

DEPARTMENT OF WATER AFFAIRS AND FORESTRY

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UPDATED INFORMATION ON THE FEASIBILITY DESIGN OF CLANWILLIAM DAM

A feasibility design report for the rehabilitation of Clanwilliam Dam was issued by the Directorate Civil Engineering in August 2006. Subsequent discussions at the study management committee (SMC) meetings for the feasibility study raised some questions regarding the design.

Further requests for clarity regarding the environmental impact of the proposed works were received from the consultant (Ninham Shand).

This memo supplies updated information on the design and issues arising from it.

Raising funded from Dam Safety Rehabilitation Programme

In terms of the Dam Safety Rehabilitation Programme (DSRP) "Rehabilitation" implies that a dam is improved and upgraded to comply with acceptable dam safety standards and best practice. In general this will not include a change in yield or full supply level (FSL).

The discharge of water at adequate rates for environmental flows was not one of the variables in the design of the capacity of the original outlet works of the dam. Water allocation and the storage volume also did not provide for environmental releases. Provision for an increase in storage and outlet capacity can be made if required by the environmental record of decision (RoD) for the project.

The DSRP will fund the construction work at Clanwilliam Dam to ensure the safety of the structure at its existing full supply capacity (FSC). Initial studies suggested that additional storage and discharges could improve the environmental condition of the downstream river. Information presented at the SMC meeting (November 2006) indicated that increased discharge will not have a noticeable influence and that there are other measures that can be employed to far greater effect.

In the light of these results, funding from the DSRP for the raising of the dam above the current FSL cannot be justified.

Hydro-electric power station

Discussions with Mr. Francois van Heerden from DWAF: Western Cape Region indicate that the hydro-electric power station is being upgraded at the risk of the operator.

The system was bought from the Clanwilliam municipality after being out of service for some time. None of the original agreements between DWAF and the municipality have as yet been found.

From initial inquiries it appears that a water use licence is not required for electricity generation, as it is non-consumptive usage. To formalise the operation of the power station an operation agreement will have to be reached between the operator and

DWAF. This agreement will have to make provision for the possible interruption or discontinuation of generation during construction of the raising of the dam.

If unresolved, this issue poses significant risks to the project. Should an existing agreement between the operator and the Department be discovered at a late stage, it may cause costly design changes and project delays. Every effort should be made to determine whether an agreement exists.

Mining of Quarry

Information on the mining of the quarry was provided electronically and at SMC meetings. It is summarised here:

- The existing quarry at the dam is to be extended.
- No further quarry sites will have to be developed.
- Preliminary drawing 152216/06 indicates the limits of the proposed extension.
- The volumes of aggregate and sand required for the various raising options are given in Table 1. Based on preliminary borehole test results, it is foreseen that approximately double the volume of aggregate will have to be excavated to obtain sufficient quality material.

Table 1: Aggregate Volumes

| Raising (m) | Aggregate | | | Sand |
|----------------|-----------------------------|---------------|----------------------------|-----------------------------|
| | Volume (m ³) | Losses (%) | Total (m ³) | Volume (m ³) |
| 15 | 119 772 | 15 | 137 700 | 67 000 |
| 10 | 84 411 | 15 | 97 100 | 47 100 |
| 5 | 58 745 | 15 | 67 600 | 32 500 |
| 0 | 34 791 | 15 | 40 000 | 19 100 |

Construction Activities

An update of the proposed construction activities was compiled by DWAF (Mr. H Swart). The document was attached to the feasibility design report by Brink (2006). In the document it is stated that the accommodation of personnel on site will only be used as a last resort, in the case that an agreement cannot be reached with the local authority to obtain/construct the accommodation within the municipal area.

The same document also indicates that the crusher plant, stockpile area, concrete batching plant and workshop will be located to the west of the road. It is the most economic option to erect the batching plant as close as possible to the stockpiles. Concrete will be transported from the batching plant to the work area via a conveyor system.

The slope of the area between the road and river makes it unsuitable for stockpiling of material and erection of extensive plant. Roads will be upgraded to improve access for construction vehicles. Only construction equipment will be stored in the area between the road and river, within the limits of the available space.

Placement of roller compacted concrete (RCC) will probably be done at night when it is cooler. The RCC placing part will be roughly 20 – 30% of the construction project duration.

Service Road

The gravel road to the east of the dam will have to be re-aligned to reach the new crest and outlet works. The alignment will depend on the eventual crest level. The section of

existing road that will fall within the construction works area will be used as a temporary access road to the right bank for construction purposes. A temporary road or coffer wall will provide access from the left bank of the river.

Seismicity

The Hydrological Scoping Report by Umvoto Africa (2005) refers to the possibility of reservoir-induced seismicity (RIS). The term reservoir associated seismicity is preferred, as it includes both reservoir-induced and reservoir-triggered seismicity.

The Directorate Civil Engineering's position is that seismicity is a design variable that should be investigated thoroughly. Induced seismicity is always smaller than the maximum credible earthquake (MCE), which the dam is designed to withstand. It therefore does not pose a risk to the stability of the dam.


Over the lifetime of the existing dam (70 + years) there have been no recordings of induced seismicity and incremental raising will not be more than 15 m. The height of the eventual dam will, at ± 50 m, be fairly low compared to dams that are known or suspected to have induced seismic events.

Even though reservoir associated seismicity is not expected to be a problem for the raising of the dam, a seismograph will be installed to monitor any events. A comprehensive report on the seismicity of the area will be compiled by the Council for Geoscience, based on existing data and the additional data from the seismograph.

Dam Capacity

The full supply capacity (FSC) for the 15m raising was incorrectly given as $335 \times 10^6 \text{ m}^3$ in the design report. The value should be $364 \times 10^6 \text{ m}^3$. The corrected Table 1-1 from the Preliminary Design Report is given below:

| Raising Option | FSL (RL) | Volume ($\times 10^6 \text{ m}^3$) |
|----------------|----------|--------------------------------------|
| 0 m Raising | 105,25 | 124 |
| 5 m Raising | 110,25 | 186 |
| 10 m Raising | 115,25 | 266 |
| 15 m Raising | 120,25 | 364 |


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