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

THEME: **Water Quality and Health**

TITLE: Re-imagine the feasibility of the future of water resources monitoring in SA and transboundary using latest technology: Accelerate digital transition

TOR NUMBER:

1. **Rationale for the Study**

- South Africa is about 1.22million km^2, with a spread of wetlands, rivers, dams, estuaries and aquifers. SA has a very dense monitoring network, but most of the sampling stations no longer generate data, mainly due to lack of sampling and analysis. In many cases, the key reason cited is budget constraints. This lack of data is not only reflected in the SDG: 2030, Stats-SA report, but also in the WRC funded reports, even the National State of Water resources notes this. While monitoring is expensive it is a prerequisite for reasonable water resources management and planning for development. The old adage which says "if you cannot measure it, you cannot manage it" is even more valid today!. Monitoring across the country as vast as South Africa through traditional sampling and transportation of samples to accredited labs needs urgent review in the times of technology where data collection can be done without even visiting sites, except for maintenance. The world is migrating towards a digital way of life (4IR/AI). It is for this reason that monitoring using various forms of tested tools and technology is viewed as of paramount importance. The technologically biased tools (such as remote sensing, cyberlakes, drones, Fish-Track, mobile Apps, citizen science tools, e-DNA, etc), have not been taken up in the water quality monitoring value chain in any significant way. The status quo has to dramatically change if custodians (e.g. DWS) are to meet their mandates, and demands for real time data and information in future. WRC is leading the development of big data warehouse with artificial intelligence and related algorithms with the purpose of securing online data, generate reports at the click of a button. The proposal needs to take advantage of the data arching and processing capabilities already in place. The need for progressive transformation use of technology in monitoring has been noted by the DWS during the national water quality monitoring committee deliberations in which the WRC is represented.

2. **Main Objective**

The aim of the call it to explore the feasibility of transforming surface water quality monitoring from traditional monthly once off sample, rush the sample to the laboratory before it expires, copying with the risks including being hijacked in dangerous sampling points to real time data collection at the frequency set as desired. The real time data allows the managers to intervene instantly when a polluter pollutes the water resource. Properly validated, such data can undoubtedly stand litigation much better than a once sample per month which leaves the resource vulnerable between sampling days in a month. However, there are numerous barriers and enablers that must be circumvented to get to the point where managers trust and invest in technologically driven monitoring as opposed to old methods.

3   **Specific Objectives**

- Conduct extensive situation analysis covering both national and international advances in surface water quality monitoring using technology, as well as artificial intelligence
- Investigate and provide evidence based fundamental information to convince managers to invest in technologically driven monitoring, including the demonstration of existing WRC products and others
- Conduct cost benefit analysis critical in transforming monitoring approaches from traditional to technological advancements
- Suggest on the skills and capacity (resources and trained staff) that will be required to realize the transformation and adoption of the technologically driven monitoring
- Test the practicality of technologically based monitoring through extensive consultation and collaboration with the DWS affected staff and other key stakeholders
- Produce a policy brief on the justification for monitoring transformation from current traditional to technologically driven approach of the future

4.   **Deliverables**

The project will culminate in a key report that must be developed together with the primary client, the DWS, a separate but related policy brief for top management of the department. Outline of the costs and benefits, capacity and capability required for transformation, evidence of consultations, piloting the technologies and series of reports-the fact sheets per water resource type.

Important to note that this investigation entails extensive consultation and negotiations, convincing authorities, hence the importance of case studies and multidisciplinary teams. The citizen scientists form part of the entire consultation process.

Budget: R1 000 000
Year 1: R400 000
Duration: 2 years