

MANAGEMENT POLICY ON DAM SAFETY

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ABSTRACT

The paper aims to highlight the management policies in force for the safety of new and existing dams to reduce the potential harm to the public property and resource quality, and to find the best engineering practice for different categories of dams.

The dam safety policies (published in Govt notice R. 1560 of 25 July 1986) became fully effective in January 1987 and are still in force under the new National water Act, 1998 (Act 36 of 1998). Only dams with a safety risk (i.e. dams with a maximum wall height that exceed 5.0m and with a storage capacity of more than 50 000 m³ or any other dam declared on a dam with a safety risk are subject to these policies. The following policies are in force for the New Dams and existing Dams. For the new Dams: The first step is applied for classification of the dam on from DW 692E of the Department of Water Affairs (DWA), the Department of Water Affairs will inform the applicant of the classification of the dam and of further procedures. If the Dam is classified as category I Dam, just a licence on from DWA 694E needs to be obtained by the DWA.If the dam is classified as a category II or III dam, the service of an approved professional engineer (APE) must be obtained. All the existing Dams with safety risk must be registered on form DW 693E.

The dam owner must arrange for the execution of a formal dam safety inspection when instructed to do so by the Department of Water Affairs (at intervals between 5 and 10 years). In the case of category II and III Dams the inspection must be done by APE. In the case of category I Dams an experienced person to perform this task should be engaged.

1. Introduction

THE SAFETY REGULATIONS (published in Government Notice R. 1560 of 25 July 1986) became fully effective in January 1987 and are still in force under the new National Water Act, 1998 (Act 36 of 1998) [NWA]. Only dams with a safety risk (i.e. dams with a maximum wall height that exceeds 5, 0 m and with a storage capacity of more than 50 000 m³, or any other dam declared as a dam with a safety risk) are subject to these regulations.

❖ Objective of the dam safety legislation

To improve the new and existing dams to reduce the potential harm to the public, property and resource quality, and to find the best engineering practice for different categories of dams.

2. Summary of legal requirements for prospective and existing dam owners

There are three legal requirements that must be met before a person may construct/alter repair a dam, namely with regard to (1) dam safety, (2) water entitlement and (3) environmental legislation. These requirements as well as those for owners of existing dams are summarized below:

2.1. Dam safety

2.1.1. New dams, alterations to existing dams or repair of dams that failed

- The first step is to apply for classification of the dam on form DW 692E. The department of Water Affairs will then inform the applicant of the classification of the dam and of further procedures.
- If the dam is classified as a category I dam, apply for a licence to construct on form DW 694E and submit construction drawings. **Construction may only commence after the licence to construct has been issued.**
- If the dam is classified as a category II or III dam, the services of an approved professional person/engineer (**APP**) must be obtained. The APP must apply for a licence to construct on behalf of the dam owner (this involves the submission of an application form, design report, engineering drawings and construction specifications). **Construction may only commence after the licence to construct has been issued.** The APP must also ensure that an adequate quality control programme is in place during the construction period. Before starting with storage of water, the APP must apply for licence to impound (this involves the submission of an operation and maintenance manual and emergency preparedness plan together with an application form DW 696E). After completion of all construction work, the APP must submit a completion report, completion drawings and a completion certificate stating that the work has been completed according to his/her specifications.
- On completion, dams with a safety risk must be registered on form DW 693E.

2.1.2. Existing dams

- All dams with a safety risk must be registered on form DW 693E.
- The Department of Water Affairs must be notified of any changes of particulars (dam owner, address, telephone numbers, person in control, etc.)

- The dam must be operated and maintained in a responsible manner. Basically this requires that the owner, or the person appointed by the owner, will visit and inspect the dam on a regular (at least weekly) basis. Maintenance work must be done regularly. In the case of unsafe conditions, emergency procedures and safety measures must be taken and the Department of Water Affairs informed thereof.
- The dam owner must arrange for the execution of a formal dam safety inspection when instructed to do so by the Department of Water Affairs (at intervals between 5 and 10 years). In the case of category II and III dams the inspection must be done by an APP. In the case of category I dams it is not prescribed by whom the inspection must be done but it is in the owner's interest to appoint an experienced person to perform this task. If necessary, the inspection report will indicate what work should be done to upgrade the dam to acceptable safety standards.

2.2. Water entitlements

- Any new water use as defined in section 21 of the NWA is subject to licensing. There is no guarantee that any licence will be issued as it is subject to a number of conditions and constraints in the NWA.
- Before construction of a new dam or alterations/raising/re-construction of an existing dam may start, a water use licence or written authorization must be obtained from the Regional Director of the relevant region.
- In the case of dams that failed, existing lawful water use (subject to verification) will normally be acknowledged but it is essential that confirmation is obtained in writing from the Regional director.
- Existing dams: Section 21 (b) of the NWA defines storage of water as a water use. If more than 10 000 m³ or more than 1, 0 hectare of water is stored, then that water use must be registered on a form that will be supplied by the Regional Director for this purpose. However, in some Water Management Areas the general authorization does not allow any dam, irrespective of size, outside the licensing procedure and in those areas all dams must be registered.

2.3. Requirements of environmental legislation (Applicable to all new dams or raising of existing dams)

- The requirements of Regulations published in Government Notice R. 1182 and R. 1183 of 5 September 1997 in terms of the Environment Conservation Act, 1989 (Act 73 of 1989) must be complied with. Normally it will be required that an environmental impact assessment (EIA) must be carried out before construction of a new dam or raising/re-construction of an existing dam will be authorized. Written authorization must be obtained from the relevant provincial department before commencing with the project.

3. Registration of water use

3.1. Why register?

Registration of water use is required in terms of section 26 (1) (c) and 34 (2) of the National Water Act (Act 36 of 1998). There are several reasons why water users are required to register their water use with the Department.

Most important are:

- To manage and control water resources for planning and development.
- To protect water resources against over-use, damage and impacts.
- To ensure fair allocation of water among users.

Registration is also the first step in recovering the true and actual costs of water use in a fair and systematic manner. These funds in turn will be used to achieve the above goals. Registration is to the benefit of the country as a whole, and not only to water users. South Africa is one of the most water-scarce countries in the world. We are on the threshold of being what is internationally defined as a country “under water stress”. Estimates are that all freshwater resources will be fully allocated in about 20-30 years from now, depending on economic growth scenarios. Impacts on freshwater resources from waste discharges can limit the value of water for other use. Contamination can also lead to health problems and can damage the aquatic environment. Good water resource management and long-term planning are thus essential for South Africa. In order to do this, it is important to understand how much water we have, who is using it and where.

3.2. What is registration?

Registration is the process of officially notifying the Department of a water use. Registration is required in terms of a Notice issued under the Registration Regulations, or under a General Authorization published in the Government Gazette. Water use is registered by completing the official forms obtainable from the Department.

3.3. Who does not have to register?

The following water use need NOT be registered:

- If the water use is listed in Schedule 1 of the Act (see Section 4).
- If the water use is excluded from the requirement to register in terms of a Notice issued under the Registration Regulations.
- If the water use is part of the services offered by a Water Services Provider, such as a Local Authority (municipality) or a Water Board. An example of this is water and sanitation provided to households by a municipality. Each household is not required to be register. However, the municipality must register its use.

3.4. Who must register their water use?

- Individuals – such as farmers, small-holders, land-owners or lessees.
- Communities – such as communal enterprises, traditional farmers groups.
- National Provincial Government
- Companies and businesses – including partnerships, public companies, private companies, companies not for gain, guarantee companies, foreign companies, incorporated private companies, closed corporations etc.
- Water Users Associations.
- Water Services Providers, including Water Boards and Local Government

3.5. When must users register?

From 8 October 1999, all NEW water use must be registered as set out in the Registration Regulations. Those users engaging in a waste discharge related water use identified in Section 21 (e), (f), (g), (h) and (j) will be required to register their water use by 31 August 2009 as specified in Government Gazette 32209, dated 6 May 2009.

3.6. How will users be registered?

Forms to register are obtainable from any office of the Department (see Section 8). To register your water use, submit completed registration forms to the Department. Registration cannot be turned down or denied, if it is for a legitimate water use. Incomplete forms may be returned to the water user, and registration suspended until complete information is provided. A Registration Certificate will be issued bearing the Register Number as soon as the forms have been processed.

3.7. What does it cost to register?

Registration is free of charge if you submit your application to register within the time period stated in the Notice. If you delay unnecessarily, you may have to pay for the processing of your registration forms. Registration certificates are issued free of charge for the first certificate, and for valid amendments to registration details. Reprints of lost registration certificates can be obtained for a replacement fee from the departmental office if issue.

Registration no entitlement

Registration is not an entitlement to use water. Issuing of registration certificate is not a licence to use water. A water use licence authorizes you to use water. Registration can be seen as the first step in establishing yourself as a water user with the Department.

3.8. Waste discharge charge system

The information provided by the user in the registration forms will be used to calculate charges under the Waste Discharge Charge System (WDCS). The WDCS defines 2 charges-

- An incentive charge and a Mitigation Charge. The Incentive Charge will be calculated based on
- Actual discharge, while the Mitigation Charge will be calculated on registered information.

3.9. Water Resource Management Charge

WRM charge defined under the Pricing Strategy will be charged to users, either abstraction related or discharge related, based on registered information.

4. Guidelines for the classification and registration of dams with a safety risk

❖ What is a dam with a safety risk?

A dam with a safety risk can be described as any dam storing more than 50 000 cubic metres of water and has a vertical wall height of more than five metres. These dams are subdivided into different categories declared in section 118 (2) of the national water act.

4.1. Purpose of the guidelines

All existing dams with a safety risk should be registered by the owners, with the department. This is to classify dams and to determine the requirements that should be met in respect of the safety of the dam. The responsibility for the classification of dams has been entrusted to the Dam Safety Office. The classification will determine the extent of Departmental control over the design and construction stages

as well as in the operation and maintenance of the dam after completion. The purpose of these guidelines is to establish uniformity and ensure that the same norms for the classification of dams with risk are applied throughout.

Tables 1, 2, 3 are used to classify the dams accordingly as follows:

Table 4 – 1: size classification

Size class	Maximum height of the wall in metres
Small	Higher than 5 but less than 12m
Medium sized	Equal to or higher than 12 but less than 30m
Large	Equal to or higher than 30m

Table 4 – 2: Hazard potential classification

Level	Loss of life	Economic losses
Low	None	Minimal
Significant	Not more than ten	Significant
High	More than ten	Great

Table 4 – 3: Category allocation of dams posing a safety risk

Size class	Minimal	Significant	Great
Small	I	II	II

Medium	II	II	III
Large	III	III	III

4.2. Determine of the potential loss of life

In most cases the potential loss of life as a result of a dam break flood is the determining factor for the eventual classification of a dam. Attention should be paid to areas on the map where loss of life could occur. The most important areas are:

- a) Houses, huts and other buildings
- b) Railway and road crossings
- c) Recreational areas, for example, caravan parks

Table 4 – 4: Determination of the potential loss of life

As a general guideline the following is suggested:	
% loss of life	Type of dwelling
10%	Dwelling where the warning time exceeds 8 hours or the flow and

	speed is so low that people who cannot swim stand a reasonable chance of escaping. The following maximum flow depths and speeds could be used as a guide-line: Depth (m) 1, 0 0,7 0,5 0, 4 Speed (m/s) 0, 5 1, 0 1, 5 2, 0
25%	Dwelling for which the warning time is between 4 and 8 hours.
50%	Dwelling for which the warning time is less than 4 hours and where the flow depth and flow speed are so high that only person who happened not to be at home would escape the disaster

It is evident that an estimate of potential loss of life is at best approximate. In the final analysis, it is only necessary to estimate whether more than 1 or more than 10 lives could be lost. Accurate estimates are thus required only in borderline cases. In the case of a dam such as the Vaal Dam for example, it is self-evident that the potential loss of life would be considerably higher than 10. The hazard potential is therefore high and no calculations are necessary.

4.3. Registration of a dam with a safety risk

Dams with a safety risk must be registered in terms of section 120 of the Act on an official application form obtained from the Department. The completed form must be signed by the dam owner and submitted to the director-General.

- a) The owner of a dam with a safety risk must register that dam.
- b) An application for registration must be made within 120 days –
 - ❖ After the date on which the dam with a safety risk becomes capable of containing, storing or impounding water.

- ❖ After the date on which an already completed dam is declared to be a dam with a safety risk; or
 - ❖ After publication of a notice declaring a category of dams to be dams with a safety risk, as the case may be
- c) A successor-in-title to an owner of a dam with a safety risk must promptly inform the Director-General of the Department of Water Affairs of the succession, for the substitution of the name of the owner.

5. Duties of an APP

5.1. When carrying out a task in terms of this Chapter, an approved professional person also has a duty of care towards the State and the general public

5.2. An approved professional person appointed to carry out a task on a dam must –

- a) Ensure that the task is carried out according to acceptable dam engineering practices;
- b) Keep the prescribed records;
- c) Compile the prescribed reports; and

Where the task includes constructing, altering or repairing a dam, issue a completion certificate to the dam to the effect that the task on that dam has been carried out according to the applicable design and drawings

An approved professional person appointed to carry out a dam safety evaluation must-

- a) Consider whether the safety norms pertaining to the design, construction, monitoring, operation, performance and maintenance of the dam satisfy acceptable dam engineering practices; and

Compile a report on the matters contemplated in paragraph (a) according to the prescribed requirements and submit the signed and dated report to the owner of the dam within the prescribed period

. Conclusions

It is essential that monitoring of the condition, particularly its behaviour, of the dam (as well as O&M, or lack thereof!), allows for rapid detection of any threat to its safety.

The measures to be taken in various emergency situations should be well prepared i.e. good emergency preparedness plans (EPP's) in place, so as to enable dam owners and authorities to react promptly and appropriately.

It goes without saying that the monitoring of a dam should be based on the laws and regulations in force, which designate the authority responsible for such control, independent of the owner of the dam and which also define the mutual and respective responsibilities of the various different parties.

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