

WASH R&D Centre

Water, Sanitation & hygiene Research & Development Centre
Building Knowledge, Delivering Insight



WASH R&D CENTRE

**WATER SANITATION & HYGIENE
RESEARCH & DEVELOPMENT CENTRE**

WHERE TO FIND US:

Chemical Engineering
Howard College Campus
University of KwaZulu-Natal
Durban

☎ 031 260 3131
✉ washcentre@ukzn.ac.za
🌐 washcentre@ukzn.ac.za

📷 @WASH_Centre_sa

✂ WASH R&D Centre

f @WASH_Centre_sa

in WASH R&D Centre

▶ WASH R&D Centre

Who we are & what we do

The WASH R&D Centre (formerly the Pollution Research Group) was formed in the 1970s, and is a professional research centre in Chemical Engineering at the Howard College Campus of the University of KwaZulu-Natal (UKZN) which has grown to become a significant role player in the water and sanitation field in South Africa.

Our collective efforts remain centred on real-world impact – supporting the development, testing, and scale-up of technologies and frameworks that deliver sustainable, resilient, and dignified sanitation solutions for communities in South Africa and across the continent.

A major focus of the Centre is the progression of Water Efficient Sanitation Solutions (WESS) and the strengthening of our Testing and Validation programme. These systems, which significantly reduce reliance on traditional sewer infrastructure and water consumption, represent a pathway to more resilient urban and rural sanitation models. Through our testing and co-development work, we ensure that technologies meet the highest standards of performance, safety, and user acceptance.

Besides the technical progression, the socio-technical assessment framework developed by the social sciences team at the Centre has resulted in broader developmental benefits for households and communities, inclusive of basic services upgrading, social learning, and improved relationships between household members and the local state.



The Centre is a strategic research partner to the South African Water Research Commission, and the Water and Sanitation Unit (EWS) within the eThekweni Municipality.

We envisage a fully realised water and sanitation circular economy, where the processing of waste, food production and human and environmental health are integrated in a multi-level stakeholder involvement by communities, governments, technology developers and industry. We aim to be recognised locally, nationally, and internationally as a leader in WASH research, development and innovation by responding impactfully to water, sanitation and linked hygiene and food security needs on a local and global level



Transdisciplinary Research

Our transdisciplinary research helps identify bottlenecks and inefficiencies, while our innovative approaches work on practical solutions to streamline processes, enhance infrastructure, and optimise resource utilisation. We also provide crucial insights into the complexities of sanitation challenges. This involves studying factors such as community behaviour, environmental impacts, and technological limitations as there is no one-for-all solution. In so doing, we also guide and inform policy to address these challenges more effectively.

While chemical engineering principles are still at the core of the research conducted by the Centre, strong partnerships with other disciplines within the university have been established to further expand the scope of research. This includes social sciences, agricultural economics, crop and soil sciences, microbiology, chemistry, and mechanical, electrical and civil engineering.

This transdisciplinary research process allows for the integration of different forms of knowledge from multiple actors to address the complexity of problems related to the development of socially just water and sanitation service delivery, leading to empowerment of communities.



Our Research

The WASH R&D Centre is broadly divided into four core research units – Water Management, Sanitation Technology and Testing, Circular Economy, and Health & Hygiene – all of which are supported by cross-cutting services in smart technology, laboratory science, and social engagement.

Capacity building remains a core function of what we do. Through postgraduate supervision, technical training, and the development of short courses and professional modules, the Centre continues to invest in strengthening the human capital that will drive Africa's sanitation future.

“Water efficient sanitation solutions (WESS)” are “sanitation systems which require low to no water, completely off-grid, non-sewered, on-site or are decentralised and utilise technologies that include using water saving devices, water-efficient processes and beneficial use of waste products.”



De-risking WESS through Research Services

All research units in the Centre are working towards supporting the de-risking and scale up of WESS in South Africa through the following initiatives:

Validation and Certification readiness: Systems will be validated as WESS based on definitions provided in the DWS Norms and Standards. Testing can be carried out on systems against ISO/SANS standards to determine readiness for certification.

Localization of systems: Localisation is a crucial process of adapting an imported WESS technology to perfectly suit the local environmental, technical, social, and regulatory landscape. This adaptation impacts everything from materials, components, and spare parts to the overall design and operation.

Waste valorization: Characterization of waste streams from WESS (e.g. sludge) and opportunities for processing into useful end products such as fertilizer, biochar or alternative building material.

Health risk assessment: Quantifying changes in human and environmental health before and after sanitation technologies and intervention initiatives are implemented.

Data management: A WESS data platform which makes available a cloud hosted database to which WESS data can be streamed, stored and manage.

Water flow diagrams: WFDs are scientific representations that track the flow of water streams through any water or sanitation system and are a powerful tool in the planning and implementation of WESS.

Community engagement: A structured entry and dialogue process that facilitates social legitimacy and community buy-in throughout the duration of the project.

Social assessments: Undertaking social assessments supports WESS by aligning technology and services with real users, institutions, and contexts within which these systems are embedded.

Laboratory testing services: A comprehensive service for the monitoring and evaluation of WESS, including site observations, routine sampling and sample analysis, data analysis and validation, reporting, sanitation technology data portfolios, diagnostics, troubleshooting and optimisation opportunities.



WESS Developers Forum

The WASH R&D Centre, with support from the Water Research Commission (WRC) and the Water Partnerships Office (WPO) launched the WESS Developers' Forum in October 2025.

This forum aims to create a collaborative platform for:

- Sharing data, lessons, and standards;
- Co-developing services and field protocols;
- Ensuring that WESS technologies are deployed safely, sustainably, and at scale.

In doing so, the Forum helps to close the final gap in South Africa's sanitation transformation: linking innovation, regulation, and community delivery through a professional community of providers committed to water-wise development.

A costing model for the forum is under development



WESS Standards/Policy

The Centre has actively contributed to the drafting and revision of non-sewered sanitation standards, both nationally and internationally. These efforts are helping to streamline testing protocols, ensure efficiency, and establish a robust business case for certification. Certification improves buyer and user confidence by guaranteeing quality and safety in tested systems, while creating a clear pathway for private sector participation in the sanitation economy.

On the policy side, the Centre has recently developed a framework for Water Services Authorities to guide the development of sanitation by-laws, policies, and implementation plans – enabling municipalities to manage and monitor innovative sanitation systems within a sound governance framework.



Newlands Mashu Research Site

The Centre, together with EWS operate and maintain the Newlands Mashu Research Site in Durban. This site provides a controlled and safe environment where sanitation systems, resource recovery, and agricultural recycling of recovered resources can be evaluated and developed. The research focus encompasses several important life cycle considerations that support planning for services that extend beyond a single goal of providing sanitation.

The main focus areas of research at the Newlands Mashu Research Site are to:

- Explore and test new sanitation technologies
- Close the nutrient loop by recycling and returning nutrients to soil from properly sanitised waste streams (urine, faeces, wastewater) for use in agriculture
- Test and evaluate the use of sanitation-based fertiliser products in agriculture in a controlled and safe environment.

The Site houses the oldest Decentralised Wastewater Treatment System (DEWATS) in the country, installed in 2010 with BORDA. This system consists of a settler, a series of anaerobic baffled reactors, two anaerobic filter chambers and effluent polishing in horizontal and vertical constructed wetlands. The plant receives up to 40 m³/d of domestic wastewater from the surrounding residential area.

Other facilities on site include a growing tunnel and fields for agricultural trials, prototype solar dryers, a laboratory, urine processing reactors, and WESS pedestals.

Short courses

The Centre is in the process of developing the following courses:

- Introduction to WASH and Sustainable Development
- Good Laboratory Practices
- Field Data Collection
- Faecal Sludge Management and Treatment
- Data Management and Modelling of Systems
- Contaminants of Emerging Concern
- Social Assessments
- Pathogen Exposure Risk (SaniPath)
- Introduction to Biological Wastewater Treatment
- Sanitation Standards and Policy
- Decentralised Wastewater Treatment Systems (DEWATS)
- Helminth Detection
- Derisking of Water Efficient Sanitation Systems
- Introduction to the Sanitation Circular Economy

