

**OPEN CALL**

**Please note that the budget allocations listed below for Open Proposals are only for the first-year budget.**

**KSA 1&2: WATER RESOURCES AND ECOSYSTEMS**

The first-year budget of all project proposals that are responding to the Open and Directed Call in this business Unit (BU) or Key Strategic Area (KSA) for 2023/24 is R15 000 000.

Please note that the following thrusts, programmes, and themes are available to accept project proposals in this KSA or BU. For more information, please contact the Executive Manager, Dr Shafick Adams (E-mail [shaficka@wrc.org.za](mailto:shaficka@wrc.org.za)).

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| <b>Thrust 1: Governance and Institutional Arrangements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                       |                     |
| <b>Programme 1: Cooperative governance for water resource management</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |                     |
| No specific theme                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                     |
| <b>Programme 2: Policy, science, and implementation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Open                  | Open                |
| <ol style="list-style-type: none"> <li>Quantification of the socio-economic benefits to the communities neighbouring coastal parks in SA: A guiding framework <ul style="list-style-type: none"> <li>Communities do not always understand basic principles critical in nature conservation, the benefits and roles they can play to sustain these estuarine iconic conservation areas that are already over 65% threatened in SA.</li> <li>The proposal must attempt to address these issues within the context of influencing citizen science role in policy and natural resources management.</li> </ul> </li> </ol> |                       |                     |
| <b>Programme 3: Water pricing and financing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Open                  | Open                |
| No specific theme                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                     |
| <b>Programme 4: Gender and equity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Open                  | Open                |
| <ol style="list-style-type: none"> <li>Transformation in the water sector <ul style="list-style-type: none"> <li>Exploring the merit of developing a water sector transformation charter, drawing on the nature of the transformation challenges in the sector and the experience of other sectors that have gone this route. The research should attempt to answer the question of whether such a charter is an appropriate tool to achieve the desired transformation in the water sector</li> </ul> </li> </ol>                                                                                                     |                       |                     |
| <b>Programme 5: Operation &amp; maintenance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                     |
| New models for improving O&M at the local level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                     |
| <b>THRUST 2: HYDROLOGICAL AND ECOSYSTEM PROCESSES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       |                     |
| <b>Programme 1: Eco and socio-hydrology</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Open                  | Open                |
| <ol style="list-style-type: none"> <li>An illustrated guidebook on the biophysical aspects of closed/open estuaries for the communities <ul style="list-style-type: none"> <li>The communities surrounding the protected areas by their proximity to these sites should be empowered to have a basic understanding of the eco and hydrological flow dynamics and how these shape their livelihood. This understanding is critical to inform societies and must lead to co-existence with nature without ignoring their local and indigenous knowledge.</li> </ul> </li> </ol>                                          |                       |                     |
| <b>Programme 2: Data and hydroinformatics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Open                  | Open                |
| Quantifying the impact of air-water quality on population in the coal mining areas: Towards a Citizen Science tool development.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                     |
| <b>Programme 3: Catchment Processes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Open                  | Open                |
| <ol style="list-style-type: none"> <li>Revisiting groundwater recharge estimation methods and approaches in South Africa and its implications for water security.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                     |

[illegible]

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
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| <ul style="list-style-type: none"> <li>- To undertake the study of the potential impacts of climate change on various canal systems of various water schemes in South Africa and recommend on what should be done to avoid the potential failure of the scheme as supply dwindles due to canal system inefficiencies caused by climate change.</li> </ul> <p>4. Scenario Planning under altered Environmental Conditions of current and future climate</p> <p>The proposed research project aims to plan for more aggressive climate mitigation and adaptation strategies to prevent future “Day Zero” droughts in dry and populated areas in South Africa, through a scenario building for anticipated changes in water users and their requirement coupled with the availability of water resources under projected climate change conditions to can inform water managers on the plausible future challenges or pressures and health vulnerabilities likely to be experienced. Such strategies could contribute towards intentional transformative adaptation policies for the water sector, and also feed into present water resource management planning as impacts of climate change are already been experienced.</p> | Open                  | Open                |
| <p><b>Programme 4: Environmental risk and disaster management</b></p> <p>1. Develop tested monitoring tools for mining-impacted communities.</p> <ul style="list-style-type: none"> <li>- Citizen science-based tool. The communities neighbouring mines have long complained about deteriorating water and other environmental quality, its impact on their livelihood, including health. However, there is a serious lack of data to quantify these impacts for unknown reasons. This study will develop a CS tool for use by the impacted communities for their own benefit.</li> </ul> <p>2. Projection of Risk and Distribution of Health Vulnerabilities across Municipalities as a result of Climate Change.</p> <p>The proposed research is to develop risk profiles for local municipalities with potential areas that might be prone to an increase or occurrence in water-linked diseases as a result of climate change.</p>                                                                                                                                                                                                                                                                                      | Open                  | Open                |
| <b>THRUST 5: RESOURCE QUALITY AND MANAGEMENT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                       |                     |
| <p><b>Programme 1: Water pollution, depletion and human health</b></p> <p>Priority will be given to proposals that address: a one-health approach for early detection and prevention of waterborne disease outbreaks.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open                  | Open                |
| <p><b>Programme 2: Emerging contaminants</b></p> <p>Priority will be given to proposals that address: risk, prediction and modelling of contaminants of emerging concern within transboundary river basins.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Open                  | Open                |
| <p><b>Programme 3: Source water protection</b></p> <p>1. Best management practices including the use of 4IR technologies to identify, prevent and reduce diffuse pollution of various source water. See directed call(s).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Open                  | Open                |
| <b>THRUST 6: WATER RESOURCES INNOVATION AND TECHNOLOGIES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |                     |
| <p><b>Programme 1: Apps, online.</b></p> <p>No specific theme</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |                     |
| <p><b>Programme 2: Remote sensing and telemetry</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                     |

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| No specific themes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                     |
| <b>Programme 3: Environmental Sensors &amp; Detectors</b><br>1. CBA on transforming water resource quality monitoring.<br><br>Understanding the costs implications to engaging (or not) technology in future water resource quality monitoring. COVID:19 is the major game changer which led to collapse of traditional monthly grab samples in favor of real time data acquisition, analysis and reporting, all online. This will still be accompanied by limited ground-truth until adequate confidence on technological approach is built. WRC has produced a number of these tools, but hardly any uptake so far is happening at a scale | Open                  | Open                |
| <b>Programme 4: Models and Early warning systems</b><br>Early warning systems based on quality assured tools are required and derived from citizen-based data and information. Tools that will help forecast risks and raise awareness at the community or settlement level.                                                                                                                                                                                                                                                                                                                                                                 | Open                  | Open                |
| <b>Programme 5: Treatment Technologies</b><br>Closed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |                     |
| <b>Programme 6: Blue-Green technologies and infrastructure</b><br>No specific themes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |                     |

### **KSA 3: WATER USE, WASTEWATER RESOURCES AND SANITATION FUTURES**

The first-year budget of all project proposals that are responding to the Open and Directed Call in this business Unit (BU) or Key Strategic Area (KSA) for 2023/24 is R15 000 000.

Please note that the following thrusts, programmes and themes are available to accept project proposals in this KSA or BU. For more information, please contact the Executive Manager, Mr Jayant Bhagwan (E-mail [jayb@wrc.org.za](mailto:jayb@wrc.org.za)).

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
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| <b>THRUST 1: WATER SENSITIVE AND RESILIENT SETTLEMENTS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                       |                     |
| The scope of this thrust is to influence the planning and design of smart human settlements and environments that is sensitive to the issues of water sustainability and environmental protection, while ensuring the efficient functioning of water service institutions and their viability are key to sustaining water services in rural and urban areas. The thrust need to promote a holistic management of sewerage, stormwater and drinking water to achieve the goal Integrated Water Management (IWM) and a water supply mix. | Open                  | Open                |
| <b>Programme 1: Smart water supply management</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Open                  | Open                |
| <i>Theme</i> : The scope of this programme will focus on introducing new techniques and process, such as ICT, smart grids etc. in improving the technology for supplying water. It will give attention to better infrastructure asset management, energy management and generation, water loss minimisation, smart metering and all elements that will ensure secure and safe supply of water of good quantity and quality. Aligned to this will be improving management arrangements in achieving these outcomes                      |                       |                     |
| <b>Programme 2: Sustainable drainage futures</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Open                  | Open                |
| <i>Theme</i> : Currently the coordination of greywater, rainwater, sewerage and stormwater as an important resource mix in settlements is not well understood. Thus, the scope of this thrust will contribute to ensuring that the collection of water management practices align to modern drainage systems with natural water processes. Focus will be given to SuDS efforts make urban drainage systems more compatible with components of the natural water cycle and catchments,                                                  |                       |                     |

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
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| while modernizing monitoring and asset management systems towards development of a resource mix .<br><i>Theme 1 : Understanding the impact of land use on water services in tribal, trust and private land.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |                     |
| <b>Programme 3: Water efficiency and behaviour change</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open                  | Open                |
| <i>Theme : A fully-informed and empowered community or individual plays a vital role in the sustainable use of water services, which contributes to water efficiency and improved environmental health. This programme will address education and awareness aspects which contribute to efficient water use, improved behaviour and sustainable services. It will support the development of innovative tools, technologies and systems which contribute to water efficiency and behaviour change.</i>                                                                                                                                                                                                                                                                                       |                       |                     |
| <b>Programme 4: Water services Institutional and management programme</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open                  | Open                |
| <i>Theme : Relationships and partnerships between service providers, both external and internal, are important prerequisites to sustainable water service delivery. This programme's objective is to generate knowledge and processes that would support this new form of service delivery. Innovative management techniques are a necessity for viable and sustainable water service provision. This programme intends to find innovative solutions to critical problems with the financing, cost recovery, regulation and management of essential services such as water supply and sanitation</i>                                                                                                                                                                                         |                       |                     |
| <b>THRUST 2: WATER QUALITY FUTURES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                     |
| The research focus of this thrust is on improving understanding of the influence of major drivers (i.e. climate change, industrialisation, land use/cover, etc), as well as anthropogenic activities on water quality changes in raw water and treated water sources for different uses including; drinking; and agricultural and industrial uses. Research on contaminant sources, loads, transport and partitioning and as well as their combined impacts is also key in determining appropriate risk management scenarios and developing the appropriate water quality management responses such as tools/technologies and regulatory/policy instruments.                                                                                                                                 | Open                  | Open                |
| <b>Programme 1: Smart water quality monitoring and decision making</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Open                  | Open                |
| <i>Theme 1: Development of innovative methods/models for detecting and monitoring water quality changes; sources, transport and partitioning of contaminants between the water component and sediment, and the subsequent use of the information for decision making. The following needs to be prioritised:</i><br><ul style="list-style-type: none"><li>• Technology scan or survey of rapid and efficient household microbial and chemical water quality monitoring devices/methods.</li></ul>                                                                                                                                                                                                                                                                                            | Open                  | Open                |
| <i>Theme 2: Development of decision support systems, knowledge hubs and cataloguing platforms for water quality information, ready to be uploaded onto the Water Research Observatory (<a href="https://www.waterresearchobservatory.org/home">https://www.waterresearchobservatory.org/home</a>). The following needs to be prioritised:</i><br><ul style="list-style-type: none"><li>• Development of national database of environmental occurrence of antimicrobials and antimicrobial resistant organisms</li><li>• Development of a national database and mapping of desalination and water reuse plants in South Africa</li><li>• Further development and enhancement of the decision support tool for the South African Water Quality Guidelines for domestic water quality</li></ul> | Open                  | Open                |
| <b>Programme 2: Water quality regulation, compliance and reporting</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Open                  | Open                |
| <i>Theme 1: Development of customized manuals and for drinking water quality management to support compliance to regulations and achieve capacity development. The following needs to be prioritised:</i><br><ul style="list-style-type: none"><li>• Determine the impact of raw water quality pollution and non-compliance to SANS 241 to human health</li><li>• Conduct an audit of drinking water treatment chemicals used in South Africa, and establish the effectiveness of treatment processes in removing these chemicals and associated health risks</li></ul>                                                                                                                                                                                                                      |                       |                     |
| <b>Programme 3: Risk assessment for environmental water quality management</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Open                  | Open                |

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
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| <i>Theme 1:</i> Development and application of quantitative and comparative risk assessment, integrated human and ecological risk assessment approaches, as well as risk perception and communication methodologies for water quality assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |                     |
| <b>Programme 4:</b> <i>Emerging issues and substances of concern in water</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Open                  | Open                |
| <i>Theme 1:</i> Integration of state-of-the-art analytical and environmental forensic technologies for identifying, and studying the sources, concentrations, transport and fate of emerging substances of concern within the urban water cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |                     |
| <b>Programme 5:</b> <i>Innovations in water treatment technologies</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Open                  | Open                |
| <i>Theme 1:</i> Development and demonstration of innovative technological solutions for water purification, clearly demonstrating primary linkages and trade-offs between energy use efficiency (and cost), as linkages to better outcomes in terms of health                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |                     |
| <b>THRUST 3: SUSTAINABLE INTEGRATED WASTEWATER RESOURCES FUTURES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |                     |
| The scope of this thrust is to address wastewater as a resource, encourage the valorisation, reuse of wastewater effluents and promote sustainable integrated wastewater management through reducing pollution, removing pollutants, reusing/recycling reclaimed water and recovering useful resources. The thrust is premised on a paradigm shift from current wastewater management practices, catalysing achievement of sustainable development goals (SDGs) and need to transition the water sector to a circular economy. The thrust therefore prioritizes research, development and innovation that deliver the required solutions, innovations, processes and interventions at scale.                                                                                                                                                                  | Open                  | Open                |
| <b>Programme 1:</b> <i>Quantification and Minimisation of water use and effluent production</i><br>The objective of reducing pollution at source entails, (i) better understanding of the water footprint of industries, (ii) promotion of water use efficiency with reduced effluent production and (iii) establishing capabilities for preventing and reducing pollutants from entering the environment. In this regard, new tools, methodologies and models, etc. that aid with prediction, quantification, minimization of water use and effluent production will be prioritised.                                                                                                                                                                                                                                                                         | Open                  | Open                |
| <b>Programme 2:</b> <i>Effluent Treatment, Volarization and Reuse</i><br>Reclaimed water offers opportunities for a sustainable and reliable water supply for industries and municipalities as an alternative source to meet increasing demand. Therefore, the treatment of wastewater effluents and volarisation to a quality standard acceptable by users (i.e. 'fit-for-purpose' treatment) need to be prioritised to supplement the ever-growing demand of water supply in support of sustainable reuse. The objective of effluent reuse and volarisation will entail, (i) tapping into reclaimed water opportunities as alternative source and (ii) treatment of effluents and volarisation to quality standard acceptable by users. Further, 'fit-for-purpose' treatment to supplement the ever-growing demand of water supply needs to be prioritised. | Open                  | Open                |
| <b>Programme 3:</b> <i>Advanced Technologies and Processes for Resource Recovery</i><br>Innovative technologies, processes and solutions for resource recovery from wastewater effluents need to be developed and used to demonstrate recovery of high value products that can be used as feedstocks for secondary industrial processes, with special focus on scaling up recovery of water, material and energy-based resources. Therefore, the objective of resource recovery will entail, (i) development of innovative technologies, processes and solutions for resource recovery from wastewater(s) (ii) demonstrating recovery of high value products that can be used as feedstocks for secondary industrial processes and (iii) scaling up recovery of water, material and energy-based resources.                                                   | Open                  | Open                |
| <b>Programme 4:</b> <i>Nature-based Tools, Solutions and Innovations</i><br>The objective of nature-based solutions entails prioritizing projects that emulate, mimic and use nature inspired forms, processes and systems to address challenges associated with sustainable integrated wastewater resources management. The focus will be on (i) capacity building and providing awareness, (ii) supporting the community of practice and (iii) strengthening nature inspired research, development and innovation traction targeting products and innovations.                                                                                                                                                                                                                                                                                              | Open                  | Open                |

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
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| <b><i>Programme 5: Sustainable Mine Closure Management</i></b><br>The objective of sustainable mine closure will entails prioritizing projects supporting (i) sustainable mine-impacted water management, (ii) mine rehabilitation and land management, (iii) community upliftment through local economic development (iv) entrepreneurship and economic sustainability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Open                  | Open                |
| <b>THRUST 4: THE SANITATION TRANSFORMATION INITIATIVE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |                     |
| The scope of this thrust is to provide impetus to the development of non-sewered sanitation solutions which would assist sanitation service providers to be more efficient and cost-effective. The focus on non-sewered sanitation is designed to move away from current linear approach to a circular approach through development of innovations and models that promote cost-effectiveness and longevity of infrastructure investment in which re-use, recovery and recycling through the sanitation value chain are promoted. The thrust support acceleration of sanitation provision through innovative technologies and approaches; minimising health risk through use of toilets; recycling / re-using limited resources, meeting user experience and acceptance; minimising environmental pollution; and linking sanitation infrastructure to additional revenue streams from valorisation of faecal wastes. | Open                  | Open                |
| <b><i>Programme 1: Re-Engineered Toilets</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Open                  | Open                |
| <i>Theme 1: New and Emerging Off-grid / Resource Recovery Toilets</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       |                     |
| <b><i>Programme 2: Sanitation-Sensitive Design (SSD)</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Open                  | Open                |
| <i>Theme 1: New institutional and municipal financial, planning, and management models centred around Sanitation Sensitive Design (including circular economy)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                       |                     |
| <i>Theme 2: Training, education and awareness aspects which contribute to sanitation sensitive design</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |                     |
| <b><i>Programme 3: Municipal Sludge Valorisation</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Open                  | Open                |
| <i>Theme 1: Approaches, Tools, Practices and Innovations for municipal sludge valorisation</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                     |
| <b><i>Programme 4: SaniBus – Sanitation Linked Business</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Open                  | Open                |
| <i>Theme 1: Business-driven Approaches, Tools, Innovations and Practices for Sanitation</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |                     |

#### **KSA 4: WATER UTILISATION IN AGRICULTURE**

The first-year budget of all project proposals that are responding to the Open and Directed Call in this business Unit (BU) or Key Strategic Area (KSA) for 2023/24 is R5 000 000.

Please note that the following thrusts, programmes, and themes are available to accept project proposals in this KSA or BU. For more information, please contact the Executive Manager, Professor Sylvester Mpandeli (E-mail [sylvesterm@wrc.org.za](mailto:sylvesterm@wrc.org.za)).

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                 | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| <b>THRUST 1: WATER UTILISATION FOR FOOD, FORAGE AND FIBRE PRODUCTION</b>                                                                       |                       |                     |
| <b><i>Programme 1: Water-efficient production methods in relation to soils, crops and technology in rain-fed and irrigated agriculture</i></b> |                       |                     |
| Theme: Climate change impacts on water sustainability of South African crop production in strategic water resource areas                       | Open                  | Open                |
| Theme: Determine water use of Apricot crop                                                                                                     | Open                  | Open                |
| Theme: Water use of Nectarine crop in different agro - ecological zones                                                                        | Open                  | Open                |
| <b>THRUST 2: WATER UTILISATION FOR FUELWOOD AND TIMBER PRODUCTION</b>                                                                          |                       |                     |

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                   | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
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| <b>Programme 1: <i>Water-efficient production methods and systems in agro-forestry, woodlands and forestry plantations</i></b>                                                                                                                                                                                   |                       |                     |
| Theme: Water use and energy production of Pines in the Eastern Cape, KwaZulu – Natal and Western Cape Provinces                                                                                                                                                                                                  | Open                  | Open                |
| <b>THRUST 3: WATER UTILISATION FOR POVERTY REDUCTION AND WEALTH CREATION IN AGRICULTURE</b>                                                                                                                                                                                                                      |                       |                     |
| <b>Programme 1: <i>Sustainable water-based agricultural activities in rural communities</i></b>                                                                                                                                                                                                                  |                       |                     |
| Theme: Development of a drought early warning system for South Africa (SA-DEWS): linking access to climate services to rainfed agriculture in rural communities                                                                                                                                                  | Open                  | Open                |
| Theme: Developing a database and utility tool for underutilised indigenous crops for increased agricultural diversification in South.                                                                                                                                                                            | Open                  | Open                |
| Theme: Contextualising and developing priorities for the African Union's Irrigation Development and Agricultural Water Management (IDAWM) Framework for South Africa<br>Theme: Quantifying the impacts of the Revitalisation of Smallholder Irrigation Schemes (RESIS) Program in South Africa – 20 years later. | Open                  | Open                |
| <b>Programme 2: <i>Integrated water management for profitable farming systems</i></b>                                                                                                                                                                                                                            |                       |                     |
| Theme: Linking crop failure of underutilised and conventional crops under climate change to resilience and sustainable diets in South Africa                                                                                                                                                                     | Open                  | Open                |
| Theme: Piloting Metagenomics In Irrigated Agricultural Systems : A WEFE approach                                                                                                                                                                                                                                 | Open                  | Open                |
| Theme: Developing a regional knowledge hub for the WEF nexus for southern Africa<br>Theme: Institutionalising and embedding the WEF nexus and related appropriate tools into the South African future development context                                                                                        | Open                  | Open                |
| <b>THRUST 4: WATER RESOURCE PROTECTION, RESTORATION AND RECLAMATION IN AGRICULTURE</b>                                                                                                                                                                                                                           |                       |                     |
| <b>Programme 1: <i>Sustainable water resource use on irrigation schemes and within river catchments</i></b>                                                                                                                                                                                                      |                       |                     |
| Theme: Developing scalable and inclusive pathways for water, land and ecosystem innovations for sustainable and resilient food systems for South Africa                                                                                                                                                          | Open                  | Open                |
| <b>Programme 2: <i>Impact assessment and environmental management of agricultural production</i></b>                                                                                                                                                                                                             |                       |                     |
| Theme: Mapping climate, water, energy, food and environmental risks and developing sustainability and climate change adaptation guidelines on the Water-Energy-Food (WEF) Nexus                                                                                                                                  | Open                  | Open                |
| Theme: Circular economy resource recycling and sustainability: wastewater irrigation and crop associated microbiomes                                                                                                                                                                                             | Open                  | Open                |

## **DIRECTED CALL**

The WRC has also published terms of reference (ToR's) from different business Units or Key Strategic Areas. These terms of reference are part of the 2022 Annual Call for project proposals. The tables below indicate specific BU's/ KSA's, thrusts, programmes and themes or tiles that must be addressed by project proposals that are responding to those ToR's.

### **DIRECTED CALL FOR KSA 1&2: WATER RESOURCES AND ECOSYSTEMS**

| THRUSTS, PROGRAMMES AND THEMES                                                                   | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
|--------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| <b>THRUST 1: GOVERNANCE AND INSTITUTIONAL ARRANGEMENTS</b>                                       |                       |                     |
| <b>Programme 2: Policy, science, and implementation</b>                                          |                       |                     |
| <i>Title: Enabling the incorporation of administrative penalties into the National Water Act</i> | 800 000               | 800 000             |
| <b>THRUST 2: HYDROLOGICAL AND ECOSYSTEM PROCESSES</b>                                            |                       |                     |
| <b>Programme: 2. Data and hydroinformatics</b>                                                   |                       |                     |
| The state of citizen science as an approach to water resource quality monitoring                 | 500 000               | 1500 000            |
|                                                                                                  |                       |                     |
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### **DIRECTED CALL FOR KSA 3: WATER USE, WASTEWATER RESOURCES AND SANITATION FUTURES**

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                             | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| <b>THRUST 1: WATER SENSITIVE AND RESILIENT SETTLEMENTS</b>                                                                                                                                 |                       |                     |
| <b>Programme 1: Smart water supply management</b>                                                                                                                                          |                       |                     |
| Title 1: Development of an approach towards digitalization of water services sector in SA                                                                                                  | 400 000.00            | 750 000.00          |
| Title 2: Smart water metering, trends, opportunities, risks and policy.                                                                                                                    | 350 000.00            | 600 000.00          |
| <b>Programme 2: Sustainable drainage Programme futures</b>                                                                                                                                 |                       |                     |
| Title 1: Demonstration of the development of a WSD plans for four case study municipalities from category B and C.                                                                         | 600 000.00            | 1 500 00.00         |
| Title 2: An investigation and analysis of the intense storms generated by climate change and its impact on urban drainage design and practice – case study of Ethekeweni and surroundings. | 300 000.00            | 600 000.00          |
| <b>Programme 3: Water efficiency and behaviour change</b>                                                                                                                                  |                       |                     |
| Title 1: Strategy for national scaling of behavioural nudges and other associated behaviour change tools                                                                                   | 450 000.00            | 450 000.00          |
| <b>Programme 4: Water services Institutional and management programme</b>                                                                                                                  |                       |                     |
| Title 1: The DDM model and its implications on Water Services Legislation, planning and regulation.                                                                                        | 300 000.00            | 500 000.00          |
| <b>THRUST 2: WATER QUALITY FUTURES</b>                                                                                                                                                     |                       |                     |
| None                                                                                                                                                                                       | none                  |                     |
| <b>THRUST 3: SUSTAINABLE INTEGRATED WASTEWATER RESOURCES FUTURES</b>                                                                                                                       |                       |                     |
| None                                                                                                                                                                                       | None                  | None                |

| THRUSTS, PROGRAMMES AND THEMES                                                                                                                                                                                                                                                                                          | BUDGET<br>2023/24 (R) | TOTAL<br>BUDGET (R) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| <b>THRUST 4: THE SANITATION TRANSFORMATION INITIATIVE</b>                                                                                                                                                                                                                                                               |                       |                     |
| <b>Programme 1: Re-Engineered Toilets</b>                                                                                                                                                                                                                                                                               |                       |                     |
| <i>Title 1: SMARTSAN 1- Proof-of-Concept for urban, household re-engineered toilet that uses incineration as the main treatment process. Conceptual design must meet spatial requirements of urban toilet cubicle and deal with flushing water content.</i>                                                             | 400 000               | 600 000             |
| <i>Title 2: SMARTSAN 2 – Proof-of-Concept for urban, household re-engineered toilet that carbonises human faecal waste. Conceptual design must meet spatial requirements of urban toilet cubicle and deal with flushing water content.</i>                                                                              | 400 000               | 600 000             |
| <b>Programme 2: Sanitation-Sensitive Design (SSD)</b>                                                                                                                                                                                                                                                                   |                       |                     |
| <i>Title 1: The Development of a Framework and Model for Designing Sanitation Sensitive Cities</i>                                                                                                                                                                                                                      | 300 000               | 600 000             |
| <i>Title 2: Development of a Strategic Approach to include Re-Engineered Toilets into Institutional and Municipal Financial Planning</i>                                                                                                                                                                                | 350 000               | 700 000             |
| <b>Programme 3: Municipal Sludge Valorisation</b>                                                                                                                                                                                                                                                                       |                       |                     |
| <i>Title 1: Development of Curricula for Non-Sewered Sanitation &amp; Sludge Valorisation</i>                                                                                                                                                                                                                           | 250 000               | 500 000             |
| <i>Title 2: What are municipalities doing with their municipal sludge? Understanding the current practices and the cost associated with municipal sludge disposal with case studies</i>                                                                                                                                 | 350 000               | 700 000             |
| <i>Title 3: Understanding the current trends and advances in municipal sludge technology and innovative options related to sludge management</i>                                                                                                                                                                        | 400,000               | 700,000             |
| <i>Title 4: Paradigm shift towards Circular Economy (CE) approaches in the Water and Wastewater Sector: Understanding the benefits, financing options and recommending policy, institutional and regulation frameworks and actions required to shift towards CE approach, including local examples of best practice</i> | 400 000               | 800 000             |

#### **DIRECTED CALL FOR KSA 4: WATER UTILISATION IN AGRICULTURE**

**NO PLANNED DIRECTED PROJECTS ARE ANTICIPATED FOR KSA 4: WATER UTILISATION IN AGRICULTURE DURING THE 2023/24 FINANCIAL YEAR**