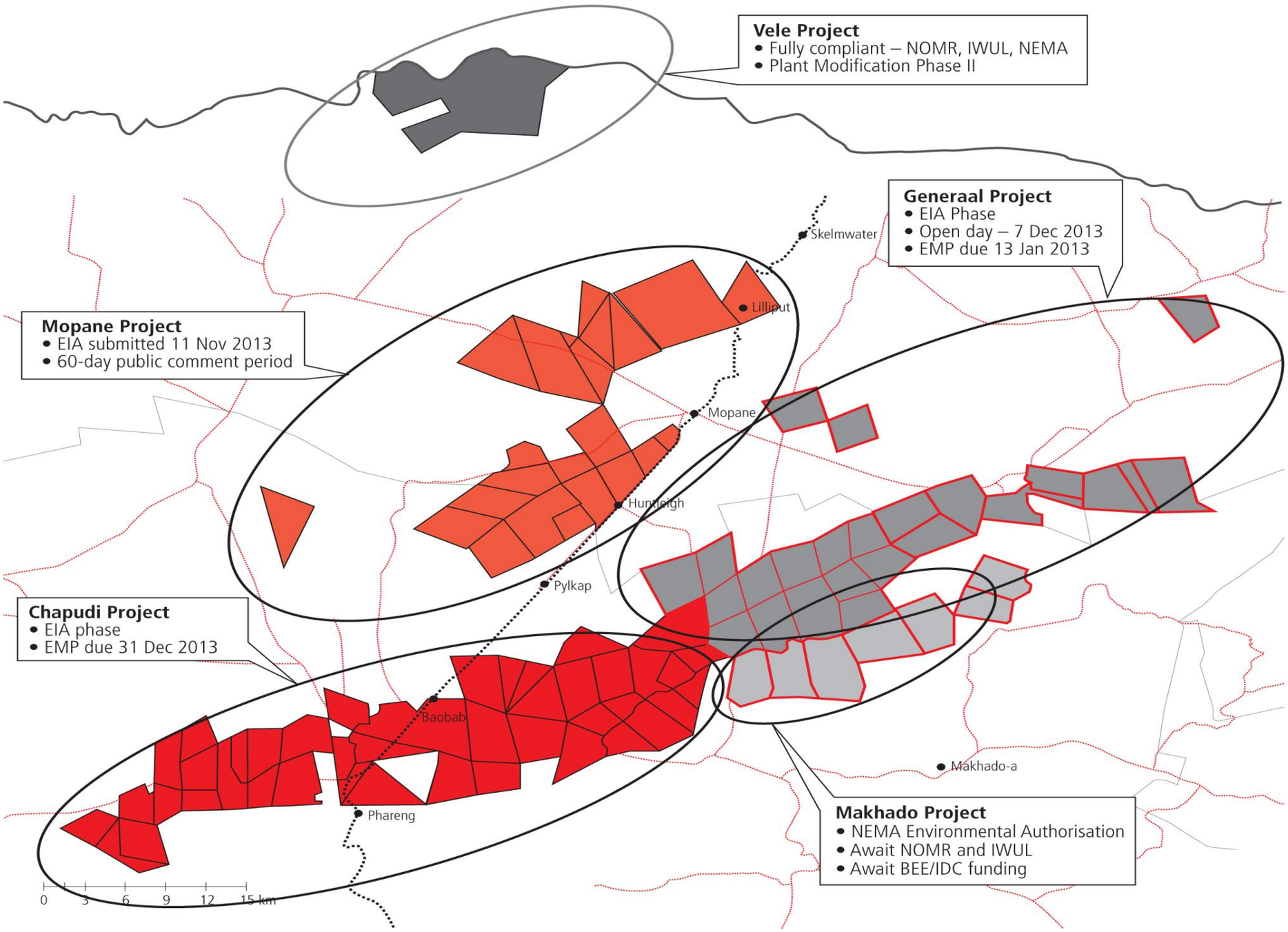
Location: operations and explored resources



CoAL's PROJECTS IN LIMPOPO



CoAL's PROJECTS IN LIMPOPO



Project pipeline

Vision to responsibly produce in excess of 6.7 million tonnes per annum of saleable product

Vele Short term "brownfields" (1.2 Mtpa)	Makhado Medium term "greenfields" (5.5 Mtpa)	GSP Long term "greenfields"

Leverage existing Infrastructure	Existing rail infrastructure	▪ Existing rail infrastructure has sufficient capacity and is in close proximity to the resources thereby reducing the potential capital expenditure and lead time to build ,commission and achieve steady state production ▪ Rail infrastructure and operations have proven track record as evidenced by the Vele operations
	Export ports	▪ CoAL has access to port throughput capacity at the Matola Terminal in Maputo ▪ Proven track record of delivery of coal from Vele
	Road	▪ All projects in close proximity to existing national road infrastructure to facilitate the road transport of coal to domestic customers
	Electricity	▪ Both Vele and Makhado have access to and allocations of Eskom power

Opportunities:	
Logistics	▪ Transnet costs remain an impediment
Off-take	▪ Develop as a supplier potentially to customers in Limpopo

Vele – Short term brownfields project

Project Parameters

Produce 2.7m ROM tonnes per year
Simultaneous production of two products: • Semi-soft coking coal • Thermal quality coal
Initial Mine Plan is based on mining 2.7Mt of ROM from the east pit over a 16 year period
Additional Open cast reserves in the west pit, and potential for underground mining with a total life of mine in excess of 100 years

Highlights

In March 2010, a New Order Mining Right was granted to Limpopo Coal Company (wholly owned subsidiary of CoAL) for 30 years over 8.562 hectares

To date, CoAL has invested R1.3 billion in plant construction and production

Approved and valid Integrated Water Use License

Approved Environmental Authorisation and EMP

Mine is placed under care and maintenance to conclude plant modifications

Spiral Plant

Thickener and Product Stockpile

Makhado Project – medium term “greenfields”

Project parameters

- Expected production of ~12.6 million ROM tonnes per annum
- 2.3Mtpa of hard coking coal and 3.2Mtpa of thermal coal
- Life Of Mine: 16 years
- Resource to be mined on an opencast basis with the potential for underground expansion

Highlights

- Completed a Class II Definitive Feasibility Study (DFS) on its flagship Makhado Project
- Discussions underway:
  - Broad Based Black Economic Empowerment (“**BBBEE**”) groups, majority being local communities
  - strategic partners (from a funding and off take perspective)
- Approved Environmental Authorisation
- **Timeline:**
  - CY 2015 NOMR approval process and finalisation of BBBEE funding process
  - planned commencement of construction in CY 2016
  - 26 months plant construction and mine development
  - Production to commence CY2019

Bulk sample pit on Tanga

Project water demand

Projects	IWUL status	Timing	Bulk water allocated / required	Water source
Vele	Approved	Short term	-2.45 million m^3 per annum allocated	Limpopo – ground water
Makhado	Applied – await approval	Medium term	~2.48 million m^3 per annum required	Nzhelele Dam irrigation scheme
Greater Soutpansberg	Still to apply	Long term	~0.92 - 1.82 million m^3 per annum estimated requirement	To be determined (1)

Water use design philosophy

- Zero discharge
- Separation of clean and dirty water with lined pollution control dams
- Maximum re-use of water in the operations

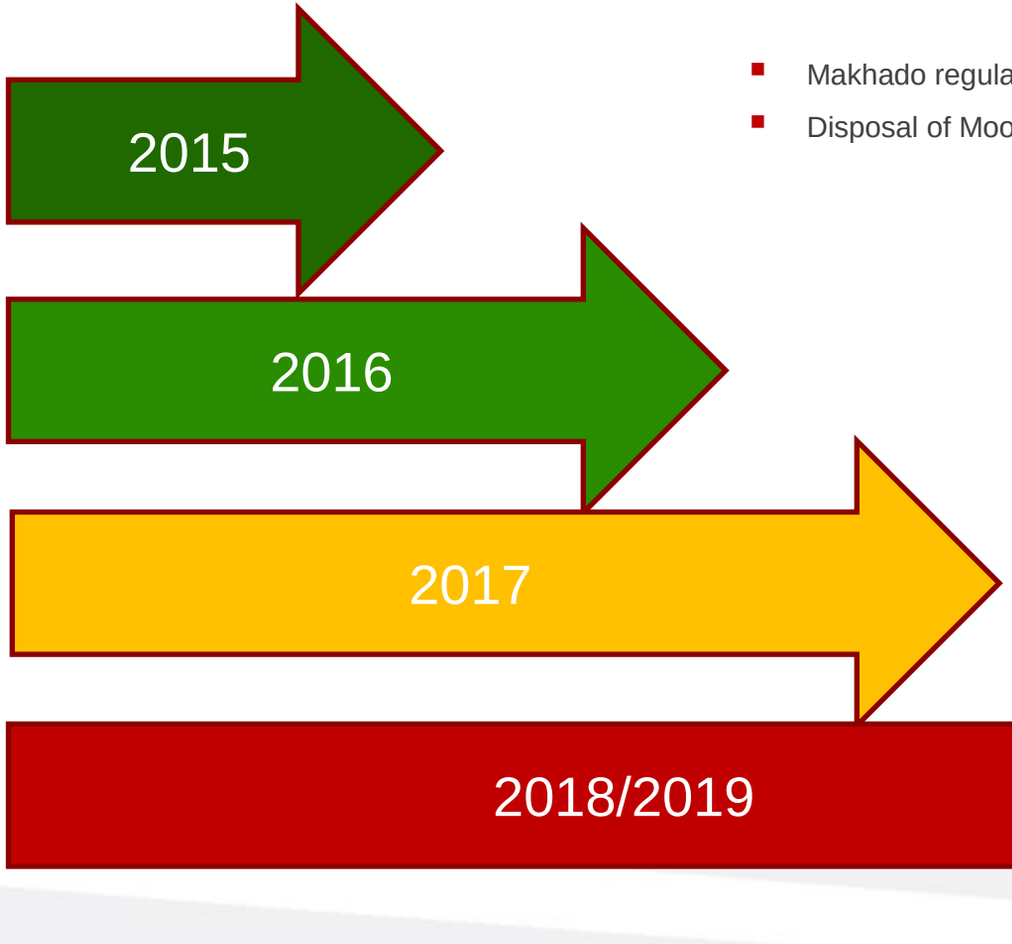
Footnote (1) – potential bulk water sources to be investigated

- Musina and Makhado waste water treatment works, Nzhelele valley transfer scheme, Zimbabwe transfer scheme, ASR(aquifer storage and recovery)

CoAL's Value Add

- CoAL supports the national agenda (National Development Plan) and the Provincial Growth and Development Strategy (PGDS) to promote social cohesion and socio-economically transform the areas in which the company operates
- Its socio economic model seeks to facilitate community development and maximise the benefits of mining for communities through various pillars like Skills Development, SME Development, Community Investment, and the company's Social and Labour Plan
- The company's ultimate objective is to be a local supplier of choice to enable local beneficiation. Currently, Arcellor Mittal imports over 95% of its coking coal requirements. CoAL's coking coal assets, which will produce a "premium" coking coal, will minimise exports, and drive local supply.
- The huge potential of the resource rich Soutpansberg has been recognised within the Strategic Investment Priority (SIP) 1, which will focus on the "unlocking the northern mineral belt", of which CoAL is a key role player in respect of coal, both coking and thermal.
- There is a need to conduct an overarching strategic assessment of the combined infrastructural requirements of the current and future projects, in order to develop a long term strategy for the region.

Key deliverables to unlock intrinsic value



- Makhado regulatory approval (NOMR and IWUL)
- Disposal of Mooiplaats, turnaround strategy completed

- Makhado financial close which indicates fully funded project
- Vele off take agreements finalised
- Vele plant modification commences
- Vele plant modification complete
- Sale of Vele BEE component completed

- Vele steady state production achieved

- Makhado Construction to Commercial Production

DEFINED PATH FOR FUTURE VALUE CREATION

6.5: WATER QUALITY

METHODOLOGY

- **Literature overview of each catchment to identify potential and future pollution sources**
- **Identify 'hotspots' within WMA**
- **Determine level of risk at each hotspot**
  - Identify water quality problem determinant
  - Obtain water quality information (DWS National programs and municipalities)
  - Determine trends with regards to problem determinant
- **Categorise hotspots based on level of risk**
- **Outline mitigating factors to reduce risk**

MATLABAS CATCHMENT

- Dry catchment
- No significant dams
- Low growth potentials

Pollution source	Associated determinant	Water quality problem
Agricultural activities	Pesticides, nitrate, phosphate, ammonia, E.Coli, Suspended Solids (SS)	• Eutrophication (algal blooms, Microcystin, low oxygen levels) • Poor micro quality: danger to human health • Increased turbidity due to erosion

MOKOLO CATCHMENT

- **Economic importance :**
  - Matimba and Medupi power station,
  - Grootegeluk Coal mine
  - Game farms
  - Farming
- **Area of future growth**
  - Increase in demand: transfer scheme from Crocodile West
  - Informal settlements

Pollution source	Associated determinant	Water quality problem
Coal Mine	Heavy metals, sulphates, pH	• Occurrence of acid mine drainage in surface and groundwater
Power stations	Hardness, turbidity, temperature, Suspended Solids (SS)	• Decrease in biodiversity • Increase hardness of water
Informal settlements	Chemical Oxygen Demand (COD), Nitrate, phosphate, ammonia, E.Coli	• Danger of nitrate poisoning ; Blue baby syndrome • Danger to human health

LEPHALALA CATCHMENT

- Wilderness area
- High ecological importance (high number of **red data** species)
- Agricultural activities: cattle, game and agriculture
- Game lodges and hotels – potential to increase in future

Pollution source	Associated determinant	Water quality problem
Agricultural activities	Pesticides, nitrate, phosphate, ammonia, E.Coli, Suspended Solids (SS)	• Eutrophication (algal blooms, microcystin, low oxygen levels) • Poor micro quality: danger to human health • Increased turbidity due to erosion
Hotels and lodges	Chemical Oxygen Demand (COD), nitrate, phosphate, ammonia, E.Coli	• Danger of nitrate poisoning ; Blue baby syndrome • Danger to human health

MOGALAKWENA CATCHMENT

- 18 mines is surrounding area
- Large potential for growth
- Insufficient supply to meet current needs
- Densely populated with informal settlements supplied mainly by groundwater
- Increased Fluorides and other minerals in groundwater

Pollution source	Associated determinant	Water quality problem
Informal settlements	Chemical Oxygen Demand (COD), Nitrate, phosphate, ammonia, E.Coli	• Danger of nitrate poisoning ; Blue baby syndrome • Danger to human health
Geology of area	Flouride, calcium, sodium, magnesium,	• Negative impact on health • Affects aesthetic quality of water

SAND CATCHMENT

- **Increased growth and development in Polokwane and Louis Trichardt areas**
- **Dry area reliant on groundwater and transfer schemes**
- **Mining in area:**
  - Silicone Mine - Polokwane
  - Diamond mine - Musina
  - Platinum smelter - Polokwane
- **Groundwater artificially recharged with relevant treated effluent from Polokwane**
- **Uncontrolled use of fertiliser in some areas.**

SAND CATCHMENT

Pollution source	Associated determinant	Water quality problem
Agricultural activities	Pesticides, nitrate, phosphate, ammonia, E.Coli, Suspended Solids (SS)	• Eutrophication (algal blooms, microcystin, low oxygen levels) • Poor micro quality: danger to human health • Increased turbidity due to erosion
Mining	Heavy metals, sulphates, pH	• Acid mine drainage in surface and groundwater: danger to environment and human health
WWTW	Chemical Oxygen Demand (COD), Nitrate, phosphate, ammonia, E.Coli	• Danger of nitrate poisoning ; Blue baby syndrome • Danger to human health • Negative impact on ecosystem

NZHELELE CATCHMENT

- **Supplied by regional schemes and groundwater supply**
- **Large scale irrigation which is affecting supply**
- **High coal mining potential but insufficient supply at present to support this**

Pollution source	Associated determinant	Water quality problem
Agricultural activities	Pesticides, nitrate, phosphate, ammonia, E.Coli, Suspended Solids (SS)	• Eutrophication (algal blooms, Microcystin, low oxygen levels) • Poor micro quality: danger to human health • Increased turbidity due to erosion

6.6: OPPORTUNITIES FOR WATER REUSE

INTRODUCTION

- **Task: To identify opportunities for the reuse of treated sewage and industrial effluent within the study area, focusing on the current impact of this source on the receiving environment**
- **Reuse:** Any water that has been adversely affected in quality by anthropogenic activities can be reused for various purposes
- Focus of this exercise is reuse of wastewater effluent as possible source
  - Quantity of wastewater available?
  - Quality of wastewater?
  - Impact on receiving environment?
  - Cost implications of reuse?

METHODOLOGY

- **Task: Overview of quantity and quality of wastewater in WMA.**
- **Source: Green drop PAT 2012**
- **Assumptions:**
  - If no information on operational capacity: use design capacity
  - If no information on design capacity: assume 2Ml/day as mostly rural systems

MICRO SIZE <0.5 Mℓ/day	SMALL SIZE 0.5-2 Mℓ/day	MEDIUM SIZE 2-10 Mℓ/day	LARGE SIZE 10-25 Mℓ/day	MACRO SIZE >25 Mℓ/day
5	17	25	1	1

*GD PAT 2012

QUANTITY

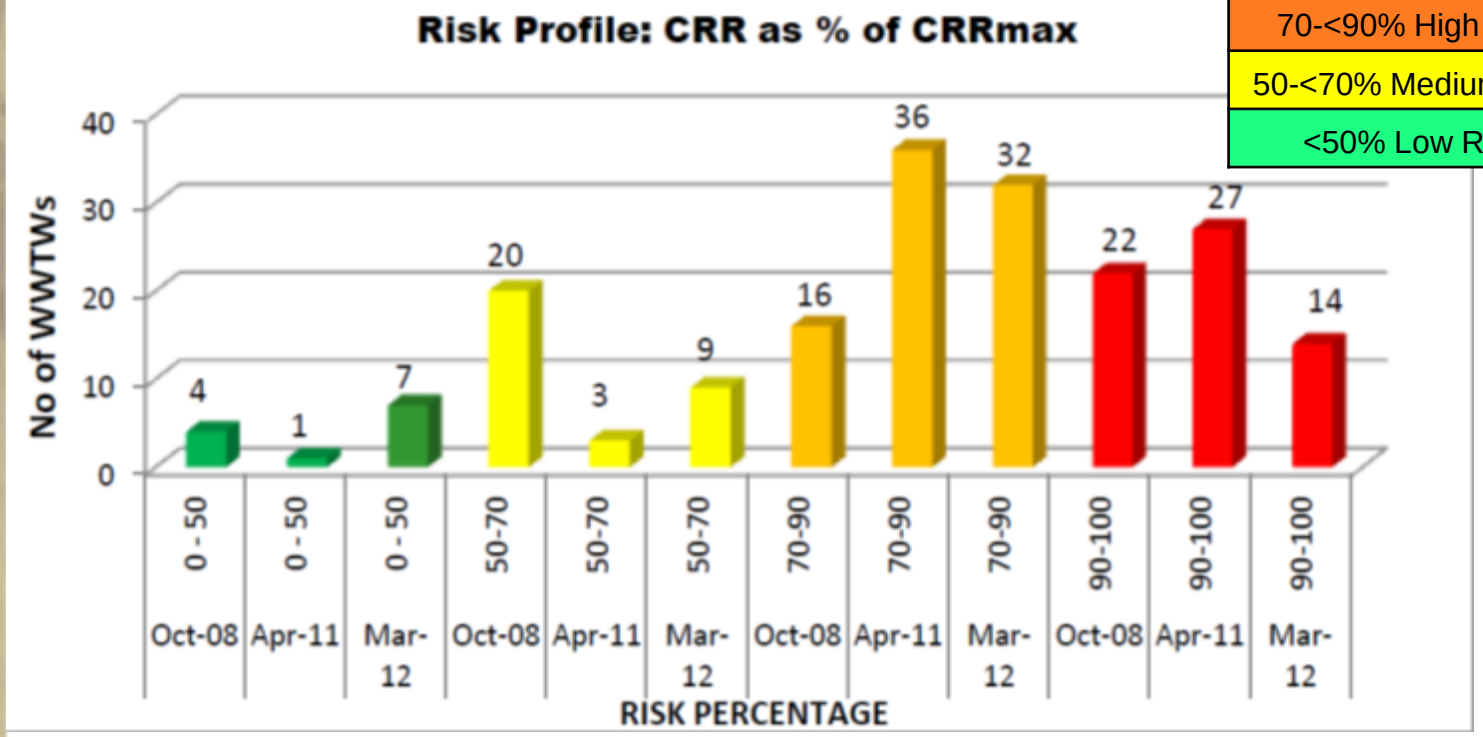
Description	Number of plants	Volume (ML/day)	Volume (Million m3/a)
Total for Limpopo Province	62	165.2	60.23
Total for systems within study area	24	94.2	34
WTWW: less pond systems	13	77.1	28.1

- **Way forward**
  - Update quantity as per 2013 Green drop reports issued to municipalities
  - Verify design and operational capacity
  - Verify location of discharge

QUALITY

CUMULATIVE RISK RATION (CRR) = DESIGN CAPACITY X CAPACITY EXCEEDANCE + EFFLUENT COMPLIANCE + TECHNICAL SKILLS

90-100% Critical Risk WWTW
70-<90% High Risk WWTW
50-<70% Medium Risk WWTW
<50% Low Risk WWTW



- **<u>Average CRR in study area = 70.7%</u>**

WAY FORWARD ON WATER QUALITY AND REUSE

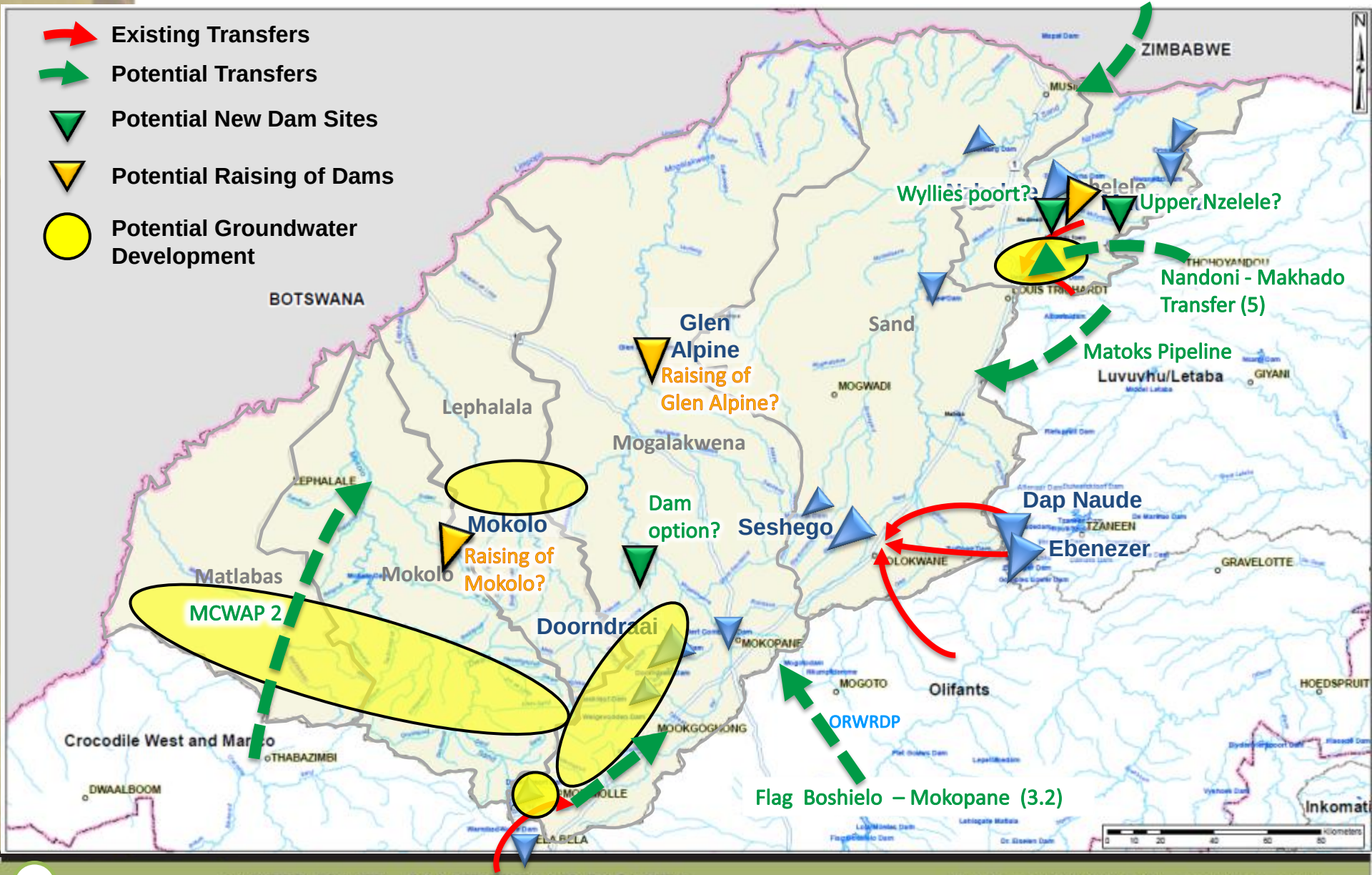
- **Only 6 out of the 13 WWTW have monitoring information**
- **Only 1 out the 6 WWTW have compliance >80%**
- **Percentage compliance is directly related to cost of treatment**
- **Way forward**
  - Update quality as per 2013 Green drop reports issued to municipalities
  - Use status reports
  - Calculate associated cost based on current effluent quality

6.7: PRELIMINARY INTERVENTIONS

PRELIMINARY INTERVENTIONS

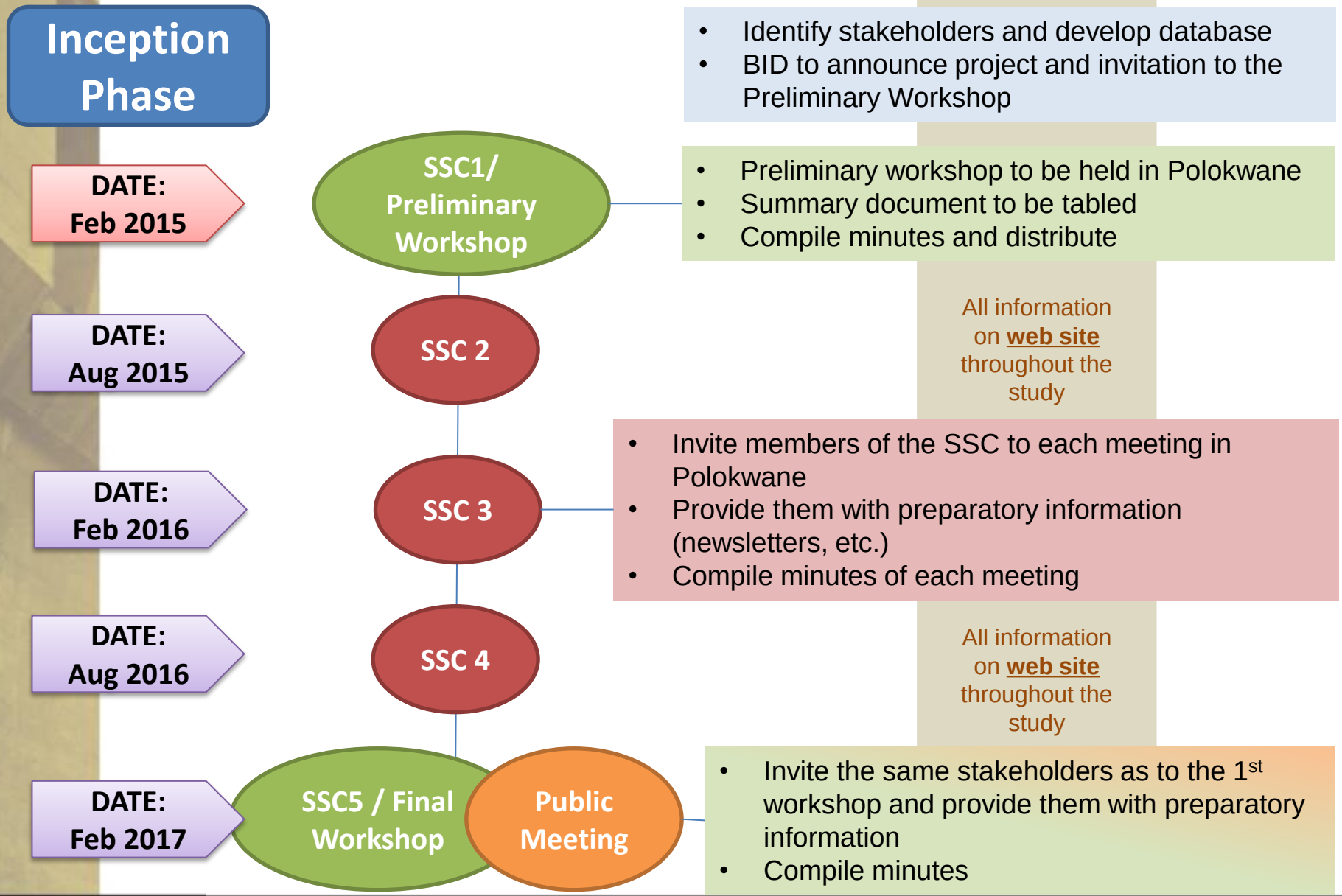
- **Management interventions:**
  - Water Conservation and Water Demand Management (WCWDM)
  - Improve management of groundwater
  - Utilise full Limpopo River allocation
  - Reallocation of water
  - Eradicate alien vegetation
  - Water quality interventions
- **Infrastructure developments:**
  - Further development of groundwater
  - Raising of existing dams (e.g. Glen Alpine Dam, Mutshedzi Dam)
  - Transfer of water
  - Desalination
  - Development of new dams
  - Rainwater harvesting (Rooftops)

POSSIBLE DEVELOPMENT INTERVENTIONS



6.8: STAKEHOLDER ENGAGEMENT

STAKEHOLDER ENGAGEMENT



STAKEHOLDER ENGAGEMENT

A key ingredient in formulating coherent recommendations and action plans is stakeholder involvement. This allows for information sharing from prevailing water resource planning and management processes with the aim of ensuring alignment in thinking and practice.

Deliverables:

- Background Information Document
- A stakeholder database
- Dry-run meetings in preparation of the SSC and public meetings
- Invitation, agenda, attendance register, minutes of SSC meetings and for the public meeting
- Two editions of a newsletter
- Inputs to the DWS website

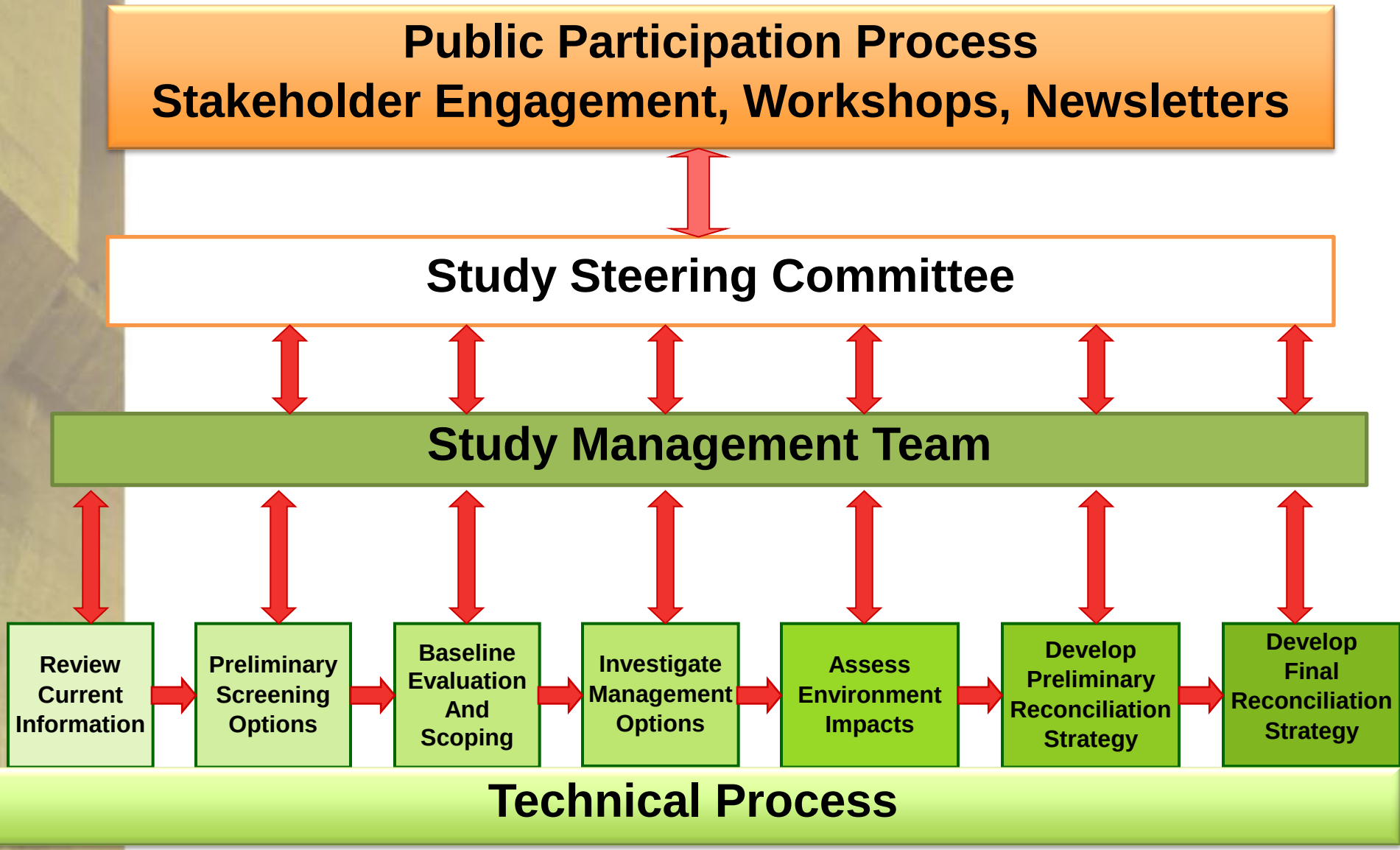
Our Strategy

ITEM 7: Function of the Study Steering Committee

PURPOSE OF THIS SSC MEETING

- To establish the SSC
- To provide overview of approach and tasks to develop the Reconciliation Strategy for the Limpopo Water Management Area (WMA) North
- To strengthen partnership between DWS and key stakeholders

ORGANISATIONAL ARRANGEMENTS

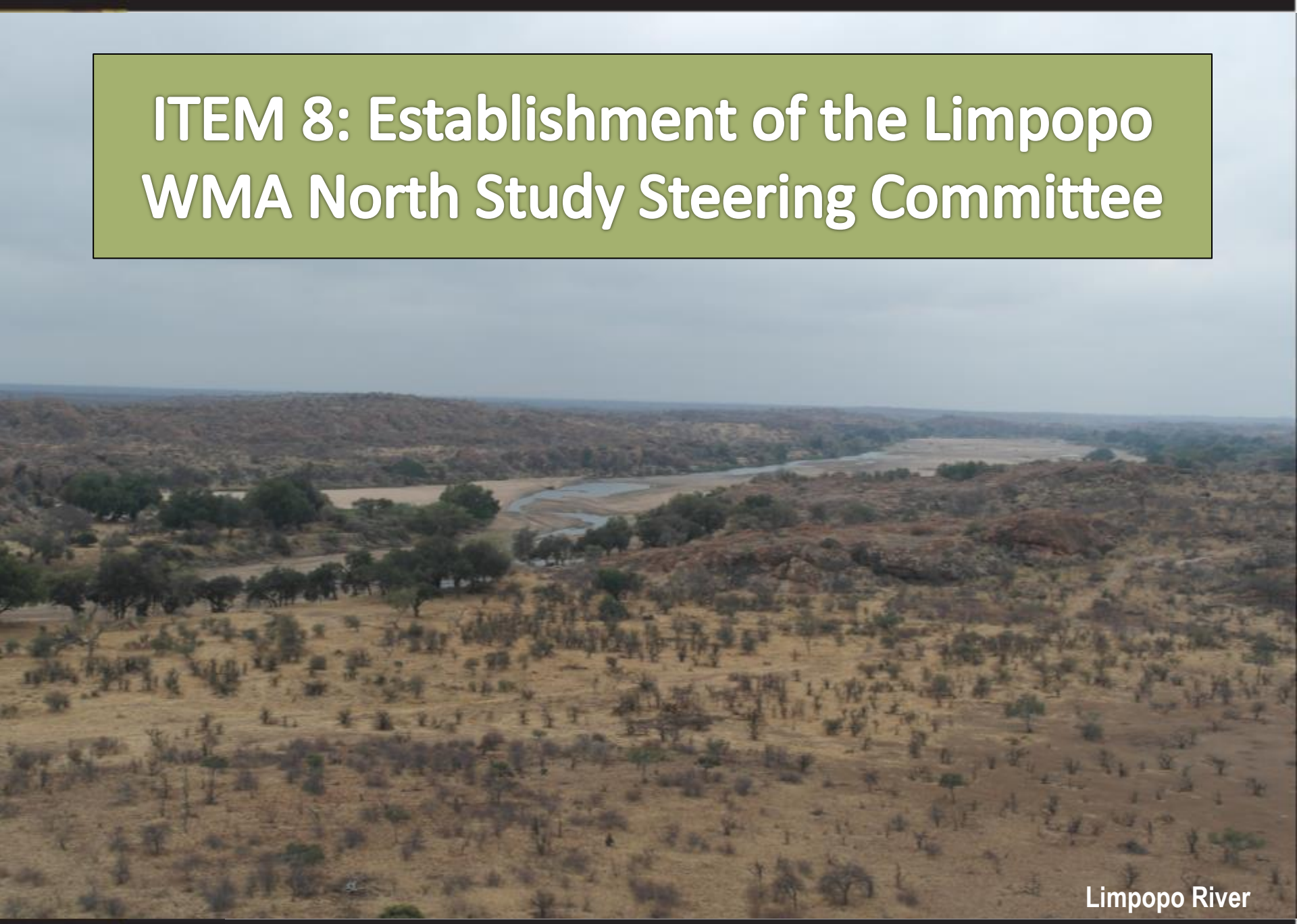


ROLES AND RESPONSIBILITIES OF SSC

- Provide executive support and guidance to the direction and outcomes of Strategy
- Share information and data or facilitate the sharing of data
- Facilitate strategic linkages with other stakeholders
- Studying of status reports and giving comments on findings
- Providing strategic advice to ensure that the national perspectives on water management are maintained
- Acting as advocates for the Strategy
- Provide feedback to their organisations

Refer to Draft Terms of Reference

ITEM 8: Establishment of the Limpopo WMA North Study Steering Committee



Limpopo River

PROPOSED MEMBER SELECTION LIST

- National and Provincial Government
- Agriculture / Conservation / Commissions
- Non-Governmental Organisations (NGOs)
- Mines/ Industry
- Water User Associations (WUAs)
- Municipalities
  - District Municipalities
  - Local Municipalities
- Academic institutions

Refer to Proposed membership selection list

ITEM 9: General

ITEM 10: Way forward

WAY FORWARD

- Compile proceedings and consider comments from the meeting
- Finalise SSC membership
- Workshops/meetings with specific stakeholders to discuss specific technical matters, if required
- Continuation of the study

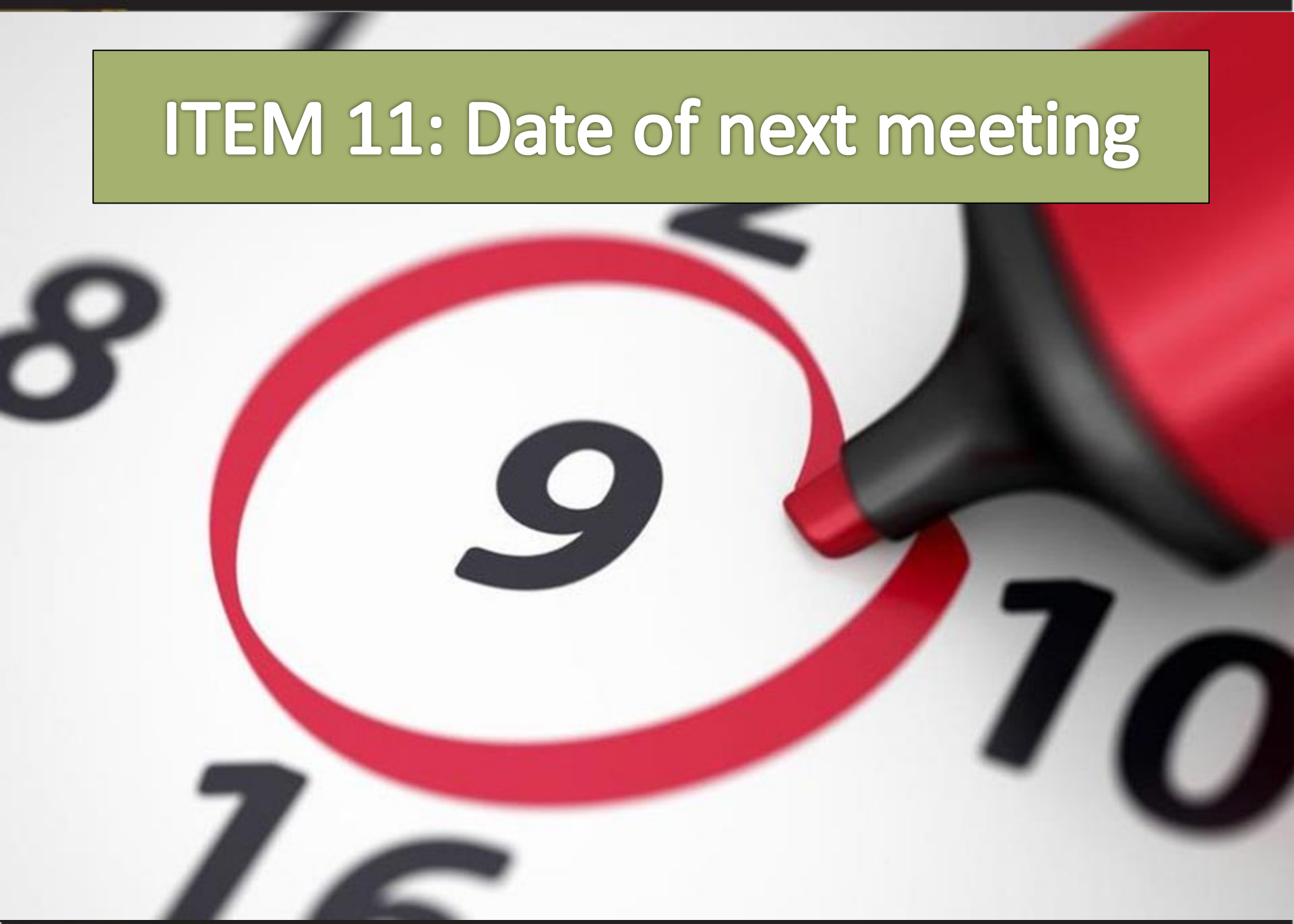
COMMUNICATION

- **DWS project website:**

  https://www.dwa.gov.za/projects.aspx (under construction)

- **Background Information Document (BID)**
  - To be distributed to SSC members
  - Refer to attached document
- **Newsletters**
  - Two editions of the ***Limpopo WMA North Reconciliation Strategy News***

ITEM 11: Date of next meeting



DATE OF NEXT MEETING

- **SSC NO. 2: 18 AUGUST 2015, LEPHALALE**
  - Meetings every 6 months

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Thank you