**TERMS OF REFERENCE FOR A SOLICITED WRC PROJECT**

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| **KEY STRATEGIC AREA** | **1&2 (Water resources and ecosystems)** |
| **THRUST** | **Thrust 3: Water Resources and Ecosystem Protection. Water Security, and Water Utilization** |
| **PROGRAMME** | National Dam Siltation Management Programme |
| **TITLE** | *Develop and integrate the upper uMkhomazi catchment and Ecological Infrastructure management plan with Smithfield Dam design using NatSilt Dam Operations model.* |

**Background and Rationale**

The National Dam Siltation Management Programme is implemented by the Water Research Commission (WRC) and funded by the Department of Water and Sanitation (DWS). The Programme's overarching aim is to develop a strategy that will guide, advise, and ensure effective siltation management and related improved storage capacity of the large dams in South Africa.

The programme is being implemented over 3 phases:

Phase 1. Development of a Siltation Management Strategy and related tools for Large State Dams
Phase 2. Piloting of the draft Strategy, Models and Tools for finalisation (current ToR focus)
Phase 3. Review and revision towards a final strategy, with relevant models and tools

Phase 1 is complete, and Phase 2 is currently underway. All the Phase 1 outputs will be piloted in Phase 2. This project is part of numerous projects that will be implemented in phase 2.

**Reports developed during Phase 1 can be found in the link below, under TOR reports to provide context on the operations model:**
**https://wrc.microsoftcrmportals.com/call-for-proposals-info/tor-reports/**

Losing storage capacity as siltation accumulates in dams aggravates water insecurity and undermines soil fertility in source areas, while the actual movement of silt damages riparian infrastructure through the process of muddy flooding. While addressing the dam engineering components of dam siltation management, it is equally important to address the socio-ecological systems aspects of it. In the engineering sector, this involves dams to be designed and constructed to complement and not destroy river catchments by recognising the importance of preventing the degradation of the catchments. It also involves considering people's livelihoods in the ways in which dams are constructed, operated and maintained.
One of the outcomes of the 1st Phase of the National Dam Siltation Programme was the Operational Model, incorporating a Decision Support System (DSS) tool that allows the dam and its catchment to be considered as an integrated system in order to improve the management of, and reduce the risk of siltation. The model also informs decision-making related to the planning of new dams, optimizes and enhances dam planning operations. It is intended that the model should form part of the design process of new dams. This will allow funds that are made available to design and construct a dam to also be used

to implement catchment management interventions and thus extend the lifespan of the dam. The primary focus of the model is on improved and sustainable storage capacity of dams, through catchment and engineering interventions with a main link to yield in terms of water resources and the economic benefit thereof.

The proposed Smithfield Dam is located 2km upstream from the confluence of the uMkhomazi and Mfeneni Rivers, along the middle reaches of the uMkhomazi River in the southern part of KwaZulu-Natal. The Smithfield Dam and the associated infrastructure fall within the Harry Gwala District Municipality and the Dr Nkosazana Dlamini Zuma Local Municip0ality as well as the uMgungundlovu District Municipality and Impendle Local Municipality. The western portion of the project area falls under Traditional Authority and State land. The area is characterized by traditional homestead settlements and rural subsistence agriculture. Technical studies undertaken for the Environmental Impact Assessment included "A Sedimentation Yield Study" as well as "Reservoir sedimentation and the potential impact of the Smithfield Dam" on the coastal sediment budget and shoreline stability.

This project intends to investigate the feasibility of the siltation management interventions for the upper uMkhomazi River catchment and to develop a catchment and ecological infrastructure management plan through utilizing the dam Operations Model produced by the WRC and any other key relevant sources.

**Overview of proposed approach**

The approach to this work is to demonstrate the applicability of the dam Operations Model as an effective decision-making tool for siltation management. The approach is to develop a sustainable framework for implementing interventions to ensure the ecosystems where dams are constructed are not degraded and to include the funding of ecological infrastructure in the design phase of new dams in accordance with the new conditions of the Environmental Authorizations.

The framework will include implementation and maintenance plans for the long-term sustainability of siltation management interventions.

A needs analysis will be conducted with the communities in the catchment area to identify their needs, which will complement the work that this project will undertake.

***Objectives:***

The aim of the project is to utilize the dam Operations Model to identify both implementation (i.e., engineering and ecological infrastructure interventions) and maintenance plans to be included in the design and Operation and Maintenance Manual of Smithfield Dam to manage siltation in the upper uMkhomazi River catchment. To develop a catchment and Ecological Infrastructure plan for the upper uMhkomazi catchment that includes *inter alia:*

The objectives of the project will be the use of the Dam Operations model to:

- Review initiatives undertaken by the National Dam Siltation Programme, Umgeni Water, and the Institute of Natural Resources to identify gaps and synergies relating to the upper catchment.
- Identify and map degraded and declining ecological features in the catchment around the Smithfield Dam site.
- Identify interventions to restore, improve and maintain the ecological features in the upper catchment.
- Develop a strategic framework plan to guide, coordinate and direct interventions aimed at the rehabilitation, restoration, and maintenance of ecological infrastructure in the surrounding catchment.
- Develop a framework for funding and implementation.
- Utilise the Dam Operations Model to identify both implementation (i.e., engineering and ecological infrastructure interventions) and maintenance plans to be included in the Design, Operation and Maintenance Manual of Smithfield Dam to prevent/minimise siltation of the Dam.

***Outputs and Outcomes:***

The output and outcomes of this project will be:

- A needs analysis report of the community in the catchment and a siltation management plan for catchment rehabilitation and extending the life of the dam.
- Strategic framework for the funding and implementation of the upper uMkhomazi River catchment management.
- uMkhomazi River Catchment and Ecological Infrastructure Management Plan.

**Deliverables:**

1. An inception report, including a needs analysis of the community in the catchment area
2. A methodology report including the synergies and alignment with Umgeni Water and the Institute of Natural Resources work
3. Strategic framework plan report for rehabilitation, restoration and maintenance of ecological infrastructure in the upper catchment
4. Framework for funding and implementation of ecological infrastructure to be included in Smithfield dam design
5. Catchment and Ecological Infrastructure Management Plan with identified interventions and maintenance plans to be included in the design, operation, and maintenance manual of Smithfield Dam to prevent/minimise siltation of the Dam

**Time Frame: July 2022 – June 2023**

**Total Funds Available:**
R 500 000 over 2 years

Year 1: R300 000
Year 2: R200 000