

# WRC RESEARCH PORTFOLIO 2011/2012

## KSA 1 WATER RESOURCE MANAGEMENT

*Denotes new project commencing in 2011				
THRUST 1: WATER RESOURCE ASSESSMENT AND PLANNING				
Project No	Title	Contractor	Term	Cost (R)
<b>Programme 1: Catchment data and information systems</b>				
1906	A comprehensive short-term heavy rainfall forecasting system for South Africa with first implementation over the Gauteng Province. SHORTRAIN	UP	1/4/09 - 31/3/12	965 900
1909	Reducing uncertainties of evapotranspiration and preferential flow in the estimation of groundwater recharge	CSIR	1/4/09 - 31/3/12	2 000 000
2020	Delineating quinary catchments for South Africa and modelling their associated hydrology	CSIR	1/4/2010 - 31/9/2011	295 000
2024	HYLARS MET: A hydrologically consistent land surface model for soil moisture and evapotranspiration modelling over Southern Africa using remote sensing and meteorological data	Pegram & Associates (Pty) Ltd	1/4/2010 - 31/9/2013	1 423 000
2049	The hydrogeology of Groundwater Region 17: Central Highveld	Council for Geoscience	1/4/2011 – 30/9/2013	700 000
2057	Developing a citizen-based rainfall monitoring system	Pegasys Strategy and Development (Pty) Ltd	1/4/2011 - 30/9/2014	400 000
2062	The establishment of rain gauge networks for rainfall estimation calibration of the South African new weather radar network	WITS	1/4/2011 - 30/9/2015	1 100 000
<b>Programme 2: Surface water / groundwater hydrology</b>				
1904	Nutrient and organic carbon fluxes from small-scale agriculture	UKZN	1/7/09 – 30/6/12	1 639 600
1907	The use of isotope hydrology to characterise and assess water resources in South(ern) Africa	WITS	1/4/09 - 31/3/12	2 009 200
2021	Hydrology of South African soils and hillslopes (HOSASH)	UFS	1/4/2010 - 30/9/2015	5 000 000
2022	The long-term impact of <i>Acacia mearnsii</i> trees on evaporation, streamflow, low flows and groundwater resources. Phase II: Understanding the controlling environmental variables and soil water processes over a full crop rotation	CSIR	1/4/2010 - 29/9/2013	800 000
2023	A method of 3-D fracture connectivity determination and its hydro-geological application	UWC	1/4/2010 - 30/9/2012	300 000
2051*	Surface water, groundwater and vadose zone interactions in selected pristine catchments in the Kruger National Park	UKZN	1/4/2011 - 30/9/2014	1 800 000
2053*	Impact of fault structures on the occurrence of groundwater in fractured rock aquifers	Council for Geoscience	1/4/2011 - 30/9/2014	600 000
2054*	Groundwater-surface water interaction: From theory to practice	UFS	1/4/2011 - 30/9/2014	2 000 000
2055*	Investigation of groundwater potential in fractured crystalline rocks of the Northwest Province, South Africa	Council for Geoscience	1/4/2011 - 30/9/2013	1 000 000

2058*	Development of the pressure release flowing test method for artesian flow aquifers with case study in TMG.	UWC	1/4/2011 - 30/9/2013	R 400 000
2066*	Validation of the forcing variables (evaporation and soil moisture) in hydro-meteorological models	UKZN	1/4/2011 - 30/9/2014	R 700 000
<b>Programme 3: Water resource planning</b>				
1951	National water resource planning for operational needs: an update of applied approaches (Phase 1): Integrated modelling for water resource planning and operational management	UKZN	1/11/09 - 31/10/12	2 300 000
1959	Optimal utilisation of geothermal water resources	UNISA	1/4/2010 - 30/9/2013	2 380 655
2019	Enhancements to WR2005 study	SSI	1/4/2010 - 31/3/2011	450 000
2048*	Development of a groundwater resource assessment methodology for South Africa: towards a holistic approach	UFS	1/4/2011 - 30/9/2013	980 000
2056*	Implementing uncertainty analysis in water resource assessment and planning	RU	1/4/2011 - 30/9/2014	600 000
<b>Programme 4: Water Resource Infrastructure</b>				
2025	Structural health monitoring of arch dams using dynamic and static measurement	UCT	1/4/2010 - 30/9/2013	1 500 000
<b>Programme 5: Sources of New Water</b>				
2059*	Optimising fog water harvesting	UNISA	1/4/2011 - 30/9/2015	2 500 000
<b>THRUST 2: WATER QUALITY MANAGEMENT</b>				
<b>Programme 1: Water quality monitoring</b>				
1962	Implementation of the rule-based agent for <i>Microcystis</i> in Rietvlei Dam	NWU	1/4/2010 - 30/9/2015	175 000
1849	Management of human-induced salinisation in the Berg River catchment and development of criteria for regulating land use in terms of salt-generating capacity	UP	01/4/08 - 03/3/12	2 964 000
1970	The optimisation of available human, institutional, technical and financial resources to strategically approach deteriorating water quality in SA through innovative and collective effort focusing on sources of pollution in prioritised fashion	Golder Associates Africa (Pty) Ltd	1/4/2010 - 30/9/2014	500 000
<b>Programme 2: Water Quality modelling</b>				
1966	A large scale study of the human-induced impacts on the microbial and physico-chemical quality of ground- and surface water in the North-West Province, South Africa	NWU	1/4/2010 - 30/9/2012	1 204 800
1967	Investigations into the existence of unique environmental <i>Escherichia coli</i> populations	UP	1/4/2010 - 30/9/2012	600 000
2063*	Implementation of salinity and water management tools for the Berg and Breede catchments in the Western Cape	US	1/4/2011 - 30/9/2015	1 000 000
2065*	Nutritional factors influencing the biosynthesis of the neurotoxin Beta-N-methylamino-L-alanine by cyanobacteria	NMMU	1/4/2011 - 30/9/2013	500 000
<b>Programme 3: Impacts on and of water quality</b>				
1915	Guidelines for EDC management in water resources: Volume 1: Monitoring and assessment	UP	1/4/09 - 31/3/12	1 500 000
1933	Guidelines for EDC management in water resources: Volume 4: Management options for EDCs in catchments.	Golder Associates Africa (Pty) Ltd	1/4/09 - 31/3/12	1 500 000

<b>THRUST 3: WATER RESOURCE PROTECTION</b>				
<b>Programme 1: Water sources protection</b>				
1848	Nitrate removal for groundwater supply to rural communities	CSIR	01/4/08 - 31/5/11	600 000
1905	Investigation of the fate and transport of selected microorganisms in two simulated aquifer conditions in the laboratory and in the field	CSIR	1/4/09 - 31/3/12	1 406 000
1968	Assessment of the prevalence of human viral and bacterial pathogens in some recreational beaches and rivers in Amathole District Municipality of the Eastern Cape Province of South Africa.	UFH	1/4/2010 - 30/9/2012	680 000
2052*	Vadose zone hydrology: Spatial and temporal influences, assessment techniques and aquifer susceptibility	UP	1/4/2011 - 30/9/2014	1 000 000
2064*	Towards an integrated framework for the assessment and management of sediment-related impacts on water resources in South Africa: A dam performance case.	Muondli Consulting and Projects	1/4/2011 - 30/9/2013	1 000 000
2069*	Guidelines for the delineation of protection zones in a complex aquifer setting	UWC	1/4/2011 - 30/9/2013	740 000
2070*	Preventing production borehole clogging by <i>in situ</i> iron removal in South African aquifer systems	Council for Geoscience	1/4/2011 - 30/9/2014	600 000
<b>Programme 2: Land-water linkages</b>				
2071*	Water Sensitive Urban Design (WSUD) or Low Impact Design (LID) for improving water resource protection/conservation and reuse in urban landscapes	UCT	1/4/2011 - 30/9/2014	2 000 000
<b>THRUST 4: WATER RESOURCES AND CLIMATE</b>				
<b>Programme 1: Predictive tools</b>				
1913	Modelled sea-surface temperature scenario considerations and Southern Africa's seasonal rainfall and temperature predictability	SAWS	1/4/09 - 31/3/12	488 625
1961	Projected impacts of climate change on water quantity and quality in the uMngeni Catchment	UKZN	1/4/2010 - 30/9/2013	1 492 000
1964	Modelling daily rain-gauge network measurement responses under changing climate scenarios (S)	Pegram & Associates (Pty) Ltd	1/4/2010 - 30/9/2013	1 000 000
2018	Developing climate change adaptation measures and decision-support system for selected South African water boards	RU	1/4/2010 - 30/9/2013	1 000 000
2050*	Unifying weather and climate variability predictions - An operational seamless forecasting system for Southern Africa at time scales from days to seasons	CSIR	1/4/2011 - 30/9/2014	950 000
2060*	South African climate multidisciplinary analysis	UCT	1/4/2011 - 30/9/2014	1 200 000
2061*	Development of defensible regional climate change projections for adaptation and policy	UCT	1/4/2011 - 30/9/2014	1 317 750
2067*	The limits of predictability of the South African seasonal climate	UCT	1/4/2011 - 30/9/2014	1 200 000
<b>Programme 2: Climate change risk, vulnerability and adaption</b>				
1843	An evaluation of the sensitivity of socio-economic activities to climate change in climatically divergent South African catchments	UKZN	01/04/08 - 31/4/11	2 500 000
1963	The role of local community institutions in the adaptation of rural and urban communities to the impacts of climate change on water access and use	UNISA	1/4/2010 - 30/9/2013	3 000 000
1965	Developing water-related climate change adaptation options to support implementation of policy and strategies for Water for Growth and Development (S)	UKZN	1/4/2010 - 30/9/2013	3 000 000
2027	Development of decision-support guidelines for vulnerability assessments	UFS	1/4/2010 -	700 000

	and adaptation requirements among rural economies and communities, including gender issues (Phase 1)		30/9/2012	
2028	Investigation of effects of climate change on eutrophication and related water quality and secondary impacts on the aquatic ecosystem	Golder Associates Africa (Pty) Ltd	1/6/2010 - 30/9/2013	1 500 000
<b>Programme 3: Integrated floods and droughts management</b>				
1960	Extreme events: Past and future changes in the attributes of extreme rainfall and the dynamics of their driving processes	UCT	1/4/2010 - 30/9/2011	420 000
2068*	Improvement of early preparedness and early warning systems for extreme climatic events flood warning	SAWS	1/4/2011 - 30/9/2014	813 000
<b>THRUST 5: WATER RESOURCE INSTITUTIONAL ARRANGEMENTS</b>				
<b>Programme 1: Governance and reform</b>				
1969	Water governance decentralisation in Africa: a framework for reform process and performance analysis	UP	1/4/2010 - 30/9/2013	1 000 000
1971	The development of an institutional adequacy index using the multi-dimensional poverty approach	UWC	1/4/2010 - 30/9/2013	1 590 000
1972	Prospects and processes for the establishment of stakeholder-initiated catchment management agencies	WITS	1/4/2010 - 01/10/2011	600 000
1975	IWRM - from theory to practice	UWC	1/4/2010 - 30/9/2013	1 005 000
2072*	Advancing Strategic Adaptive Management (SAM) as a framework for implementation of IWRM by catchment management agencies	WITS	1/4/2011 - 31/3/2014	1 637 975
2074*	Change oriented learning and water management practices: Knowledge flows and mediation Tools	RU	1/4/2011 - 30/9/2014	900 000
2076*	Investigating stakeholder engagement cycles and identities within water resource management, using narrative techniques.	The Narrative Lab	1/4/2011 - 30/9/2014	746 108
<b>Programme 2: Compliance and enforcement</b>				
1935	A management tool for the Inkomati Basin with focus on improved hydrological understanding for risk-based operational water management	UKZN	01/4/2009 - 31/3/13	1 800 000
1973	Development of a system dynamics model for the implementation of IWRM in South Africa: PHASE II: Pilot implementation and design of the PMS	Jeffares & Green (Pty) Ltd	1/4/2010 - 30/9/2011	442 750
2073*	Embedding property rights theory in cooperative approaches to the management of aquatic ecosystem services in South Africa	UKZN	1/4/2011 - 30/9/2013	600 000
2077*	Considering alternative dispute settlement practices for water resource management In South Africa	US	1/4/2011 - 30/9/2014	1 400 000
<b>Programme 3: Pricing and finance</b>				
1974	Determining the socio-economic value of groundwater in the TMG Aquifer	UWC	1/4/2010 - 30/9/2012	300 000
2075*	Approaches to engaging basin risk and the political economy of water in the Western Cape system	Pegasys International	1/4/2011 - 30/9/2014	700 000
2078*	An analysis of water pricing instruments governed by the DWA water pricing strategy, and its potential for generating revenue for CMAs	Prime Africa Consultants	1/4/2011 - 30/9/2014	610 000
<b>Programme 4: Transboundary water resources</b>				
<b>Programme 5: Future Scenarios</b>				

## KSA 2 WATER-LINKED ECOSYSTEMS

THRUST 1: ECOSYSTEM PROCESSES				
<i>Programme 1: Estuarine processes</i>				
K5	Title	Contractor	Term	Cost (R)
1982	Primary producers as sinks for nitrogen and phosphorus in the Great Brak Estuary	NMMU (Botany)	01 Apr 2010 - 31 Jul 2013	955 000
<i>Programme 2: Riverine processes</i>				
1676	Periphyton flow dynamics	UCT (Freshwater Research Unit)	01 Feb 2006 - 31 May 2011	1 000 000
1928	An assessment of the current biodiversity of amphibians associated with the major river systems of the Kruger National Park and the physical and chemical factors affecting their distribution	BioAssets cc	01 Apr 2009 - 31 Jul 2013	1 036 500
1929	Biomonitoring the fish health of two impoundments in Olifants River, Limpopo Province	UL (Biodiversity Department)	01 Apr 2009 - 31 Jul 2012	674 500
1981	Linking hydrology and lateral riparian vegetation zones	Southern Waters Ecological Research & Consulting	01 Apr 2010 - 31 Jul 2013	1 765 310
<i>Programme 3: Wetland processes</i>				
1857	To investigate the capability of the Mfabeni Mire (St Lucia) to respond to climatic and land-use stresses and its role in sustaining discharge to downstream and adjacent ecosystems	RU	01 Apr 2008 - 31 May 2011	859 750
1921	Establishing ranges of water quality variables in wetlands and their relationship to land use and ecosystem response: towards refining the ecological Reserve	UCT (Freshwater Research Unit)	01 Apr 2009 - 28 Feb 2012	1 070 064
1923	Regional wetland processes of the Maputaland coastal aquifer on the Zululand coastal plain	ARC Institute for Soil Climate & Water	01 Jan 2009 - 01 Jul 2011	893 364
1926	Evapotranspiration from the Nkazana swamp forest and the Mfabeni Mire	CSIR NRE (Pietermaritzburg)	01 Jan 2009 - 31 Jul 2011	908 000
1927	Identifying relationships between soil processes and biodiversity to improve restoration of riparian ecotones invaded by invasive acacias	US	01 Jan 2009 - 31 Jul 2012	1 800 200
THRUST 2: ECOSYSTEM MANAGEMENT AND UTILISATION				
<i>Programme 1: Ecological Reserve</i>				
1797	Application and testing of a strategic adaptive management system for freshwater protection, associated with implementation of South Africa's national water policy	SA National Parks, Scientific Services	01 Jul 2008 - 31 Sep 2011	1 335 725
1798	Environmental water requirements for non-perennial systems: Phase III (K5/1587 continued)	UFS (Centre for Environmental Management)	01 Jul 2008 - 31 Jul 2012	3 000 000
1799	Water temperatures and the ecological Reserve	Freshwater Consulting Group	01 Jan 2008 - 31 Mar 2011	1 994 090
1930	Review and update of resource directed measures (RDM) for estuaries	Anchor Environmental Consultants	01 Apr 2009 - 31 Apr 2011	604 400
1873	Decision support system for IFR	Southern Waters Ecological Research & Consulting	01 Dec 2008 - 28 Feb 2012	1 800 000
1979	Linking of daily and monthly hydrological time series for use in monthly water resources models in support of the determination of ecological water re-	Water for Africa (Pty) Ltd	01 Apr 2010 - 31 Mar 2012	378 000

	quirements			
<b>Programme 2: Estuary management</b>				
1924	The application of choice modelling techniques to guide the management of estuaries in South Africa – case studies at the Kromme, Bushmans, Sundays and Keurbooms estuaries	NMMU	01 Apr 2009 - 30 Jun 2012	770 000
<b>Programme 3: Ecosystem health</b>				
1712	Development of an ecosystem risk assessment model to determine the risk of EDCs in the water environment (was 1798S)	US (Zoology)	01 Apr 2009 - 31 Jan 2012	370 000
1976	Genetic diversity studies on selected taxa in the Klip River System: Towards the assessment of the usefulness of genetic diversity as an indication of ecological health	Sinelwati Scientific Research & Management	01 Apr 2010 - 30 Nov 2013	1 650 000
1980	Expanding on a National Wetland Vegetation Database for the purpose of conservation planning, monitoring and wetland rehabilitation	UFS (Plant Sciences) (Qwa Qwa campus)	01 Apr 2010 - 30 Nov 2013	1 951 000
2111*	Assessment of locally manufactured radio telemetry equipment for manual and remote behavioural monitoring of fish in lentic and lotic freshwater ecosystems in South Africa	Rivers of Life Aquatic Health Services cc	01 Apr 2011 - 30 Apr 2013	841 000
<b>Programme 4: Environmental water quality</b>				
1977	Survey of potential ecological and human health risks posed by persistent organic pollutants in aquatic environments in densely industrialised and urbanised areas	CSIR NRE	01 Apr 2010 - 31 Jul 2013	1 543 176
1984	Linking land use and water quality for effective water resource and ecosystem management	Consortium: CSIR; Ground-Truth cc; UKZN	01 Apr 2010 - 31 Jul 2013	1 520 060
2038*	Aquatic microbial diversity: A sensitive and robust tool for assessing ecosystem health and functioning	RU (Biochemistry & Microbiology)	01 Apr 2011 - 30 Apr 2014	800 000
2040*	The effects of sediment as a physical water quality variable on macroinvertebrates, as an input into the development of water quality guidelines	RU (Unilever Centre for Environmental Water Quality)	01 Apr 2011 - 31 May 2013	1 000 000
<b>Programme 5: Endocrine disrupting compounds (EDCs) in water sources</b>				
1680	Amphibian metamorphosis as a biological model to study the effect of endocrine contaminants on thyroid function	US (Zoology)	01 Apr 2006 - 31 May 2011	400 000
1706	Environmental assessment in an area where ongoing DDT spraying occurs	RU (Institute for Water Research)	01 Oct 2007 - 01 Jul 2011	999 415
1932	A study of the interactive effects of pesticide mixtures in water on selected species	US (Zoology)	01 Apr 2009 - 31 Jul 2013	1 400 000
1983	Manual of guidelines for the management of EDCs in water resources: Volume 2: EDC sampling guide	Golder Associates Africa (Pty) Ltd	01 Feb 2011 - 31 May 2012	495 000
<b>Programme 6: Socio-economic considerations</b>				
1925	Establishing the fishery potential of the Nandoni Dam on the Luvuvhu River, Limpopo Province	UV (Biological Sciences)	01 Apr 2009 - 31 Jul 2012	733 200
1978	Extracting scientific evidence for the development of ecosystem services production functions for the Resource Directed Measures	Prime Africa Consultants	01 Apr 2010 - 31 Jul 2012	500 000
<b>Programme 7: Ecosystem governance</b>				
1801#L	Identifying and enabling protection of national freshwater heritage ecosystems for South Africa	CSIR NRE	01 Mar 2008 - 31 May 2011	1 620 200
1920S	The Shared Rivers Initiative Phase 2	AWARD	01 Dec 2010 - 31 May 2013	1 500 000

**THRUST 3: ECOSYSTEM REHABILITATION****Programme 1: Wetland rehabilitation**

1922	Conservation of tigerfish, <i>Hydrocynus vittatus</i> , in the Kruger National Park with the emphasis on the estab-	UJ (Zoology)	01 Apr 2009 - 31 Jul 2012	1 844 120
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	lishment of management plans for the protection of its riverine habitat			
1986S	Wetlands and livelihoods: Restoration of wetlands' ecological process, form and function to provide the ecosystem goods and services necessary to support livelihoods	UKZN (CEAD)	01 Apr 2010 - 30 Apr 2012	800 000
*2035	Assessment of long-term response of specific wetlands to Working for Wetlands rehabilitation	Ground Truth cc	01 Apr 2011 - 30 Apr 2012	199 580
<b>Programme 2: River and impoundment rehabilitation</b>				
1918S	Food-web manipulation Phase II: Food-web interactions in South African reservoirs traced using stable isotopes	DH Environmental Consulting	01 Jan 2009 - 31 Jan 2012	1 500 000
*2036	Setting objectives for urban river rehabilitation	Aurecon Group	01 Apr 2011 - 31 May 2013	850 000
*2037	Hyperspectral remote sensing of water hyacinth: From plant physiology to landscape level changes	WITS (Animal, Plant & Environmental Sciences)	01 Apr 2011 - 31 Jan 2014	610 561
*2039	Biology, ecology and management of indigenous and invasive alien fish species in the Groot Marico River catchment	Consortium: SA Institute for Aquatic Biodiversity (SAIAB); Golder Associates Africa (Pty) Ltd	01 Apr 2011 - 31 Dec 2013	1 600 000

### KSA 3

## WATER USE AND WASTE MANAGEMENT

<b>THRUST 1: WATER SERVICES – INSTITUTIONAL AND MANAGEMENT ISSUES</b>				
<b>Project No</b>	<b>Title</b>	<b>Contractor</b>	<b>Term</b>	<b>Cost (R)</b>
<b>Programme 1: Pricing and Financing water services</b>				
1892	Critical assessment of raising basic level of water services	Nemai Consulting	01/04/2009-31/03/2011	600 000
1989	Strengthening the sustainability and effectiveness of Free Basic Water	Counterpoint Development	01/04/2010-31/03/2013	1 400 000
2085*	Mechanism for pricing and financing the implementation of the Green Drop Report to guide the strategic decrease of the risk factor of wastewater treatment works	Asset Research	01/04/2011-31/03/2013	597 500
2086*	Assessing the impact of expansion of bulk infrastructure on capital requirements of Water Boards	Palmer Development Group	01/04/2011-31/03/2013	475 000
2087*	Providing water services at tariff levels that cover cost and that are sensitive to demand	NMMU	01/04/2011-31/03/2014	1 250 000
<b>Programme 2: Institutional and management issues –Water services</b>				
1814	Integrated water meter management	UJ	01/04/2008-31/03/2011	660 000
1893	Guidelines on determining the vulnerability and risks of water services infrastructure	Emanti Management	01/04/2009-31/03/2011	996 800
1950	Guidelines on condition assessment of water services infrastructure	UP	01/06/2009-31/03/2011	800 000
1953	Development of protocols and guidelines for municipalities to undertake studies to determine the impact or influence of climate change on water services delivery	WITS	01/04/2009-30/06/2011	700 000
1987	The Provision of FBW to backyard dwellers and/or more than one household per stand	Nemai Consulting	01/04/2010-31/03/2012	601 800
2088*S	Adapting and piloting the new concepts of Community-Led Total Sanitation (CTLS) in the South African municipal environment	CPUT	01/04/2011-31/03/2014	2 500 000

2089*	A comparative analysis of water management devices in Cape Town and prepayment meters in Johannesburg	UW C	01/04/2011-31/03/2013	500 000
<b>Programme 3: Innovative management arrangements - Rural water supply</b>				
1940	Social scarcity of water and water use	African Centre for Water Research	01/04/2009-31/03/2011	500 000
1941	Investigating operational and indigenous knowledge of water use and waste management, and establishing ways to integrate them into water service management	Nemai Consulting	01/04/2009-31/03/2011	600 000
1888	Investigating the social vulnerability of people and their livelihoods and their response to water infrastructure	Umvoto Africa	01/04/2009-31/03/2011	500 000
1952	Franchising partnerships for operation and maintenance of water services	CSIR	01/04/2009	4 800 000
1990	Innovative water and sanitation management arrangements at family and neighbourhood level	Sarah Slabbert Associates	01/04/2010-31/03/2012	412 000
2090*	Strategy for large scale roll-out of community-based service provision	Palmer Development Group	01/04/2011-31/03/2013	645 500
<b>Programme 4: Regulation of water services<sup>1</sup></b>				
<b>Programme 5: Water services education and awareness</b>				
1886	Survey of handwashing hygiene behaviour	Sustento Development Services	01/04/2009-31/03/2011	520 670
2091*	Social norms and moderation of water consumption in a major South African city	EPRU	01/04/2011-31/03/2013	462 000

## THRUST 2 : WATER SUPPLY AND TREATMENT TECHNOLOGY

<b>Programme 1: Drinking water treatment technology</b>				
1716	Development of a durable and reliable wave-energy reverse osmosis pump	The Impact Free Water Group	01/04/2007-31/05/2012	862 000
1836	Application and performance of slow sand filtration	CPUT	01/04/2008-31/03/2011	760 000
1883	Assessment of the prevalence of organic compounds in raw and treated water for potable purposes, their fate in current treatment plants, and compilation of a guideline on best available technology for the removal thereof	UJ	01/04/2009-31/03/2012	1 800 000
1894	Wastewater reclamation for potable reuse	Umgeni Water	01/04/2009-31/12/2013	650 000
1896	The establishment and piloting of the Technical Assistance Centre for small water and wastewater treatment plants	Chris Swartz Water Utilisation Engineers	01/04/2009-31/03/2010	275 000
1942	Development of design and operating guidelines for high rate clarifiers in the South African water treatment industry	Umgeni Water	05/05/2009-01/05/2012	1 800 000
1992	Development of a costing model to determine the cost-efficiency and energy efficiency of water treatment technologies and supply options	Chris Swartz Water Utilization Engineers	01/04/2010-31/03/2012	776 800
1994	An independent investigation into the purification capacity of small-scale water purification units manufactured and supplied in South Africa	UJ	01/04/2010-31/03/2013	809 000
2092*	Energy efficiency in the South African water industry: a compendium of best practices and case studies	Chris Swartz Water Utilisation Engineers	01/04/2011-31/03/2013	1 000 000
<b>Programme 2: Water treatment technology for rural communities</b>				
1884	Compilation of guidelines for the selection and use of home water treatment systems and devices	TUT	01/04/2009-31/03/2012	1 200 000

<sup>1</sup>This programme, although presently empty, is kept open to invite new proposals.

<b>Programme 3: Drinking water quality</b>				
1885	B-N-methylamino-L-alanine bioaccumulation and biomagnification: Health risks and water treatment possibilities	NMMU	01/04/2009-31/03/2012	1 800 000
1902	Rapid enzymatic detection of organochlorine pesticides in water	RU	01/04/2009-31/03/2011	600 000
1991	Nanotechnology solutions for drinking water	RU	01/04/2010-31/03/2013	1 800 000
2093*S	Scoping study and research strategy development on currently known and emerging contaminants influencing drinking water quality	UFS	01/04/2011-31/03/2013	598 900
2094*	Verification and validation of analytical methods for testing the levels of PPHCP (pharmaceutical and personal health care products) in treated drinking water and sewage	UNISA	01/04/2011-31/03/2013	500 000
<b>Programme 4: Water distribution and distribution systems</b>				
1820	Hydraulic capacity of pipelines	UP	01/04/2008-31/03/2011	785 000
1821	Grey-water reticulation	WITS	01/04/2008-31/03/2011	1 055 500
1993	Integration of Water Safety Plan requirements into the existing WRC water supply system assessment tool	eManti Management	01/04/2010-30/09/2011	420 744
1995	Practical application of residential water demand and wastewater flow end-use model in South Africa	US	01/04/2010-31/03/2013	659 500
1996	Assessment of non-revenue water in South Africa	WRP Consulting Engineers	01/04/2010-31/03/2012	994 500
1997	Compendium of case studies relating to water loss and water demand interventions at the municipal level in South Africa	Resolve Consulting	01/04/2010-31/03/2012	600 000
1998	Apparent losses in selected areas in South Africa	UCT	01/04/2010-31/03/2012	400 000
2095*S	Energy generation from distribution systems	UP	01/04/2011-31/03/2013	2 500 000

### THRUST 3: SUSTAINABLE MUNICIPAL WASTEWATER MANAGEMENT AND SANITATION

#### Programme 1: Emerging treatment technologies - Preparing for the future

1822	Mass balance modelling for wastewater treatment plants III	UCT	01/04/2008-31/05/2011	998 950
1823	FISHing for indigenous ANAMMOX bacteria	US	01/04/2008-31/07/2011	612 750
1824	Effects of urine separation and treatment on wastewater effluent quality	CSIR - Stellenbosch	01/04/2008-31/03/2011	1 200 000
2000	Biotech in sanitation: Biopolymer production with <i>Natronococcus occultus</i> , a haloalkaliphile, using municipal wastewater and other waste resources	UCT	01/04/2010-31/03/2012	356 000
2001	Co-digestion of sewage sludge and industrial concentrates	UKZN	01/04/2010-31/03/2013	1 050 000
2004	Urban effluent treatment in a rhizofiltration system	Virtual Consulting	01/04/2010-31/03/2014	2 400 000
2005	The optimisation of waste stabilisation ponds by combining duckweed-based and algal-based systems, together with rock filters	ARTechnologies	01/04/2010-31/03/2012	1 000 000
2006	The development of nanocomposite polysulphone membrane with reduced fouling properties for use in wastewater treatment	UWC	01/04/2010-31/03/2013	900 000
2096*	Exploring knowledge on natural processes for novel approaches to constructed wetland design and performance for wastewater using biomimicry	Golder Associates Africa (Pty) Ltd	01/04/2011-31/03/2016	3 000 000

<b>Programme 2: Application of appropriate technologies and tools</b>				
1825	Denitrification in trickling filters	CSIR - Stellenbosch	01/04/2008-31/03/2011	930 500
1999	Ultra-sensitive electrochemical nano-biosensors array devices for real-time determination of estrogenic endocrine disruptors in municipal wastewater (ENDOTEK)	UWC	01/04/2010-31/03/2013	1 665 000
2003	Microbial database – tool for evaluating the BNR processes in KZN	DUT	01/04/2010-31/03/2013	900 000
2002	Evaluation of the DEWATS process for decentralised wastewater treatment	UKZN	01/04/2010-31/03/2013	900 000
<b>Programme 3: Stormwater and sewerage systems</b>				
1826	Alternative technology for stormwater management	UCT	01/04/2008-31/03/2012	1 800 000
1827	Improving sewerage for South Africa	UCT	01/04/2008-31/03/2012	1 500 000
2007	Investigation into pumps and pressurised flow in separate sewer systems	US	01/04/2010-31/03/2013	1 000 000
<b>Programme 4: Wastewater sludge and faecal sludge management</b>				
1724	Sustainable and beneficial use of biosolids land application strategies: quantifying nitrogen and phosphorus plant-soil mass balances	UP	01/06/2007-28/02/2011	1 150 000
1829	Investigating the potential of deep row entrenchment of pit latrine and wastewater treatment works sludge for forestry and land rehabilitation purposes	Partners in Development (Pty) Ltd	01/04/2008-31/03/2011	1 600 000
1936	Health for purpose in wetlands treating waste streams	CPUT	01/04/2009-31/03/2011	865 722
2097*	Investigation into the long-term risks associated with deep row entrenchment of pit latrine and wastewater treatment sludges for forestry and land rehabilitation purposes	Partners in Development (Pty) Ltd	01/04/2011-31/03/2014	1 000 000
<b>Programme 5: Sanitation technology and innovations</b>				
1901	An approach reducing risks and hazards from human waste generated by informal settlements: community-based risk assessment with municipal partnerships	CPUT	01/04/2009-31/03/2011	587 800
1745	Understanding the sludge accumulation in VIPs and other on-site sanitation systems and strategies to manage desludging in the future when pits are full	Partners in Development	01/04/2007-31/03/2011	1 220 000
1887	Piloting and testing the pour flush latrine technology for its applicability in South Africa	Partners in Development (Pty) Ltd	01/04/2009-31/03/2011	1 000 000
1890	Establishment of sanitation technology demonstration centre	CSIR	01/04/2009-31/03/2011	596 600
2016	Evaluation of the bucket eradication programme	Hlathi Development Service	01/04/2010-31/03/2012	920 000
2017	Evaluation of the Mobisan technology as a sanitation option for informal settlements: Assessing performance, operational requirements and community perspectives	CPUT	01/04/2010-31/03/2012	716 750
2098*	An investigation into technical sanitation solutions for informal areas	CPUT	01/04/2011-31/03/2013	500 000
<b>THRUST 4: SUSTAINABLE AND INTEGRATED INDUSTRIAL WATER MANAGEMENT</b>				
<b>Programme 1: Emerging challenges and solutions for the 21st century</b>				
2009	A tunable immobilised lignocellulosic enzyme (TILE) system for treatment of industrial wastewaters	CPUT	01/04/2010-31/03/2014	2 200 000

2099*	Adapting water footprints for South Africa and exploring the value of integrating water, carbon and energy (environmental) footprints for the South African industrial sector	Pegasys Strategy and Development (Pty) Ltd	01/04/2011-31/03/2013	2 000 000
2100*	Industrial brine minimization: determining the physical chemical parameters that affect evaporation rates on multi component hyper saline effluents	UWC	01/04/2011-31/03/2014	1 500 000
2101*	Evaluation of Forward Osmosis Technology for the treatment of concentrated brines	UKZN (Durban)	01/04/2011-31/03/2014	345 000
<b>Programme 2: Integrated management</b>				
1833	An assessment of the key factors that influence the environmental sustainability of a large inland industrial complex	CSIR	01/04/2008-31/03/2011	3 000 000
<b>Programme 3: Quantification, prediction and minimisation of water use and waste production</b>				
1898	Development of a zero-effluent mathematical model for wastewater minimisation in a pharmaceutical facility	UP	01/04/2009-31/03/2011	466 480
<b>Programme 4: Governance, policy, regulatory and economical instruments to improve industrial water management</b>				
1734	Protocol for quantitative assessment of industrial effluents for discharge permitting	UKZN	01/04/2007-31/03/2011	1 500 000
2102*	Evaluation of partitioning coefficients for South African soils to inform the new National Framework for the Management of Contaminated Land with emphasis on the protection of water resources.	Golder Associates Africa (Pty) Ltd	01/04/2011-31/03/2013	480 000
2103*	Valuing water for South African industries: A production function approach	CSIR	01/04/2011-31/03/2013	780 000
<b>Programme 5: Water efficiency, cleaner production, beneficiation and treatment of industrial effluents</b>				
1900	Pilot application of a dual-stage membrane bioreactor for industrial effluent treatment	Alhydro CC	01/04/2009-31/03/2011	950 000
1937	Beneficiation of agricultural industry effluents	UCT	01/04/2007-31/03/2011	531 909
2008	Recovery and beneficiation of nutrients, water and energy from brewery effluent by means of algal assimilation, hydroponics and aquaculture.	RU (Ichthyology)	01/04/2010-31/03/2013	1 798 000
2010	Development of hybrid membrane-chromatography system for simultaneous recovery of valuable products and water purification for recycle in the olive industry, with a view towards commercial application thereof	UCT	01/04/2010-31/03/2012	892 000
2104*	Adapting constructed wetlands for real-world applications	CPUT	01/04/2011-31/03/2015	1 100 000
2105*	Integrated photo-catalytic and anaerobic treatment of industrial wastewater for biogas production	VUT	01/04/2011-31/03/2013	500 000
2106*	A modern role for wastewater ponding systems in the beneficiation of 'specialist' effluents in industry	Blue Green Technologies cc	01/04/2011-31/03/2013	280 000
<b>THRUST 5: MINE WATER TREATMENT AND MANAGEMENT</b>				
<b>Programme 1: Water use and waste production</b>				
1895	Field testing methods to determine the evaporation rates on brine solutions produced from mine-water treatment	Golder Associates Africa	01/04/2009-31/07/2011	452 100
2107*	Toxicity evaluation of metal and metal oxide nanoparticles to aquatic invertebrates and algal species	CSIR	01/04/2011-31/03/2014	495 000

<b>Programme 2: Regulatory, management and institutional arrangements<sup>2</sup></b>				
<b>Programme 3: Minimising waste production</b>				
2014	Preparation of magnetic nano-composite beads and their application to remediation of mine wastewaters	WITS	01/04/2010-31/03/2013	378 500
2015	Evaluating approaches to and benefits of minimising the formation of acid mine drainage through management of the disposal of sulphidic waste rock and tailings	UCT (CeBER)	01/04/2010-31/03/2013	1 435 250
2108*	Removal of metal ions from industrial effluents and acid mine drainage by metal sulphide precipitation	UCT	01/04/2011-31/03/2013	884 820
2109*	Development of a toolkit to enable quantitative microbial ecology studies of sulphate-reducing and sulphide-oxidising systems	UCT	01/04/2011-31/12/2013	487 500
2110*	Addressing the challenges facing biological sulphate reduction as a strategy for AMD treatment through analysis of the reactor stage: raw materials, products and process kinetics	UCT	01/04/2011-31/03/2014	1 050 000
<b>Programme 4: Mining in the 21st century</b>				
1834	Towards passive treatment solutions for the oxidation of sulphide and subsequent sulphur removal from acid mine water	Golder Associates Africa	01/08/2008-31/03/2011	1 205 000
1897	Nanotechnology in water treatment	UWC	01/05/2009-31/03/2012	1 565 590
2012	Extended investigations into recovery of water and salts from multi-component hypersaline brines using eutectic freeze crystallization	UCT (Precipitation & Crystallization)	01/04/2010-31/03/2013	1 571 490
<b>Programme 5: Low volume mined products</b>				
2011	Application of emulsion liquid membranes in the recovery of platinum group metals from precious metal refinery wastewaters and mining effluents	RU	01/04/2010-31/03/2013	337 450
2013	Development of an analytical sensor for the identification, quantification and detection of heavy metal pollution associated with precious metal refinery wastewater	CSIR	01/04/2010-31/03/2012	716 000
<b>THRUST 6: WATERSMART FUND</b>				
<b>Programme 1: Advocacy, health and hygiene education</b>				
Reserved	2 projects			1 000 000

## KSA 4

### WATER UTILISATION IN AGRICULTURE

<b>THRUST 1: WATER UTILISATION FOR FOOD AND FIBRE PRODUCTION</b>				
<b>Programme 1: Water-efficient production methods in relation to soils, crops and technology in rain-fed and irrigated agriculture</b>				
Project no	Title	Contractor	Term	Cost (R)
1650	Guidelines for irrigation management in pasture production	CSIR NRE	01/04/2006-31/03/2011	2 117 600
1770*	Water use of fruit tree/orchard crops	CSIR NRE	01/04/2007-31/03/2013	4 400 000
1771*	Water use of drought-tolerant food crops	UKZN (Crop Science)	01/04/2007-31/03/2013	3 900 000

<sup>2</sup>This programme, although presently empty, is kept open to invite new proposals.

1874	Water use of cropping systems adapted to bio-climatic regions in South Africa and suitable for biofuel production	UKZN (Bioresources Engineering and Environmental Hydrology)	01/04/2009-31/03/2015	5 000 000
1954	A baseline and scoping study on water use and nutrient content of crop and animal food products for improved household food security	UP (Human Nutrition)	01/04/2010-31/03/2012	1 000 000
2079*	Water use efficiency of irrigated agricultural crops determined with satellite imagery	UKZN (School of Bioresources Engineering and Environmental Hydrology)	01/04/2011-31/03/2014	4 000 000
2080*	Investigating the possibility to improve water use efficiency and reduce canopy management inputs of wine grapes through deficit irrigation	ARC Infruitec-Nietvoorbij	01/04/2011-31/03/2015	2 072 000

**Programme 2: Fitness-for-use of water for crop production, livestock watering and aquaculture**

1773*	A quantitative investigation into the link between irrigation water quality and food safety	US (Food Science)	01/04/2007-31/03/2012	3 760 000
1802	Interaction between aquaculture and water quality in on-farm irrigation dams: Extended monitoring and mitigating procedures to manage environmental impact	US (Aquaculture)	01/04/2008-31/03/2012	1 680 000
1875	An investigation into the link between water quality and microbiological safety of fruit and vegetables from the farming to the processing stages of production and marketing	UP (Microbiology and Plant Pathology)	01/04/2009-31/03/2015	4 419 200

**THRUST 2: WATER UTILISATION FOR FUELWOOD AND TIMBER PRODUCTION**

**Programme 1: Water-efficient production methods and systems in agro-forestry, woodlands and forestry plantations**

1480	Agro-forestry systems for improved food production through the efficient use of water	CSIR NRE	01/04/2005-31/03/2011	3 250 000
1803	The impact of re-establishing indigenous plants and restoring the natural landscape on sustainable rural employment and land productivity through payment for environmental services	ASSET Research	01/04/2008-31/03/2013	3 000 000
1876	Water use and economic value of the biomass of indigenous trees under natural and plantation conditions	CSIR NREt	01/04/2009-31/03/2015	4 999 100
2081*	Rehabilitation of alien-invaded riparian zones and catchments using indigenous trees: An assessment of indigenous tree water use	UP (Plant Production and Soil Science)	01/04/2011-31/03/2016	4 900 000

**THRUST 3 : WATER UTILISATION FOR POVERTY REDUCTION AND WEALTH CREATION IN AGRICULTURE**

**Programme 1: Sustainable water-based agricultural activities in rural communities**

1351*	The effect of the introduction of agro-forestry species on the soil moisture regime of traditional cropping systems in rural areas. Phase II: On-farm trials of alternative agro-forestry systems	CSIR NRE	01/04/2002-31/03/2011	1 850 000
1465	Sustainable techniques and practices for water harvesting and conservation and their effective application in resource-poor agricultural production in KwaZulu-Natal Province	Zakhe Agricultural College	01/04/2003-31/03/2011	3 000 000
1478	Sustainable techniques and practices for water harvesting and conservation and their effective application in resource poor agricultural production in Eastern Cape Province	UFH (Agricultural Economics)	01/04/2004-31/03/2011	5 200 000
1579*	Nutritional value and water use of indigenous crops for improved rural livelihoods	UP (Centre for Nutrition)	01/04/2005-31/03/2011	2 850 000
1648*	Assessment of the social and economic acceptability of rain-water harvesting and conservation practices in selected peri-urban and rural communities	UFS (Agricultural Economics)	01/04/2006-31/03/2011	2 800 000
1775*	Rainwater harvesting and conservation (RWH&C) for rangeland and cropland productivity in communal areas in selected provinces in the semi-arid area of South Africa	ARC Institute of Soil, Climate and Water	01/04/2007-31/03/2013	3 200 000
1776	Development of a comprehensive learning package for education on the application of water harvesting and conservation (WH&C)	Umhlaba Consulting Group, Agricultural and Rural Development	01/04/2007-31/03/2012	1 950 000
1804	Improving plot-holder livelihood and scheme productivity on smallholder canal irrigation schemes in Limpopo Province	TUT (Crop Science)	01/04/2008-31/03/2012	1 890 000

1878	Empowerment of women in rural areas through water use security and agricultural skills training for gender equity and poverty reduction	UKZN (Environment Sciences)	01/04/2009-31/03/2014	3 000 000
1957	Baseline and scoping study on the development and sustainable use of storage dams for inland fisheries and their contribution to rural livelihoods	RU (Ichthyology and Fisheries Science)	01/04/2010-31/03/2014	2 000 000
2082*	Empowerment of women through water use security, land use security and knowledge generation for improved household food security and sustainable rural livelihoods in selected areas of, amongst others, Limpopo Province	UKZN (Agriculture Sciences and Agribusiness)	01/04/2011-31/03/2015	3 000 000
2083*	Empowerment of women through water use security, land use security and knowledge generation for improved household food security and sustainable rural livelihoods in selected areas of, amongst others, the Eastern Cape Province	Umhlaba Consulting Group (Pty) Ltd	01/04/2011-31/03/2015	3 000 000
<b>Programme 2: Integrated water management for profitable farming systems</b>				
1580*	Revitalisation of provincial fish hatcheries and training facilities to promote profitable aquaculture	RU (Ichthyology and Fisheries Science)	01/04/2005-31/03/2011	2 250 000
1649*	Development of training material for extension in irrigation water management	UP (Agricultural Economics, Extension and Rural Development)	01/04/2006-31/03/2011	1 870 000
1778	Awareness creation, implementation plans and guidelines for management of sustainable on-farm and on-scheme water measurement	WSM Leshika (Pty) Ltd	01/04/2007-31/03/2011	1 400 000
1779	Assessment of the contribution of water use to value chains in agriculture	UFS (Agricultural Economics)	01/04/2007-31/03/2012	2 430 000
1805	The development and testing of an integrated set of models to evaluate the financial/economic impact of irrigation water curtailment decisions on participant farm case studies in the Crocodile Catchment	CPH Water	01/04/2008-31/03/2011	1 790 000
1806	Technology transfer on the technical aspects and cost estimating procedures of surface and sub-surface drip irrigation systems	ARC Institute for Agricultural Engineering	01/04/2008-30/09/2011	1 485 400
1879	Analysis of food-value chains in rain-fed and irrigated agriculture to include emerging farmers in the mainstream of the economy	UKZN (Institute of Natural Resources)	01/04/2009-31/03/2014	2 999 989
1958	Investigation of water conservation in food value chains by beneficiaries of water allocation reform and land reform programmes in South Africa	CSIR Water Resources Governance System	01/04/2010-31/03/2014	3 000 000

**THRUST 4: WATER RESOURCE PROTECTION AND RECLAMATION IN AGRICULTURE****Programme 1: Sustainable water resource use on irrigation schemes and within river catchments**

1647	Managing salinity associated with irrigation in selected areas in South Africa	UFS (Soil, Crop and Climate Sciences)	01/04/2006-30/09/2011	2 480 000
1880	Methodology to monitor the status of water logging and salt-affected soils on selected irrigation schemes in South Africa	ARC Institute for Soil, Climate and Water	01/04/2009-31/03/2014	3 693 800
2026	Development of technical and financial norms and standards for drainage of irrigated lands	ARC Institute of Agricultural Engineering	01/04/2009-31/03/2015	4 000 000

**Programme 2: Impact assessment and environmental management of agricultural production**

1516	Modelling non-point source pollution in agriculture from field to catchment scale	Sigma Beta	01/04/2004-30/09/2011	5 000 000
1646*	Applications of rainfall forecasts for agriculturally-related decision making in selected catchments	UKZN (Bioresources Engineering and Environmental Hydrology)	01/04/2006-31/03/2012	2 850 000
1807	The impacts of unpaved access roads on runoff, sediment fluxes and soil water movement within timber plantations	Aquagreen Consulting	01/04/2008-31/03/2011	1 700 000
1881	Impact of wastewater irrigation by wineries on soils, crop growth and product quality	ARC Infruitec-Nietvoorbij	01/04/2009-31/03/2014	3 500 000

1882	Adaptive interventions in agriculture to reduce vulnerability of different farming systems to climate change in South Africa	UCT (Climate Systems Analysis Group)	01/04/2009-31/03/2014	4 000 000
1955	Improving the livestock carrying capacity with rainwater harvesting and conservation on grasslands for extensive and/or intensive livestock production and biogas generation from manure in rural areas of South Africa	UKZN (Grassland Science)	01/04/2010-31/03/2015	5 000 000
	Investigation of the contamination of water resources by agricultural chemicals and the impact on environmental health	CSIR NRE	01/04/2010-31/03/2015	4 109 825
	Insights into indigenous coping strategies to drought for drought adaptation in agriculture: The Southern Cape scenario	CPUT (Centre for Water and Sanitation Research)	01/04/2011-31/03/2013	712 000