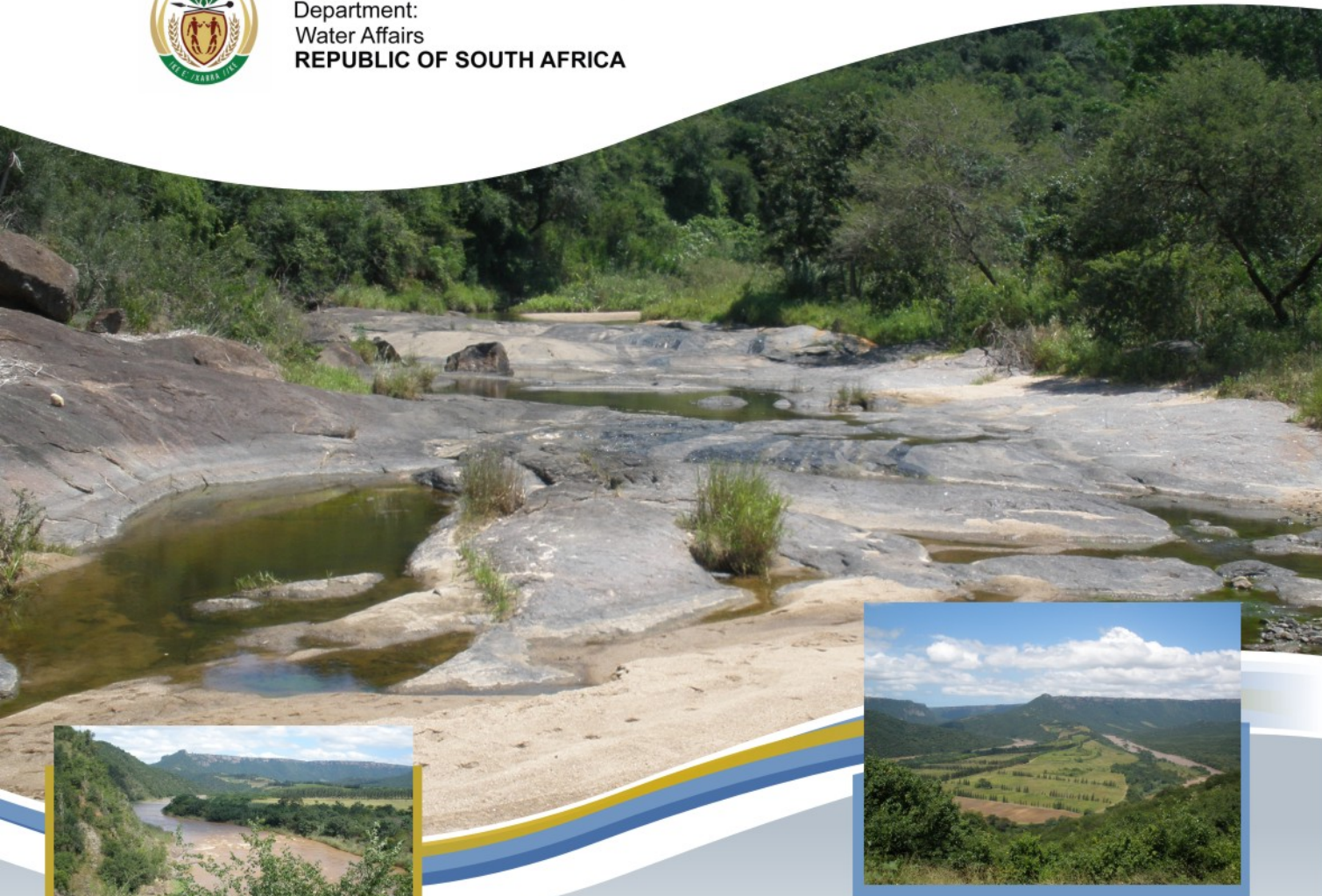




water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA



REPORT NO: P WMA 11/T52/00/331/8

Ncwabeni Off-Channel Storage Dam Feasibility Study: Module 1: Technical Study

SUMMARY REPORT

JULY 2012

NCWABENI OFF-CHANNEL STORAGE DAM FEASIBILITY STUDY: MODULE 1: TECHNICAL STUDY

Summary Report

July 2012

FINAL

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Report Details Page

Project name: Ncwabeni Off-Channel Storage Dam Feasibility Study: Module 1:
Technical Study

Report Title: Summary Report

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PSP project reference no.: J01494

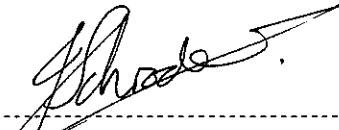
Status of report: Final

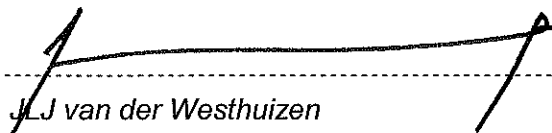
First issue: June 2012

Final issue: 31 July 2012

Consultants: BKS (Pty) Ltd.

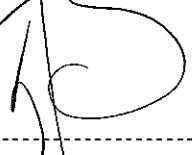
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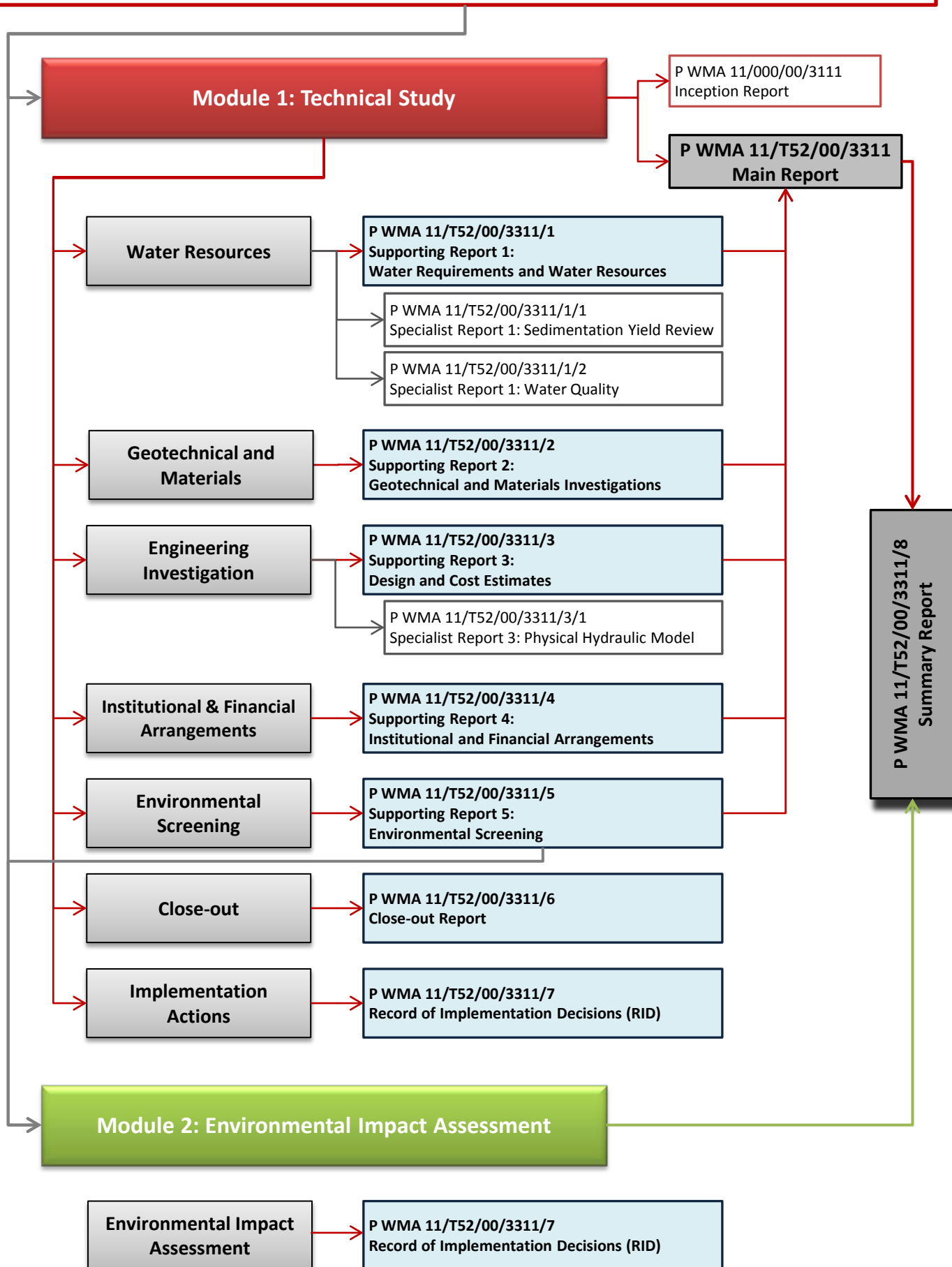
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Ncwabeni Off-Channel Storage Dam Feasibility Study - List of Study Reports



Background to the Project

The Umzimkhulu Regional Water Supply Scheme (RWSS) supplies water to the coastal region from Hiberdeen to Margate, including Port Shepstone. The water is presently sourced from non-regulated river flows in the Umzimkhulu River. Abstraction is at the St. Helen's Rock works near Port Shepstone and the water is treated at the Umzimkhulu/Bhobhoyi treatment plant from where it is distributed to various users.

Water resources planning studies over the past 10 years have concluded that during dry periods, the river flow is insufficient to meet water requirements, even without provision for the ecological Reserve. This was confirmed recently when there was salt water from the estuary and was pumped at the abstraction works due to insufficient flow in the river.

Previous studies recommended that, in order to provide for the water supply to all user sectors, including the Reserve, the construction of an off-channel storage (OCS) dam in one of the tributaries to the Umzimkhulu River should be considered. The reservoir can be filled from its incremental catchment, supplemented by pumping from the Umzimkhulu River during times of high river flows. During times of low flows water can be released back into the Umzimkhulu River for abstraction downstream at the St. Helen's Rock abstraction works.

Subsequently the Ncwabeni Off-channel Storage Dam Feasibility Study was initiated to conduct a comprehensive investigation at the feasibility level for the proposed Ncwabeni Off-Channel Storage Dam, and the Gugamela site alternative. The study comprised of two modules, namely Module 1: the Technical study, and Module 2: the EIA. The location of the two dam sites together with the existing St Helen's Rock Abstraction is shown in **Figure 1**.

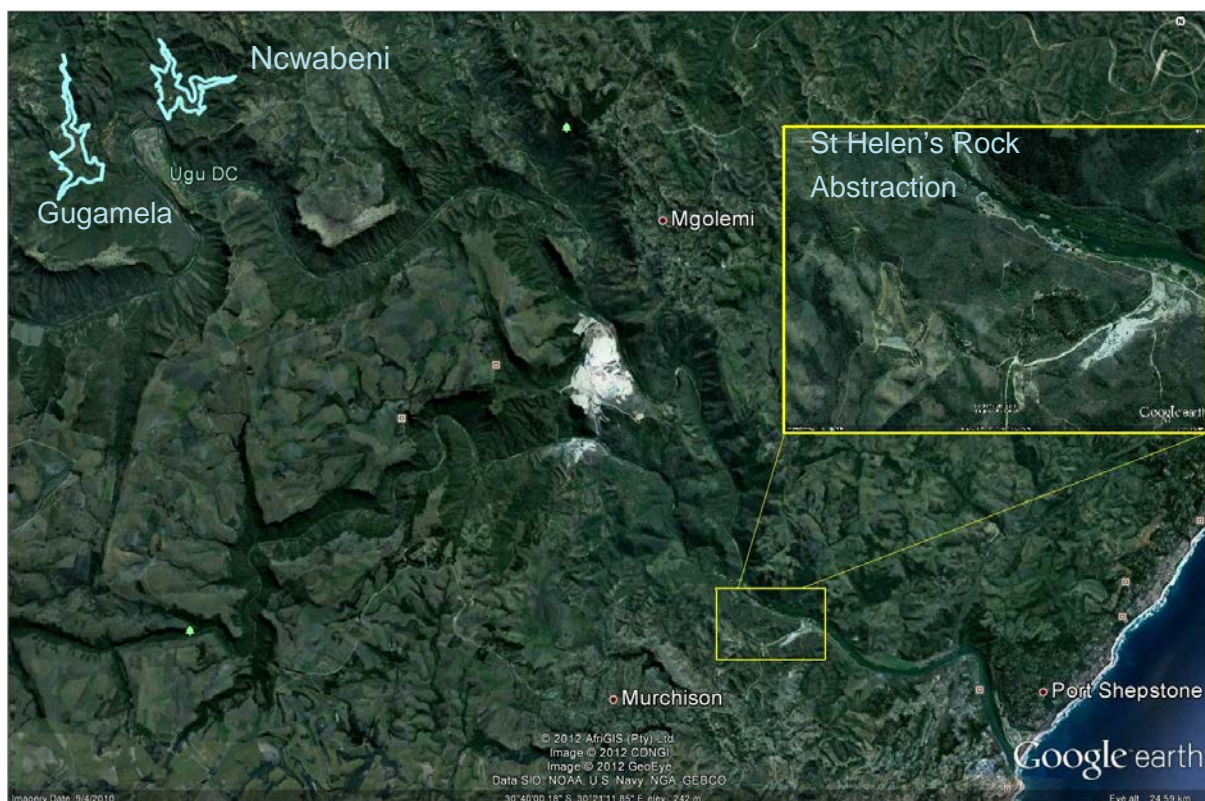


Figure 1: Location of the dam sites and the St Helen's Rock abstraction

Water Requirements

Current water requirements of the Umzimkhulu RWSS are in the order of 18.5 million m³/a. The supply area needs to be expanded to also include the rural areas around the dam site, as well as to augment water supply into the southern parts of the Mhlabatshane Scheme supply area. The Mhlabatshane scheme is currently being implemented by Umgeni Water, and is planned to supply the Phungashe/Mhlabatshane supply area in phases. By augmenting this supply with water from the proposed Ncwabeni OCS dam, the full desired level of water services can be achieved.

The total requirement to be supplied by the Ncwabeni Dam within the Umzimkhulu RWSS for the planning horizon date of 2040 is 30 million m³/a.

Approximately 50 % of the households that will be supplied by water are classified as poor will not be able to pay for water.

Water availability and yield of the dam

The current run-of-river yield of the Umzimkhulu River at St Helen's Rock is about 18.3 million m³/a. This is already below the current requirement without including the ecological reserve. The yield of the system including different sizes of off-channel storage dams, and different off-channel pumping rates was determined. The projected future water balance for the Umzimkhulu RWSS is shown in **Figure 2**. As can be seen, successful implementation of water conservation and water demand management (WC/WDM) measures is needed to reduce the short term deficit until the proposed Ncwabeni OCS Dam can deliver water.

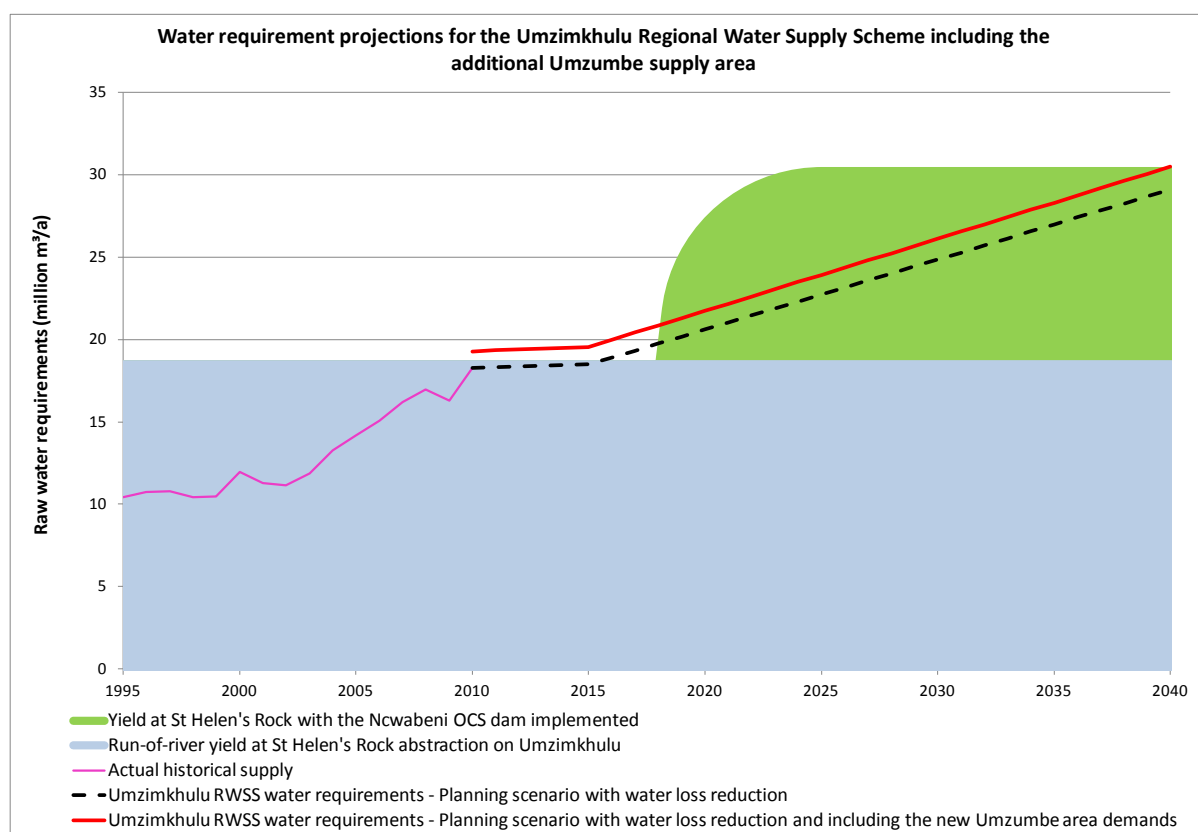


Figure 2: Projected water balance of the Umzimkhulu Regional Water Supply Scheme

To achieve a yield of 30 million m³/a or greater and meet future water requirements, a dam of 15.5 million m³ or larger is needed together with a pumping rate of 0.75 m³/s or more. Based on unit costs a dam with a capacity of 15.5 million m³ is cheaper than larger dam sizes, and can still meet the future water requirements in 2040, thereby achieving a supply period of close to 25 years.

Geological conditions and dam design

Based on a comprehensive geological and materials investigation the lowest cost and preferred dam type for the conditions on site is a concrete-faced rockfill dam. The materials will be sourced from a quarry within the reservoir basin. The dam wall for a 15.5 million m³ capacity dam is 47 m high. The dam will also include an outlet tower structure and side-channel spillway. These main components of the dam are summarised in **Table 1**. The layout of the proposed dam is shown in **Figure 3**, together with the position of the weir and abstraction works to pump water into the dam. The weir for off-channel pumping will also be used for gauging of flows in the Umzimkhulu River, which will drive operation decisions on pumping to, and releases of water from the dam. Final operating rules with specific volumes will be established once the reserve classification study has been completed and ecological flows set.

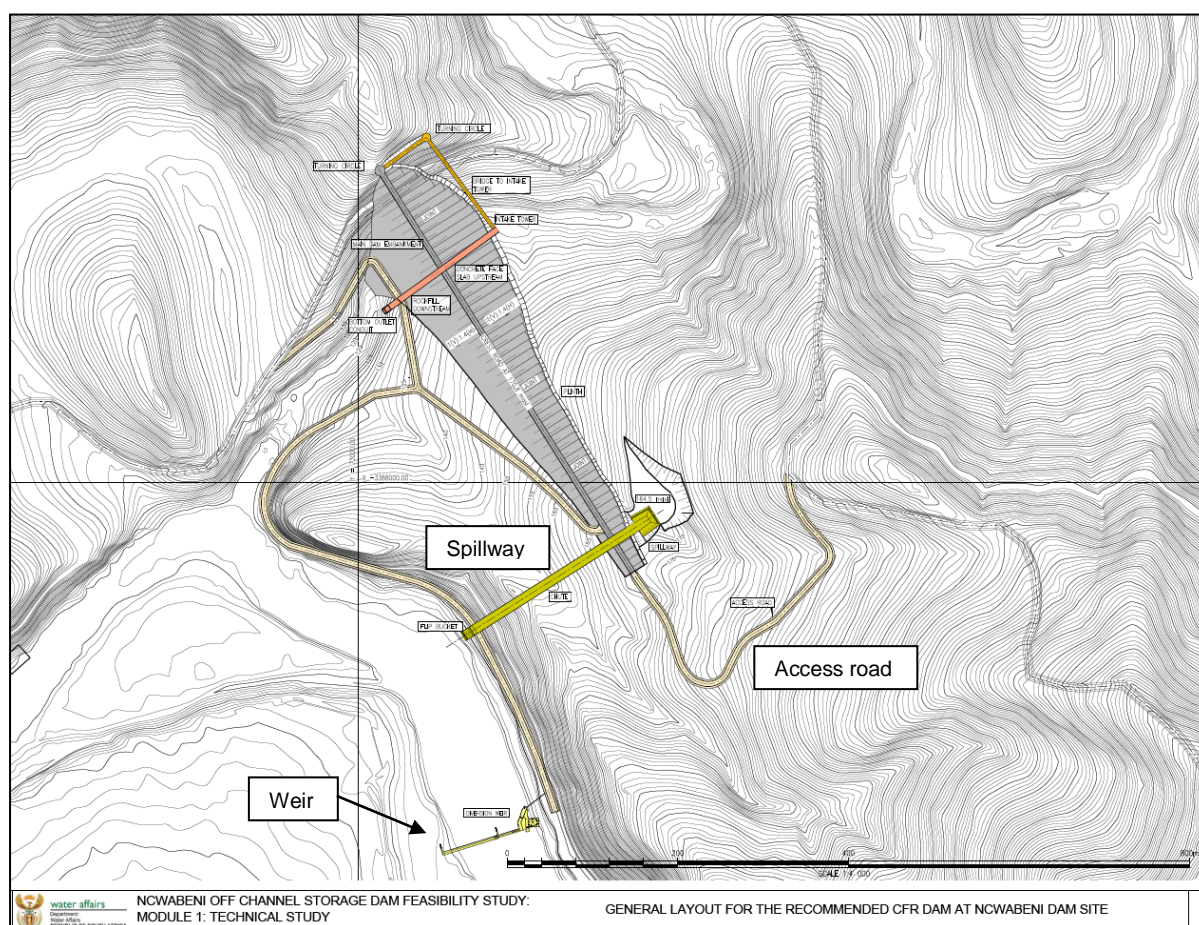


Figure 3: Proposed Ncwabeni OCS Dam Project layout

Table 1: Ncwabeni off-channel storage dam characteristics

Component	Description/Value
Dam Type	Concrete faced rockfill
Dam Height	47 m
Storage Capacity (gross)	15.5 million m ³
Spillway Type	Side-channel with chute
Outlet	Tower

Project cost

The cost of the proposed Ncwabeni OCS Dam Project is R 580 million (excl. VAT) in 2011 Rands value. The costs of the main project components are shown in **Table 2**. Including finance costs and escalation the cost in 2017 is in the order of R 900 million.

Table 2: Project cost (2011 Rands)

Component	Cost (R)
Section	
Main Embankment	197,782,342
Spillway	18,083,846
Outlet works	37,730,244
Diversion weir and abstraction works (including roads to site)	30,677,400
Subtotal A	284,273,833
Preliminary & General (40 % of sub-total A)	113,709,533
Preliminary works	
(a) Access road for main dam	604,000
(b) Electrical supply to site	15,000,000
(c) Construction water to site	300,000
Accommodation	6,000,000
Subtotal B	419,887,367
Contingencies (20% of subtotal B)	83,977,473
Subtotal C	503,864,840
Planning, design and supervision (15% of subtotal C)	75,579,726
Subtotal D	579,444,566
VAT (14% of subtotal D)	81,122,239
Total Project Cost	660,566,805

Funding and institutional arrangements

The funding and institutional options are interlinked. National Treasury has expressed the preference that the owner of the dam should also be the institution responsible for funding the dam.

Sources of funding were identified from which possible funding options were determined. Two funding options have been proposed for consideration:

- Either Ugu District Municipality (DM) could raise funds for the project itself using a combination of Regional Bulk Infrastructure Grant (RBIG) funding, Municipal Infrastructure Grant (MIG) and other grant funding, and limited commercial funding; or
- Ugu DM could appoint Umgeni Water as bulk water services provider for the Umzimkhulu RWSS and other areas supplied out of the dam, and Umgeni Water could fund the dam and the upgrading of the downstream water treatment works with a mix of RBIG funding, other grant funding if available, and commercial loans.

In the second option Umgeni Water could recover these costs from Ugu DM through Umgeni's universal bulk water tariff.

Whichever option is selected, National Treasury would need to be satisfied after jointly assessing with the party responsible for raising the funds, that that party has the financial capacity to take on the additional financial burden. DWA would also need to be satisfied that the implementing party has the required skills to implement the project.

Implementation program

The project implementation program has been drawn up based on actual construction rates from similar projects. The key dates of the implementation program are as follows:

- Environmental authorisation April of 2013
- Final design and tender completion by April 2014
- Construction beginning in April 2015
- First impoundment in 2018

To guide implementation and hand over the project to the implementing agent who will be chosen, a Record of Implementation Decisions (RID) report has been prepared. The projected project capital requirements based on the program are shown in **Table 3**.

Table 3: Projected capital requirements for the project (in 2011 Rands)

Year	Estimated Capital Expenditure (VAT inclusive)
	(R million)
2015	100
2016	250
2017	250
2018	160
Total	660

Environmental impacts mitigation

The Department of Environmental Affairs (DEA) approved the Final Scoping Report and Plan of Study for the Environmental Impact Assessment (EIA) on 26 April 2012. Thereafter the specialist studies were completed and a Draft EIA Report was prepared.

Due to the extent of the overall project, the following suite of Environmental Management Programmes (EMPr) was developed to deal with the various key components of the project:

1. Pre-Construction EMPr;
2. Construction EMPrs -
 - a). OCS Dam;
 - b). Re-alignment of D859; and
 - c). Abstraction weir, abstraction works, pipeline and access road.

The following EMPrs will be developed as further information becomes available during the implementation of the project:

1. Search, Rescue and Relocation Management Plan for red data, protected and endangered species, medicinal plants, heritage resources and graves;
2. Ncwabeni OCS Dam Impoundment EMPr;
3. Rehabilitation Management Plan for disturbed areas outside of the dam inundation area; and
4. Operational EMPr.

The Draft Environmental Impact Assessment (EIA) Report needs to be lodged in the public domain for review and a public meeting needs to be convened. Currently it is anticipated that the Final EIA Report will be submitted to DEA in February 2013. The subsequent decision-making timeframes are as follows:

- Department to acknowledge EIA Report – 14 days;
- If in order, DEA to accept the EIA Report – 60 days; and
- After having accepted the EIA Report, DEA to decide whether or not to grant or refuse Environmental Authorisation – 45 days.

Based on the abovementioned regulated timeframes, a decision is expected in June 2013.

Way Forward

The suit of reports that have been delivered should be used to provide a more comprehensive view of the project and support this summary report and the RID.

The funding and institutional arrangements need to be agreed upon and finalised before an implementing agent can be selected.