

Development of a Reconciliation Strategy for the Luvuvhu and Letaba Water Supply System

Background Information Document (No. 4):

Preliminary Reconciliation Strategy for the Letaba River System- November 2013



water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

PURPOSE OF THIS DOCUMENT

This background information document (BID) presents progress made in the study initiated by the Department of Water Affairs (DWA), to develop a Reconciliation Strategy for the Luvuvhu and Letaba Water Supply System.

A reconciliation strategy identifies, prioritises and confirms the interventions required to reconcile the water requirements with the available water resources in a catchment or water system for current and future development scenarios.

Stakeholders are encouraged to participate and communicate their views to the Department on this process by attending Study Steering Committee meetings, corresponding with the public participation office or the technical team at the contact details provided below.

DWA Manager

Tendani Nditwani
Tel: 012 336 8358
Email: NditwaniT@dwa.gov.za

Technical enquiries

Pieter van Rooyen
WRP Consulting Engineers (Pty) Ltd
Tel: 012 346 3496
Email: pieter@wrp.co.za

Public participation office

Anelle Lotter / Nicolene Venter
Zitholele Consulting (Pty) Ltd
P O Box 6002
Halfway House, 1685
Tel: 011 207 2077
Fax: 086 676 9950
Email: nicolenev@zitholele.co.za
www.dwa.gov.za/projects

STUDY PROGRESS

Progress has been made with delivering on the main objective of this study which is to develop a reconciliation strategy for the bulk water resources of the Luvuvhu and Letaba Water Supply System. A preliminary reconciliation strategy has been prepared for the Letaba River System for discussion at the fourth Study Steering Committee (SSC) meeting to be held on Thursday, 21 November 2013 in Tzaneen. The reconciliation strategy for the Luvuvhu River System will be documented and distributed to the SSC members prior to the fifth SSC meeting – scheduled for May 2014.

The Letaba River System preliminary reconciliation strategy is based on the assessment of the current and projected water balances for the planning horizon up to the year 2040. This considers future growth scenarios of water use mainly in the urban sector, improved assurance of supply in the irrigation sector in the Letaba System as well as what additional water can be made available from the options identified and screened during the second SSC meeting held in April 2013.

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.

After the November SSC meeting, work will continue to assess relevant alternative options for comparison and ranking on economic basis. Comments received from the SSC and any new information that may influence the water balance will be incorporated in a draft reconciliation strategy scheduled for May 2014. The final strategy is programmed for completion by October 2014 as the main deliverable of the study.

HOW MUCH WATER IS NEEDED?

To determine how much water is needed, information was gathered on the water requirements of the different sectors and the water use Validation Study served as the primary source of historical water use data. **Figure 1** depicts the core study area for which the current water use and future requirements were determined.

Tables 1 summarises the water requirement for the Letaba River System for the user sectors, listing the 2012 water use as well as estimates for the indicated scenarios for the year 2040.

Table 1: Total High and Low growth water requirements (values in million m³/annum)

Letaba River System			
Sector	Requirement in 2012	Future requirement (2040)	
		High growth	Low growth
Irrigation	132.6	132.6	132.6
Urban ⁽¹⁾	72.0	131.8	105.2
Mining/Industrial	4.1	4.1	4.1
TOTAL	208.7	268.4	241.9

⁽¹⁾Detailed information on the water requirement scenarios will be presented at SSC meeting.

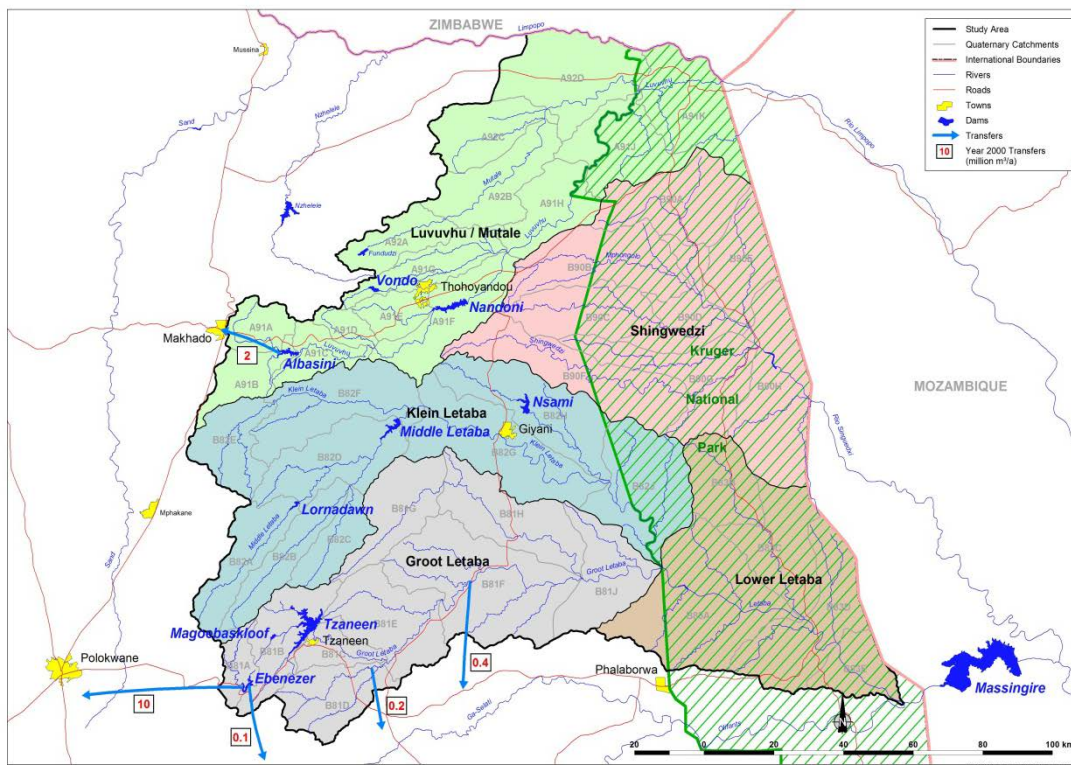


Figure 1: Luvuvhu and Letaba Water Supply System (Study Area)

THE RESERVE

The Reserve is that portion of the natural flow that has to be available in a river or stream in order to sustain the aquatic ecology, and also to provide for basic human needs.

The work carried out in the Letaba Classification Study consolidated the Ecological Water Requirement (EWR) scenarios for application in the water balances assessment of this study.

EWR scenarios were formulated to reflect the implication on the available yield as shown later in the document and further details will be presented at SSC meeting.

SURFACE AND GROUNDWATER

The surface water hydrology, also accounting for groundwater-surface water interaction, was updated for the Study Area. Yield analyses were undertaken based on the revised hydrology for all major dams and relevant sub-systems. **Table 2** provides a summary of the yield results for the existing infrastructure, indicating the high assurance yield (Historical Firm Yield) and total yield including the low assurance portion. A confidence rating of the yield results reflects the “accuracy” level of the yield estimates.

Groundwater use and availability were assessed and although there are areas where the use exceeds the exploitable groundwater potential, there remain areas where further groundwater abstractions are possible.

Table 2: Letaba River System yield results

System / dam	Yields for different assurances (million m ³ /annum)			Confidence Rating of yield estimates
	High (Hist. Firm Yield)	Total (High and Low)	Groundwater	
Dap Naude	3.1	-	-	Medium
Ebenezer	32.0	38.0	-	High
Hans Merensky	3.4	4.3	-	Medium
Magoebaskloof / Vergelegen	7.2	15.1	-	Medium
Tzaneen	43.0	81.7	1.0	High
Thabina	1.0	-	2.3	Low
Modjadji	0.4	-	-	Low
Thapane	0.1	-	0.3	Low
MiddelLetaba	21.0	-	3.3	High
Nsami	0.2	-		Medium

Note: Groundwater yield reflects the current domestic use in the supply areas.

The yield analysis methodology applied to determine the yield results given in **Table 2** will be presented at the SSC meeting.

POSSIBLE INTERVENTION OPTIONS

At the Screening Workshop held in April 2012, intervention options were identified for consideration in the study as measures to reconcile the water requirement and availability. These consisted of options to reduce the water requirements as well as those that increase the water supply.

The identified options are listed below for the indicated catchment areas:

Groot Letaba Catchment Options:

- Water Conservation & Water Demand Management.
- Raising of Tzaneen Dam.
- Construction of Nwamitwa Dam.
- Bulk Water Supply Infrastructure to distribute water from Nwamitwa Dam.
- Artificial recharge at Mulele on the Molototsi River.
- Groundwater regional scheme in conjunction with surface scheme.

Note: Further details on the Groot Letaba Water Development Project are provided in the following section.

Middel and Klein Letaba Catchment Options:

- Water Conservation & Water Demand Management.
- Development of groundwater resource.
- Replacement of Middel Letaba canal with pipeline – reduce canal losses.
- Transfer Scheme from Nandoni Dam.
- Construction of new dam on Klein Letaba River:
 - Majosi Dam, or
 - Crystalfontein Dam

These options were applied in the projected water balances to determine if reconciliation is possible for the period up to 2040.

by implementing the recently signed-off preliminary Reserve determined in compliance with the National Water Act.

- To minimize further lowering of the assurance of availability of water supplies to the irrigation sector for the existing development. This sector is the major contributor to the economy of the region and worsening shortages will have serious negative socio-economic consequences through job losses and increased poverty.
- To make water available for the establishment of resource-poor farmers in the irrigated agriculture sector. About 2 000 ha is available for accommodating new resource poor farmers as commercial irrigation farmers. These new irrigators can receive reliable water allocations from the increasingly stressed water resource system once a dam is in place at Nwamitwa. In this way a positive contribution can be made to agrarian reform as well as to the economic transformation of rural communities.

The GLeWaP consists of the following infrastructure components:

- The raising of the existing Tzaneen Dam by 3m to improve the assurance of supply;
- A new major storage dam on the Groot Letaba River just downstream of the Nwanedzi River confluence, at the site known as Nwamitwa on Janetsi Farm 463LT (Nwamitwa Dam). The proposed Nwamitwa Dam, developed to a level of 479.5 m above mean sea level will increase the high assurance yield; and
- Development of bulk potable water supply infrastructure mainly to serve rural communities without adequate water supplies.

It is envisaged that first water will be stored in Nwamitwa Dam by 2019.

Groot Letaba Water Development Project

The Minister approved implementation of the Groot Letaba Water Development Project (GLeWaP) and a Notice in accordance with Section 110 of the NWA declaring the Minister's intent to implement the GLeWaP was gazetted on 21 December 2012. The GLeWaP is a major initiative by the Department of Water Affairs (DWA) in support of the social and economic development strategy for the Limpopo Province. The purpose of the project is:

- To meet the projected growing primary water requirements to a 20 year planning horizon at an acceptable assurance of supply in parts of the Mopani District Municipality, and specifically the Greater Tzaneen and Greater Letaba Local Municipalities. Additional water for domestic and industrial use will support economic growth in the region, maintaining existing employment opportunities, contributing to the eradication of poverty and, in so doing, improving the quality of life for all.
- To prevent further degradation of the riverine ecosystem

RECONCILING WATER REQUIREMENTS WITH WATER RESOURCES

Annual water balance diagrams were prepared for all the systems listed in **Table 2**, using the indicated yields and projected water requirements for the respective areas.

The implication of additional licence applications on the water balances of Ebenezer Dam as well as the Magoebaskloof / Vergelegen system were also assessed and will be presented at the SSC meeting.

Figure 2 show the water balance and reconciliation scenario for the **Groot Letaba River System** (Tzaneen Dam and downstream supply areas), containing the following elements:

- Total yield (high and low assurance) of 81.7 million m³/annum, reflecting an average assurance of supply of about 60% to the irrigators.
- Implementation of Water Conservation and Demand Management in the urban sector (dashed red line).
- Raising of Tzaneen Dam, main purpose is to improve the

assurance of supply.

- Once Nwamitwa Dam is implemented (see yellow area), water is supplied to the areas currently receiving water from Modjadi and Thapane dams.
- The excess water in Ebenezer Dam is made available to support users receiving water from Tzaneen Dam.
- Water from existing and additional groundwater resources for target areas was added as yield.
- Implemented the low flow Ecological Water Requirements

for the scenario defined as the Present Ecological State.

The above indicated interventions can supply the target water requirement scenario (High growth with WC/WDM) up to the year 2035

This date is brought earlier to 2028 if all the deficits on the Modjadi and Thabina dams are supplemented from the Groot Letaba System. Details will be provided at the SSC meeting.

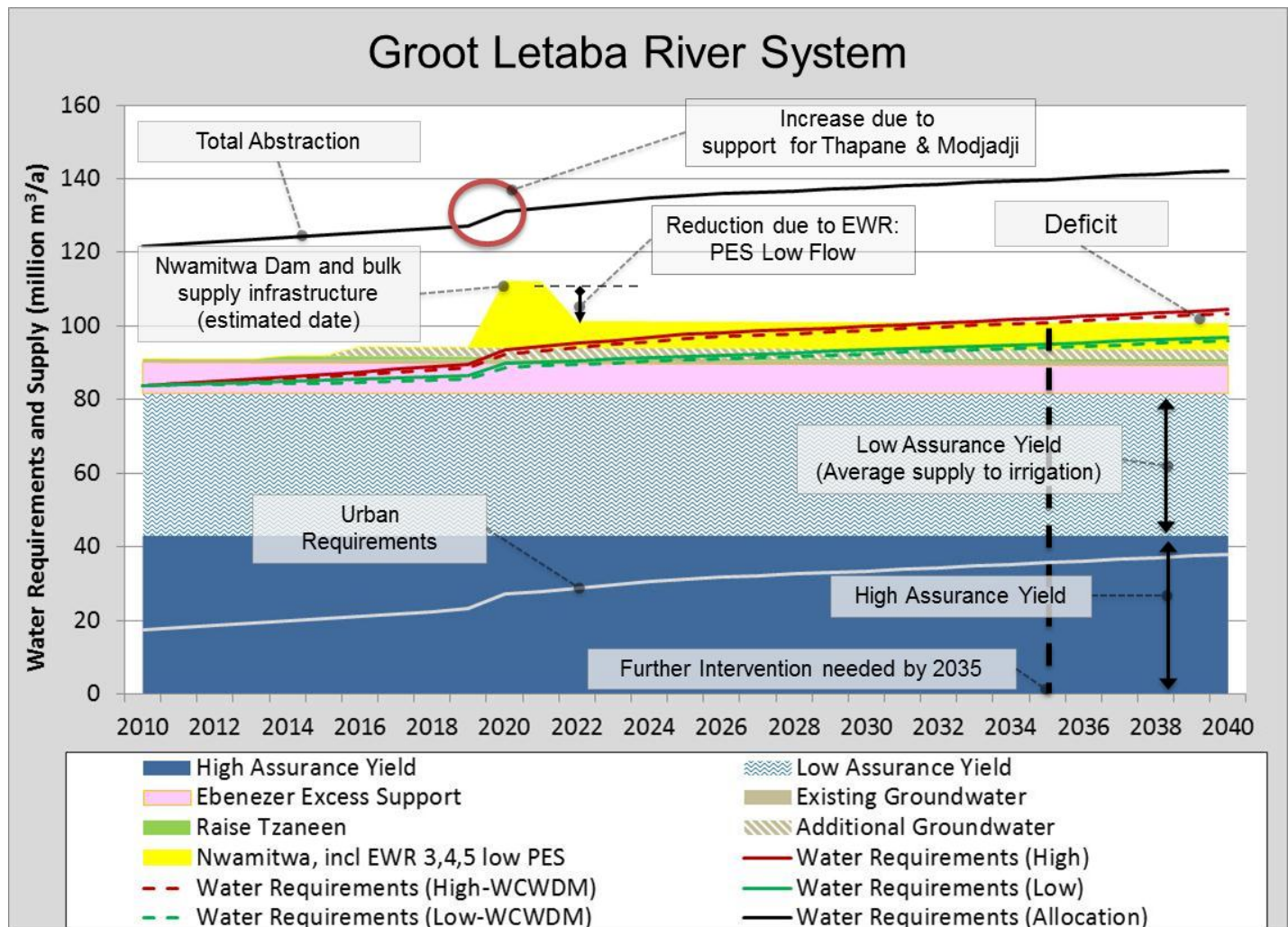


Figure 2: Groot Letaba River System water balance and reconciliation scenario

Figure 3 shows the water balance for the Middel Letaba and Nsami dams, indicating the following elements:

- Yield of both dams as well as the existing groundwater resources.
- Implementation of Water Conservation and Demand Management in the urban sector (dashed red line).
- Transfer from Nandoni Dam, indicated by the orange augmentation option.

- Replacement of the canal transferring water from Middel Letaba Dam to the waterworks at Nsami Dam with a pipeline. This result in a reduction in losses, reflected by the drop in the red dashed line in 2015.
- Implementation of a dam on the Klein Letaba River (Crystalfontein Dam) by 2019.

By implementing all these interventions, sufficient water can be made available to supply the high water requirement scenario until 2028.

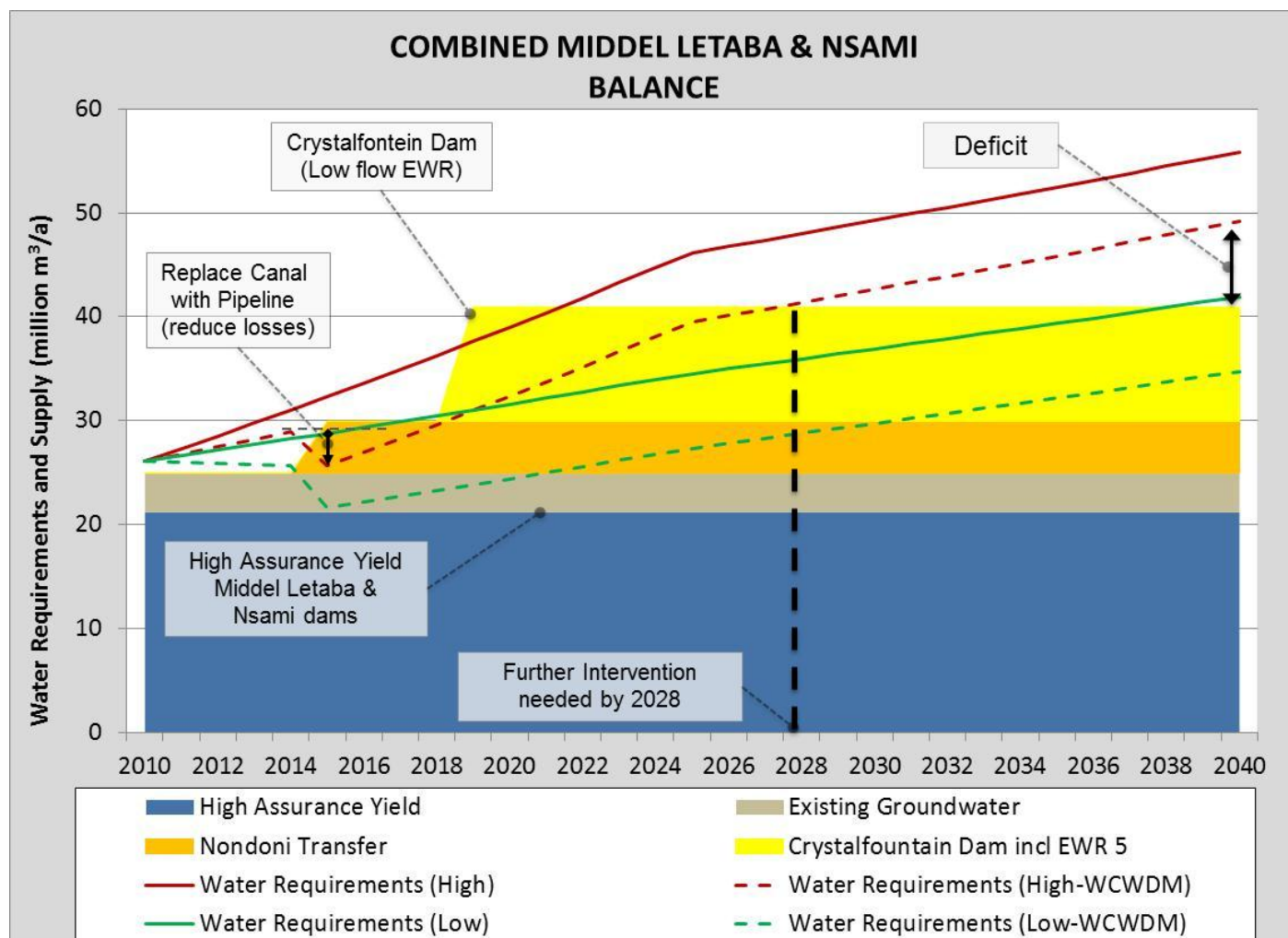


Figure 3: Water balance projection and reconciliation scenario for Middel Letaba and Nsami dams system

PRELIMINARY RECONCILIATION STRATEGY AND RECOMENDATIONS

The above presented water balances points to the following reconciliation strategy:

- Excess water from Ebenezer Dam should be allocated to users in the Groot Letaba System (Tzaneen Dam). Polokwane should therefore be augmented further from the Olifants River System and not from Ebenezer Dam.
- Additional monitoring of flows and dam balances are required to improve the confidence in the yield estimates of Thabina, Modjadji, and Thapane dams.
- Groundwater is an important resource and in some areas the current level of use exceeds the availability. High level catchment wide groundwater assessments indicate additional groundwater abstraction is possible – as reflected on the water balances.
- Augmentation is required from the Groot Letaba System to the supply areas currently receiving water from, Thapane, Thabina and Modjadji dams.
- The water use needs to be monitored to confirm which water requirement scenario (projection) should be applied over the long term.

Details of all the interventions applicable to each dam / system will be presented at the SSC meeting.

The following further work will be carried out as part of the study towards finalising the reconciliation strategy:

- Incorporate comments from the SSC on the water balances and preliminary reconciliation strategy.
- Consider further information from the water use validation and verification study as an estimate of possible unlawful water use when it is available.
- Undertake system yield risk analysis (stochastic analysis) and refine balances accordingly.
- Determine the Unit Reference Values of the development options as a measure to compare their relevant economic efficiency.
- Develop the Reconciliation Strategy for Luvuvhu River System.
- Coordinate scenario analysis and results with the Classification process and study.

The DWA recognises the importance of stakeholder contributions as a key requirement to develop the Reconciliation Strategy. Your attendance at the fourth SSC meeting will assist with evaluating the preliminary reconciliation strategy as you will be contributing information relevant to the prevailing conditions in the study area. The preliminary reconciliation strategy report will be made available to stakeholder early in 2014. Your comments on the report will be appreciated and will assist in the compilation of the draft reconciliation strategy report. The draft reconciliation strategy will be presented in May 2014 from where the final strategy will be prepared and presented in October 2014.