MAPPING OUT FINANCING OPPORTUNITIES AND MODELS FOR WATER-LINKED RESEARCH, DEVELOPMENT AND INNOVATION

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Report to the
WATER RESEARCH COMMISSION

by

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LIST OF ABBREVIATIONS

AMD	Acid Mine Drainage
BBBEE	Broad Based Black Economic Empowerment
CMA	Catchment Management Agencies
CoEs	Centres of Excellence
CSF	Commercialisation Support Fund
CSI	Corporate Social Investment
CSIR	Council for Scientific and Industrial Research
DBSA	Development Bank of South Africa
DFIs	Development Finance Institutions
DST	Department of Science and Technology
DTI	Department of Trade and Industry
DWS	Department of Water and Sanitation
EDTEA	Department of Economic Development, Tourism and Environmental Affairs
ERWAT	East Rand Water Care Company
EWS	eThekwini Water and Sanitation
EWSETA	Energy and Water Sector Education and Training Authority
HDI	Historically Disadvantage Individuals
ISDG	Infrastructure Skills Development Grant
KGFT	KwaZulu-Natal Growth Fund Trust
MIG	The Municipal Infrastructure Grant
NPAT	Net Profit After Tax
NRF	National Research Fund
PPDF	SADC Project Preparation and Development Facility
PPPs	Public Private Partnerships
RDI	Research, development and innovation
RBIG	The Regional Bulk Infrastructure Grant
RIAs	Research Impact Areas
RISA	Research and Innovation Support and Advancement Unit
SADC	South African Development Community
SALGA	South African Local Government Association
SARChi	South African Research Chairs initiative
SEDA	Small Enterprise Development Agency

SPII	Support Programme for Industrial Innovation
STP	Seda Technology Programme
TCTA	Trans-Caledon Tunnel Authority
THRIP	Technology and Human Resources for Industry Programme
TIA	Technology Innovation Agency
TVC	Technology Venture Capital
UKZN	University of KwaZulu-Natal
USDG	Urban Settlements Development Grant
WCWDM	Water Conservation and Water Demand Management
WRC	Water Research Commission
WSA	Water Service Authorities
WSIG	Water Services Infrastructure Grant
WSP	Water Service Providers
WTE	Water Trading Entity
WWF	World Wide Fund

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Foreword by WRC CEO

Financing the Water Research, Development and Innovation research report

South Africa's competitiveness relies on our ability to translate our investment in research and development into innovative products and services that will drive an inclusive, thriving economy. When considering global trends, the fastest growing economies have made some courageous choices in the allocation of financial resources towards strategic areas, creating bridges for the initial investments in R&D to spur future GDP growth. Unfortunately, South Africa has a way to go in realising this degree of alignment specifically for water and sanitation, when considering the critical role that RDI can play in attracting e.g. Foreign Direct Investment (FDI) and being the bedrock of inclusive economic growth.

To achieve the dividend, Water RDI investments require smart cross-sectoral partnering to build the bridges that South Africa requires. It is for this reason that the Water Research Commission (WRC), together with the Department of Science and Technology (DST) has invested in research that will begin to translate knowledge into social and economic opportunities. Understanding the financing landscape is a step towards supporting knowledge creation and dissemination of insights in order to shift grand strategies into implementable solutions for our country. The WRC aims to expand such work with public, private and civil society partners in generating similar knowledge resources going into the future.

Dhesigen Naidoo

CEO – Water Research Commission

1 INTRODUCTION

The Water Research Commission (WRC), Department of Science and Technology (DST) and the Department of Water and Sanitation (DWS) have jointly contributed to the development of the National Water Research, Development and Innovation (RDI) Roadmap[1]. The overall investment ambition of the Roadmap is approximately R8 billion between 2015 and 2025.

In addition to the Roadmap, the WRC recently underwent a restructuring process that underlines the organisation's commitment to innovation and impact. Innovation and impact will be achieved through the scaling of research with embedded impact requirements and partnering across sectors for testing, uptake, promotion and use of new processes, evidence and technology.

1.1 Objectives of the study

The objective of this study is to provide an overview of public and private sector funding and investment opportunities to finance the Water RDI Roadmap, as well as activities that achieve impact and innovation. The broad areas in which funding models and partnerships are required is presented in the table below:

Table 1: Areas in which funding is required

Area	Description
Establishing high-level technical, research and leadership capacity in the water sector	Students, post-doctoral candidates, reskilling and on the job training, mobility grants, mentorship, etc.
Knowledge economy activities	Research calls, research chairs, centres of excellence, centres of competence, professional services centre, research infrastructure costs, etc.
Innovation and deployment activities	Proof of concept, pilots, demonstrations, intellectual property rights, localization, enterprise development, etc.

The report presents:

- A holistic overview of all financial models, instruments and partners that can contribute to the areas in the table above

[1] It must be noted that whilst the document is titled 'South Africa's Water Research, Development and Innovation Roadmap: 2015-2025", it does include sanitation. Thus, any reference to the Roadmap in this report also includes a sanitation component.

- An understanding of the availability, accessibility and expectations of each opportunity
- Guidance on what partnerships, data and expertise is required to access this funding
- Risks and possible challenges that are associated with each funding opportunity

1.2 Methodology

The study employed a mix of qualitative approaches. This included a comprehensive document review of public policy, institutional mandates and programmes, and sector literature. In addition to the document review, key informant interviews were held with stakeholders in each of the researched sectors, to establish appetite within each sector for partnering and funding links to water RDI.

Key informants were requested to rate levels of interest in partnering and funding RDI, with the purpose of providing an understanding of what sector, and institutions within each sector, to engage with of project in the respective areas of water RDI.

1.3 Purpose of this report

Each chapter within the main body of the report provides the scope of the key thematic areas of the Water RDI Roadmap, along with a summary of the identified funders and partners for the area. A summarised version of potential funding partners per thematic area is presented in the figure below.

Potential Funding Source	Research	Advisory units for practitioners	Demonstration of technology	Skills development and training	SMME and enterprise development	City scale project and programmes	Infructructure
National Government Insitutions							
Local Government Institutions							
State Owned Entities (National)							
Development Agencies							
Philanthropic Organisations							
Business							
Private Equity							
Commercial and Investment Banks							

Figure 1: Summary of potential funders

	Strong potential funding source
	Possible potential funding source
	Unlikely funding source
	No data

The table below provides a brief description of each of the thematic areas that were considered during the study.

Table 2: Brief description of thematic areas that require funding and partnership

RDI Area	Definition
Research	Research related to water and sanitation services.
Advisory units for practitioners	Advisory units for practitioners in the water sector (Professional services centre – Knowledge brokering).
Demonstration of technology	Demonstrations for technology to decrease the risk to investors.
Skills development and training	Skills and training for practitioners.
SMME and enterprise development	Enterprise development and the inclusion and development of Small Medium and Micro Enterprises (WRC SMME Development Programme).
City scale projects and programmes	Projects that could be rolled out at a city or small settlement scale (Resilem, USAID). These could be supply side interventions, such as new infrastructure, or demand side, such as an area-based water stewardship programme.
Infrastructure	Relates to infrastructure projects that are implemented to deliver water and sanitation services.

The body of this report provides high level directions to potential funders and partners for RDI processes in the water sector. More detailed information on the funders and partners and their programmes in contained in the appendices attached to this report. The table below provides an indication of which appendices contain detailed information relating to each of the following chapters.

Table 3: Link between RDI area and appendices

RDI Area	Relevant appendices
Research	Appendix A, F, G, H,
Training and development of staff	Appendix A, F
Advisory units for practitioners	Appendix B, I
Demonstration of new technologies	Appendix F, H, I
SMME and enterprise development	Appendix D
Project at a city of small scale	Appendix A, I
Conclusions	Appendix B, C

2 RESEARCH ACTIVITIES RELATED TO WATER AND SANITATION

2.1 The opportunity

There has been significant research and development undertaken within the South African water sector. This has largely been driven by the Water Research Commission (WRC), the Department of Science and Technology (DST), academic institutions, international donors and industry. There is also collaboration between institutions to undertake research. The Water RDI Roadmap is an example of such a collaborative effort between DST, WRC and the Department of Water and Sanitation.

2.2 Funding

There are several funding opportunities for funding research related to water and sanitation services. Funding for water- and sanitation-related research is largely expected to be from the public sector although there are two private sector funding opportunities that could be explored.

Water Research Commission

The WRC was established to facilitate research in the water sector in terms of the Water Research Act, No 34 of 1971.

The objectives of the WRC are to:

- Promote coordination, cooperation and communication in water research and development
- Establish water research needs and priorities
- Stimulate and fund water research according to priority
- Promote the effective transfer of information and technology
- Enhance knowledge and capacity building within the water sector.

The total budget of the WRC in the 2015/16 financial year was R273.3 million. This was comprised of the revenue streams detailed in the table below (Water Research Commission, 2016):

Table 4: WRC Revenue Streams

Revenue stream	R million
Water Research Levy	200.0
Leverage	60.9
Other income	12.4
Total	**273.3**

The WRC spent R201 million on research and development during the 2015/16 financial year. This equates to 74% of the total budget. However, the WRC established an Innovation and Impact branch in 2015/16. Thus, the expectation is that the focus of the WRC will shift towards more projects geared towards impact and innovation rather than pure research and development (Water Research Commission, 2016).

The WRC has a limited budget and resources and will not be able to solely conduct the research and development required to achieve the objectives of the Water RDI Roadmap with the funding that has been currently allocated. Additional funding and resources will be required to achieve the desired outcomes.

Horizon 2020

Horizon 2020 is the largest European Union Research and Innovation programme with nearly €80 million of funding available for the 2014-2020 period. The programme is a means to drive economic growth and create jobs by taking great ideas from the lab to market and will end in 2021. (Horizon 2020, 2017)

Horizon 2020 has identified five main priorities for the 2018-2020 period (European Commission, 2017). These are:

- Increased investment in sustainable development and climate related research and innovation
- Integrating digitisation in all industrial technologies and societal challenges
- Strengthening international research and innovation
- Societal Resilience
- Market creating innovation.

Calls are issued at different dates based on the different programmes. The applicant should register on the participant portal to keep abreast of forthcoming calls and associated deadlines.

Eurostars

Eurostars supports international innovative projects led by research and development performed by small and medium enterprises. The programme supports the development of rapidly marketable products, processes and services that help improve the daily lives of people around the world. Eurostars has a budget of €1.14 billion for the 2014-2020 period. (Eurostars, 2017)

South Africa is a partner country of the Eurostars programme and has established a National Project Coordinator at DST (Ms Vinny Pillay). The Coordinator can guide the

applicant through the application process and provide guidance on the funding rules and procedures. The programme can fund up to 80% of eligible costs (up to a maximum of €300 000 to small and medium enterprises, large companies, universities and research organisations. (Eurostars, 2017)

Eurostar provided grant funding to develop AutoSharkSpotting. This project sought to develop a low-cost computer vision-based automatic shark detection system for surveillance of beaches and surf breaks. This is intended to be an integral element of the South African Shark Spotters Program that focusses on preventing human-shark conflict. (Eurostars, 2017)

Eureka

EUREKA is a publicly-funded, intergovernmental network, involving 40 countries. The aim of the programme is to enhance European competitiveness by fostering innovation-driven entrepreneurship in Europe between industries, research institutes and universities. EUREKA provides funding and support for any research and development project that has a good business plan, independent of its technological nature or the type of organisations involved. (EUREKA, 2017)

South Africa is an associate member of the programme and has a National Project Coordinator based at the DST (Ms Vinny Pillay). The National Project Coordinator acts at an operational level and are the direct contacts for project participants. These Coordinators facilitate the establishment of the project providing support for the project duration. Eureka has funded five projects in South Africa (EUREKA, 2017). These include:

- Web-based air quality assessment and management
- Development of a new solidification simulator prototype for the modernisation of the South African foundry industry
- Research and development of advanced technologies for case analysis and design of large dams under extreme conditions.

EUREKA is structured in different clusters with ACQUEAU being the cluster for water. ACQUEAU aims at promoting innovation and market-driven solutions in the European water sector. The five key challenges identified by ACQUEAU (ACQUEAU, n.d.) are:

- Low environmental impacts for disinfection and oxidation
- Low energy wastewater treatment
- Membrane technologies
- Real-time system management

- Materials for pipes and coating

ACQUEAU usually two calls for proposals each year. A call is usually issued at the beginning of the year (January or February) and mid-year (June or July).

Danida Fellowship Centre

The Danida Fellowship Centre (DFC) was founded in 1990 to manage and implement the Danida supported Fellowship Programme. The DFC is currently implementing more than 1 000 fellowships annually and administering research activities for approximately DKK 230 million annually. DFC supports development research, offers courses and studies as well as provides services. (Danida Fellowship Centre, 2017)

The research grants provided by the DFC are aimed at generating new knowledge and strengthening research capacity in Danida priority countries to promote the overall objective of the Danish development cooperation to reduce poverty and support sustainable development.

Phase 1 of the most recent application process closed on 2 February 2018. The research grants are available to research-based institutions in Denmark, and only in partnership with research institutions of partnering countries. The total budget available for the research window is DKK 60 million, with a maximum of DKK 5 million per project. South Africa is a partner country to Denmark and have the following thematic focus areas (Ministry of Foreign Affairs of Denmark, 2018):

- Water Management
- Renewable energy
- Sustainable smart city development.

The DFC received 15 applications in total during window of 2017. Of these, 12 applications were approved for funding. Only four of the successful applications were South African-Danish Collaboration (Ramphal, 2018). The next funding window will close on 24 August 2018.

Sustainable smart city development is being undertaken as a partnership between the City of Aarhus and the City of Tshwane. The focus will be on sustainable and smart urban development as well as collaboration with private sector developers and knowledge institutions. (Ministry of Foreign Affairs of Denmark, 2018)

Philanthropic Foundations

Philanthropic sources are important sources of funding for research. One such example is the Bill and Melinda Gates Foundation, which has contributed funding to

the University of KwaZulu-Natal's pollution research group as well as the Water Research Commission. It may be necessary to partner with academic institutions to access this type of funding.

Water Boards and Water Service Authorities

Water Boards and Water Service Authorities occasionally are prepared to make funding available for research purposes. This is particularly the case for research that solves a specific problem for them. Some have created research chairs at South African universities, where the rules and objective of the position are negotiated between the funding institution and the university. Rand Water and Rand Water Academy have established seven research chairs and Umgeni Water and ERWAT have also established research chairs. These entities also fund research through funding PhD- and Master's research. However, they primarily offer an opportunity to partner on research (Pouris, 2017). For more information on opportunities arising through Water Boards see Appendix F and for Water Service Authorities see Appendix A.

Technology and Human Resources for Industry Programme

The Technology and Human Resources for Industry Programme (THRIP) is administered by the Department of Trade and Industry (DTI) and aims to promote research and development in science to improve industrial competitiveness. THRIP provides R500 000 per annum to a candidate over a three-year cycle. The challenge with THRIP is ensuring the research undertaken is relevant and can be implemented by industry. For more information on opportunities arising through THRIP see Appendix H.

2.3 Partners

Most institutions that were engaged during the study indicated a willingness to support different areas of research. It will be important to structure research collaboratively with these partners to ensure that the research undertaken is aligned to their mandate.

The Department of Science and Technology (DST) is an important partner in assisting in identifying potential international funding sources that could be allocated towards research that needs to be undertaken. The DST has over 40 bilateral agreements with African and International governments which provide funding for research programmes. These agreements are usually structured around common objectives and require a degree of funding from each institution that is involved in the agreement. The DST has an interest across all areas of the Water RDI Roadmap and needs to be

engaged to identify funding for specific calls that can be issued with the correct partner. It is important to note that government departments are provided with DST funding to implement projects. For more information on opportunities arising through DST see Appendix G.

Water Service Authorities and Water Boards are also important partners in undertaking research activities related to the water sector. This is due to fact that these institutions will often be tasked with the provision of water services to consumers. Research needs to be designed to meet the needs of practitioners in these institutions to ensure uptake. Involving these stakeholders during the conceptualisation of research programmes will ensure buy-in and could also attract some level of funding or resources that can assist in undertaking the research.

Water Service Authorities are also able to partner with academic institutions for research to be undertaken. eThekwini Water and Sanitation have an existing agreement with the Pollution Research Group at the University of KwaZulu-Natal to undertake research on their behalf. In addition to this, the eThekwini Municipality is planning to establish a forum that includes academics and practitioners from the City to develop research topics that can be used to inform the City's Resilience Plan.

Academic institutions are key partners in undertaking research within the water sector. There are universities that have established water research teams and are able to attract funding from international sources. As an example, the pollution research group from the University of KwaZulu-Natal was able to attract funding from the Bill and Melinda Gates foundation to undertake research. The WRC will need to engage academic institutions to ensure that research is not duplicated.

There many organisations that represent a collective body of institutions in South Africa. These include the National Business Initiative (NBI), Association for Savings and Investment South Africa (ASSISA) and the South African Venture Capital and Private Equity Association (SAVCA). These organisations will have an interest in research that is relevant to the organisations that they represent. Organisations that may be of interest but were not engaged during the study include Business Leadership South Africa and Banking Association South Africa.

The Research and Development tax incentive encourages companies to in invest in scientific and technological research and development in South Africa. DST is responsible for the administration of the incentive and a company could qualify for a 150% tax deduction for operational research and development expenditure items (Department of Science and Technology, 2012).

2.4 Conclusion

Accessing funding for research activities should be focussed on philanthropic-, donor- and government sources. The WRC and Water RDI Roadmap PMU is largely aware of these sources and does actively seek to access additional funding from other institutions. It may be possible to increase funding for research by partnering with local government partners on projects that are structured to find solutions to existing challenges. It has been noted that some programmes require researchers from several different countries. This can sometimes prove to be challenging.

Organisations that represent a body of institutions are important partners, as they could provide direction to private sector funding for research and provide an indication of the potential roles that the institutions they represent could play in research activities. The private sector is incentivised by the research and development tax incentive.

DST has several bilateral agreements in place and are well placed to identify additional research funding sources based on the identified research programmes. The research programmes must be designed in a manner that meets the requirements of funders to ensure that funding can be secured but should also include input from practitioners to ensure uptake and impact.

3 TRAINING AND DEVELOPMENT OF STAFF

3.1 The opportunity

It is often said that South Africa has sophisticated water sector legislation, policies and plans that compare favourably to first world countries. However, the implementation of these plans and policies has proved challenging. Various reasons have been provided for the lack of implementation. Included in these reasons are a lack of experience, lack of technical capability and high staff turnover (Schreiner, 2013). For example, in the case of Integrated Water Resource Management (IWRM), Jonker (2014) states that there is a hesitancy to implement IWRM due to a fear of making a mistake.

The institutional arrangements in the water sector add to the complexity, as there are different institutions that are tasked with meeting the objectives of different elements of the water value chain. Challenges faced by practitioners vary based on the context they find themselves in and thus there is a need to equip practitioners with the right tools in order implement solutions that are relevant to their challenges.

Technical skills are also in short supply, with high levels of turnover amongst engineers and artisans also prevalent (MBI, 2015). Shortages of engineering skills are also prevalent, with local government particularly struggling to attract and retain staff, with municipal staff vacancies rising from 13.3% in 2015 to 15.2% in 2016 (StatsSA, 2017). Training technical staff to a level where they would be able to manage and maintain infrastructure is key.

It was noted during the stakeholder phase of the study that whilst individuals within an organisation can select training courses based on their interests, some programmes are fairly generic and not tailored to the water sector. Therefore, there could be interest in programmes that are tailored to the water sector. There is a need to develop programmes that cut across different management disciplines that could assist members of the leadership and senior management teams within water sector institutions.

3.2 Funding

There are two separate funding aspects related to the training and development of staff. These are:

- Funding to develop the required programmes for the water sector
- Funding for practitioners to enrol and complete programmes.

Funding to develop the programme

Funding would be needed to develop a programme for practitioners. This could include funding research to enable the development of a suitable programme as well as funding for market research to confirm the need for programme. Most tertiary institutions have resources that are tasked with developing new programmes and these resources could provide an indication of additional funding sources that could be accessed.

Funding to enrol and complete the programme

There are currently several training programmes being offered by institutions directed at the water sector. Water institutions usually have a budget that is allocated towards the training and development of staff but the programmes that may be available may not meet the needs of practitioners. The available budgets could be accessed to fund the training of staff on programmes that are designed to equip practitioners with the necessary skills to navigate the complexities of their environments.

Institutions within the water sector could be interested in specifically designed training and development programmes that meets their needs. These institutions include Water Boards, DWS and local government partners. As an example of the funding available, Johannesburg Water had a staff complement of 2 509 in the 2015/16 financial year, and spent just under 2% of the total payroll costs onto the training and development of staff. This equates to approximately R13.9 million on training and development. The utility plans to increase this incrementally in future.

Each institution would have to comply with their internal administrative requirements for training and development prior to funding being committed. For more information on opportunities arising through Water Boards see Appendix F and for Water Service Authorities see Appendix A.

3.3 Partners

Stakeholders engaged during the study advised that they would be willing to be involved in the development of a programme that meets the needs of practitioners. The WRC has strong relations with many institutions in the water sector and could thus select practitioners with the required expertise to constitute a reference group that could guide the development of a programme.

The University of Stellenbosch Business School (USB) has recently launched an MBA stream in Health Care Leadership. The programme covers all the functional areas of management whilst also providing a contextual understanding of the principles of

clinical governance and current health care reform programmes (University of Stellenbosch Business School, 2017). It may be possible to develop similar programmes for the water sector if institutions are able to commit a pipeline of practitioners that are able to attend the programme in the short- to medium term.

Supply and demand side governance has been highlighted as a key theme of the Water RDI Roadmap. The University of Pretoria has instituted the Centre for the Study of Governance Innovation (GovInn). This is the first research institution in Africa dedicated entirely to governance innovation. It is possible to engage GovInn with a view to collaborate on research as well as the development of curricula focussed on governance in the water sector.

There are other tertiary institutions that could partner with the WRC based on the required expertise.

Both international development agencies, (specifically Danida) and local businesses and business associations, have expressed a willingness to partner on training and development. This could include contributions to curriculum development and assistance in finding appropriate lecturers and trainers. In the case of business, this would be specific to their expertise.

3.4 Conclusion

It is proposed that the WRC and PMU engage with business schools to develop a programme that could be targeted at senior management and leadership teams of water sector institutions. It is proposed that the long-term objective should be to develop programmes for practitioners at all levels in the institution. However, the short-term objective should be to begin with senior staff to achieve high impact within a relatively short space of time.

The development of the programme could be funded by the tertiary institution, should there be a sufficient market. Water institutions have budgets directed towards training and development that could be accessed to ensure that practitioners are able to enrol and complete the programme. Water sector practitioners have indicated a willingness to contribute to the development of a programme.

The WRC has undertaken many research projects across the water sector since being established. However, the uptake of research remains a challenge. The uptake of research is the process whereby research findings enter the domains of intended but also unintended audiences (Jacobs, 2014). The WRC could thus utilise existing tools that have been developed and introduce these to the programme, thereby encouraging increased uptake of research.

4 ADVISORY UNITS FOR PRACTITIONERS

4.1 The opportunity

The South African water sector constitutes a varied and diverse institutional landscape. There are some challenges that are unique to areas whilst others that are common across the sector. For example, non-revenue water is a challenge that is common to municipalities across the country, whereas managing infrastructure capacity in holiday towns with high peak season load of low off-season load is only a concern for a few.

There is thus the opportunity to create advisory units for practitioner to address some of the common challenges. This will ensure that there is a consolidation of expertise that would be easily accessible to assist in resolving the challenge. These units could also make use of the various tools that have been developed by the WRC and will enhance the uptake of research.

4.2 Funding

Stakeholders did not indicate an interest in funding advisory units and there may be potential to charge a fee for the service that is provided to ensure that the unit is operationally sustainable. However, this would require compliance with the relevant legislation and could diminish the appetite of practitioners to access the advisory units.

There is the potential for these units to be centrally funded by National Treasury with a view that these units enhance the delivery of services and improve the financial efficiency within the system. An example of this is that reducing non-revenue water could remove the need to expand the capacity of a water network thereby delaying capital expenditure and reducing the cost of bulk water purchased by a municipality.

National Treasury already has a unit, GTAC that will provide advisory services from a panel of experts with long-term service level agreements. It will fund these services from its own budget from time to time, though normally operates through a cost recovery model. GTAC can provide advisory services based on in-house capacity or procure water sector advisory services for government institution. In addition, GTAC has a specialist public private partnership (PPP) support unit. For more information on PPPs see Appendix B.

Development bank project preparation units? For more information on opportunities arising through development finance institutions see Appendix I.

4.3 Partners

All stakeholders engaged demonstrated a willingness to be involved in the advisory units. Responses typically indicated a willingness to make technical expertise available

to advise at no charge. This was especially the case with municipality to municipality / water board to municipality / water board interaction. There was an indication that this is in place to some degree with some water boards and municipalities partnering with other municipalities to assist with challenges. It was noted that there may be some concern with the private sector being involved in the advisory units due to a potential conflict of interest that could arise in future.

Potential partners should be identified based on the presence of existing expertise that could be leveraged to develop the advisory units. An example of this is the Pollution Research Group at the University of KwaZulu-Natal. The group recently received funding from the Bill and Melinda Gates Foundation to continue their work with emerging sanitation technology. This could be developed into an advisory unit that assists municipalities with the selection and implementation of innovative sanitation technologies.

4.4 Conclusion

Advisory capabilities exist at GTAC and can be readily accessed with various funding options available. It is likely that advisory services would need to be centrally funded by National Treasury with a view that any investment in advisory units could result in savings in other areas of the capital and operating budget. Many institutions have indicated a willingness to partner and support the development of advisory units, by supplying available expertise where required and when needed particularly between local governments.

5 DEMONSTRATION OF NEW TECHNOLOGIES

5.1 The opportunity

There is scope to mainstream technologies that have been developed in the sector. This will require different partners along the new technology development continuum. It is important to differentiate the opportunity that may exist between technologies that may be directed towards a consumer as compared to technology that can be implemented in large scale infrastructure projects. Each opportunity will have to be demonstrated with the appropriate target market to ensure uptake at the required scale. The risks of implementing new technology at scale will need to be understood from the view of funders as well as practitioners that will utilise the product to improve the delivery of services.

The Water Technologies Demonstration Programme (WADER) was established by the Department of Science and Technology and the WRC. This platform pulls together the applied research and development and pre-commercialisation stages of the water continuum with the aim of accelerating technologies to market. WADER provides support for technologies at demonstration stage (WADER, 2017).

WADER is not authorised to take a project or technology to market but will create the enabling environment for innovators to engage with partners to ensure that new technology can be mainstreamed into the water sector. This is achieved by creating the opportunity to engage institutions that have the requisite expertise and funding to take the products to market and implement technologies that have been successfully demonstrated.

It was noted during the stakeholder engagement that water sector institutions are often reluctant to incur the risk of utilising an emerging technology within projects due to a fear that the technology could fail. This could result in failure to deliver services as well as the additional cost that would need to be incurred to repair the failure. There is thus a need to ensure that practitioners and funders would be suitably satisfied post the completion of a new technology demonstration.

It should also be noted that products do not only have to focus on the public-sector market but could also include the private sector and consumer markets. It is therefore important to identify the market to ensure that the demonstration project is appropriately structured.

The scale of technology and its intended market, have implications too for the scale and cost of technology demonstration and its timing in the innovation process. For large scale infrastructure and industrial products, for example a wastewater treatment

package plant for a medium sized settlement or a mobile desalination plant for a factory need a full-scale demonstration before significant investment in the technology is likely. For small products targeted at the commercial market, it is more important to demonstrate the technology at the prototype and pilot scale.

The diagram below, adapted from DNAbiotec's Innovation Matrix (2017) shows where technology demonstration applies for technologies aimed at the various markets in the innovation chain.

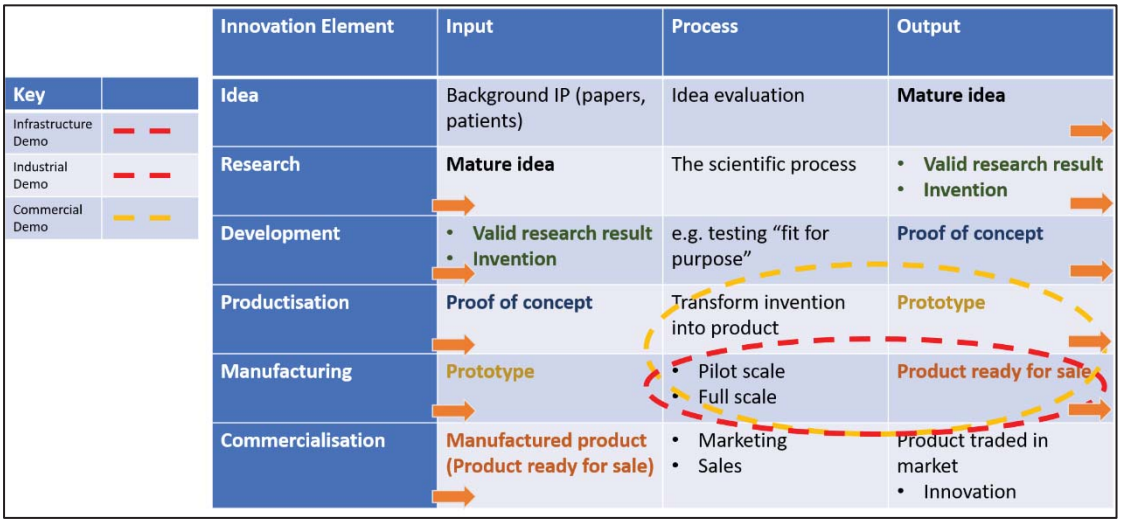

Figure 2: Innovation matrix

It should be noted that some technologies, despite being highly innovative, may not have markets that are willing to pay for the technology, or pay for the technology for a price higher than its cost. It is unlikely that these technologies will succeed commercially, so further investment in them should be carefully considered.

The issue of ownership of the intellectual property of technology developed via public sector funding could potentially deter private sector institutions. This will need to be explored further with investors and public sector when exploring the opportunity for investment in a technology.

5.2 Funding

DBSA Project Preparation Fund

The Development Bank of South Africa (DBSA) is involved in project preparation, funding and implementation. The Project Preparation Fund (PPF) provides funding to develop projects that would usually involve a relatively mature technology with established enterprises. The unit was created in 2013 to support the pipeline of DBSA's financing division. The funds can be used toward activities that are required to progress projects through its development stages up to bankability. These activities include, pre-

feasibility studies, bankable feasibility studies and financial closure. The funds are provided with the stipulation that projects will be funded through DBSA's lending division. The focus is on ICT, energy, transport, water and sanitation infrastructure. Thirteen projects to the value of R7.6 billion were approved for funding in 2015/16 (Development Bank of Southern Africa, 2016).

The preparation of projects is required to de-risk projects to prepare good quality bankable projects. The project preparation unit at the DBSA provides funding as well as financial, strategic and technical skills that are required to prepare bankable projects. The client needs to provide the DBSA with the mandate to act as the project developer/sponsor/owner to access project preparation funding. The PPF can be accessed by the following organisations:

- Municipalities
- State Owned Companies
- Government Departments. and
- Private companies (projects with a public good) (DBSA, 2017).

The DBSA will apply the following principles when evaluating projects for PPF (DBSA, 2017):

- Co-funding – sponsors are required to contribute towards the funding of PP activities and stages.
- Commercial terms – recovery of PPF funding invested as well as a return for the risk taken if the project is deemed to be viable. However, the sponsor is not obligated to repay the funds if the project is not seen to be viable. The project sponsor will be required to pay the DBSA the funds plus a commensurate return if the project is seen to be viable but does not proceed for some reason.
- The DBSA would aim to obtain a mandate as the lead arranger for the project and participate in the debt funding of the project on a competitive basis.

The selection criteria to access the PPF is summarised in the diagram below.

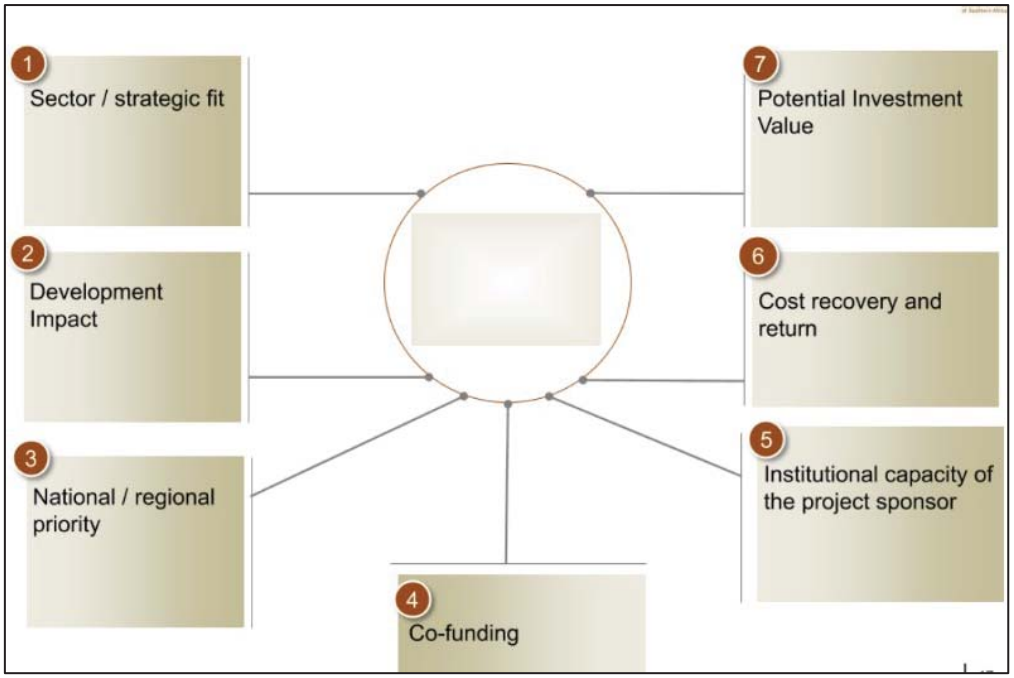

Figure 3: PPF Project selection criteria

Source: DBSA (2017)

Applications for PPF funding can be accessed via an online project application system at www.dbsa.org. For more information on opportunities arising through DBSA see Appendix F.

Funding sourced by technology suppliers

It may be possible for the suppliers of technology to provide funding in order to undertake pilot studies to prove their technology. The funding could be provided by the technology supplier to build and operate the technology to prove the concept. Alternatively, the technology supplier could raise funding from a separate entity to prove the concept.

An example of funding sourced by the technology supplier is a 6.25 Ml/day demonstration desalination remix facility that is to be constructed at eThekwini's Central Wastewater Treatment Works. The demonstration plant will be funded by the New Energy and Industrial Technology Development funding (NEDO) with Hitachi, acting as the implementing agent, carrying the costs of operating and maintaining the facility. NEDO is one of the largest public research and development management organisations focussing on addressing energy and global environmental problems as well as enhancing industrial technology (NEDO, 2016).

Industrial Development Corporation

The Industrial Development Corporation (IDC) has an Industrial Infrastructure Business Unit that focusses on investing in projects that unlock infrastructure development to create an environment that helps grow the South African economy. The Unit focusses on energy, logistics, telecoms, health and water infrastructure projects. The IDC prefers sizeable projects that demonstrate profitability and sustainability within a reasonable time frame.

The IDC may be interested in funding relatively late stage technology demonstrations that could be utilised in projects that promote industrial development. As an example, the IDC may be interested in a technology that could be utilised for a mine in a remote location, as opposed to extending bulk water and sanitation infrastructure. The proposed technology demonstration should have the potential to be utilised at an industrial scale and would usually include a relatively technology and established enterprises.

The IDC does not fund municipalities. However, it may be possible to fund a Special Purpose Vehicle that could be used to deliver municipal services to industry. There could be other off takers that could also be supplied with services. The WRC has an existing relationship with the IDC and this could be used to identify potential projects on which funding could be provided. For more information on opportunities arising through the IDC see Appendix I.

Local government

Local government have several funding streams that could be used for funding the demonstration of new technologies at various stages of maturity. The capital and operating grants framework allow for innovation but there are often competing priorities within a municipality which result in other service delivery requirements being prioritised ahead of innovation. A project that is funded by a municipality must be reflected on the municipal budget and comply with the relevant procurement legislation. The project should also be seen to meet a need within the municipality and have the potential to have an impact at scale.

Procurement was highlighted by stakeholders as a key challenge for any municipal funded project. The procurement process is onerous and there are several processes that need to be adhered to before requests for goods and services can be advertised. Thereafter, there are processes that need to comply with before a service provider can

be appointed. This can result in a delay in the implementation of a project. Further information on Local Government is provided in Appendix A.

Local government funding could be accessed for demonstrating technologies across the technology development spectrum. The challenge would be to convince these partners that funding a project could be beneficial. It would also be useful to align processes to the municipal budget and project development cycles.

Support Programme for Industrial Innovation

The Support Programme for Industrial Innovation (SPII) is administered by the DTI and provides funding for the development of innovative products and processes. SPII product process development scheme provides grant funding of up to R2 million to SMMEs and individuals whilst the SPII matching scheme provides grants of up to R5 million to enterprises and individuals. The quantum of funding provided is dependent on the level of Black Economic Empowerment (BEE) ownership. Government funded institutions do not directly qualify for support from SPII but may qualify as subcontractors. Application forms are available on the DTI website (Department of Trade and Industry, n.d). For more information on opportunities arising through SPII see Appendix H.

Technology Innovation Agency

The Technology Innovation Agency (TIA) is a national public entity that serves to bridge the innovation gap between research and development from higher education institutions, science councils, public entities, private sector and commercialisation. TIA is able to provide risk funding to innovators to progress ideas toward market entry. TIA is also able to attract funding from the private sector for the commercialisation of market ready technologies.

TIA received R464 million from the Department of Science and Technology in the 2016-2017 financial year and was able to facilitate the commercialisation of 21 innovations during this year (Khan, 2017). TIA has a commercialisation support fund, technology development fund and seed fund. Further details on these funds at the online application process is presented in Appendix G.

Water Boards

Rand Water has recently developed a Technology Roadmap that has identified elements of the water value chain that can be incrementally improved or use disruptive technologies. The Technology Roadmap is a confidential internal document. Rand

Water is willing to trial new technologies that meet the objectives of the Technology Roadmap. However, if the project is funded by Rand Water, then the standard procurement process would have to be followed. However, the procurement process can be waived if the technology meets the objective of the Roadmap and funding is provided by the technology provider. Rand Water would consider co-funding a small portion of the project but this would be assessed on a case by case basis. For more information on opportunities technology supplier funding see Appendix I.

5.3 Partners

Local government, water boards and other government agencies are important partners in the demonstration of new technologies. Local government and water boards would often be the institutions that will be utilising the technology and can often provide technical input during the demonstration phase that can enhance a technology to ensure successful implementation.

eThekwini Water and Sanitation, Johannesburg Water and Rand Water were engaged during the stakeholder phase of the study and have indicated existing programmes that are in place for technology demonstrations. It is possible that there are other water boards and local government partners that could also partner with the WRC on technology demonstration projects. For more information on opportunities arising through Water Boards and Water Service Authorities see Appendix F.

5.4 Conclusion

The DST and WRC has an established partnership in technology demonstration through the WADER programme. WADER has been established to provide support for technologies at demonstration stage. It is important that technologies are demonstrated in a manner that can convince funders and practitioners that the new technology can be successfully implemented at scale.

The DBSA and IDC have project preparation funds that could be accessed for feasibility studies that include new technology that could be implemented at scale. However, the projects will need to be suited to the mandates of these institutions and linked to funding for project implementation.

The WRC has an existing network of institutions that are in the process of demonstrating alternative technologies. These partnerships should be leveraged for future demonstrations. Practitioners within these institutions also have the requisite skills and experience to contribute to the enhancement of a technology and ensure successful implementation.

New technologies could be focussed on the public sector and the private sector. Venture capital may be interested in demonstrating technologies depending on the stage of technology development, available market and possible revenue streams. There is also a possible link between the demonstration of new technologies and the development of Small, Medium and Micro Enterprises in the water sector. The opportunity to access funding from venture capital is further explored in Section 6 of this report.

6 DEVELOPMENT OF SMALL, MEDIUM AND MICRO ENTERPRISES

6.1 The opportunity

The National Water Resource Strategy II (NWRS2) requires the WRC to contribute towards job creation by conceptualising, supporting and driving RDI initiatives that will have a positive impact on SMME development and job creation in the water sector. This National Water Research, Development and Deployment Programme focusses on, inter alia, increasing the number of small and medium enterprises operating in the water sector. The Industrial Policy Action Plan 2017/2018-2019/2020 also highlights that opportunities exist in the water sector for advancing technologies that enhance water security through recycling, reuse and reclamation, and new reliable off-grid technology options for sanitation, water purification and energy. The definition of SMMEs in the water sector is presented in the table below: (The Banking Association of South Africa, 2018)

Table 5: Definition of SMMEs

Size	Full time equivalent of paid employees	Total turnover (R million)	Total gross asset value (R million)
Micro	5	0.2	0.1
Very Small	20	5.1	1.9
Small	50	13	5
Medium	200	51	19

The following gaps in the development of water enterprises and entrepreneurs have been identified: (Water Research Commission, Gordon Institute of Business Science, 2017):

- Business expertise – Many innovators and potential SMMEs emerge from an academic or artisan background with little or no business expertise, yet are technically sound with impactful innovations
- Business innovation – A mix of traditional and new business models appear to be required to move water innovations to market
- Limited support for enterprises led by historically disadvantaged individuals (HDI) – There is a need to increase the support for the development of black and female led water enterprises
- Bureaucratic procurement burden – There are many opportunities that exist in supporting public sector partners. However, procurement systems and red tape

deter SMMEs from venturing into this space. Public Private Partnerships are a mechanism to support this.

There is a link between the development of SMMEs and the demonstration of new technologies to allow impact innovations from academia to be successfully introduced to the appropriate market. This link needs to be strengthened. WADER provides a platform for emerging, pre-commercial or newly commercialised technologies to be identified, evaluated and showcased. There is thus the potential to utilise this platform as a pipeline for new technologies within the sector and ensuring that technologies can be taken to market.

6.2 Funding

Department of Small Business Development

The Ministry of Small Business Development was established in 2014. The Department of Small Business Development was thereafter established as a standalone national department. The DBSD is mandated to "support the radical transformation of the economy through the promotion and development of sustainable and competitive entrepreneurs, small businesses and co-operatives that contribute to job creation and economic growth". (Department: Small Business Development, 2014)

The Department of Small Business Development (DBSD) has designed many programmes that are targeted at SMMEs. A description of these programmes is presented in the table below (Valla, 2017).

Table 6: DBSD Programmes

Programme	Description
Start-up Enterprise Development Programme	100% grant of up to R200 000 offered to start-up businesses that are based in townships and rural areas with an emphasis on enterprises owned and managed by Women, Youth and/or People with Disabilities. The grant may be used to acquire qualifying new machinery, equipment and tools, raw materials and commercial vehicles.
Informal and Micro Enterprise Development Programme	100% grant of up to R80 000 offered to informal and micro enterprises to improve their competitiveness and sustainability to become formal businesses. Qualifying firms must have turnovers from R1000-R200 000.
Shared Economic Infrastructure Facility	50:50 cost-sharing grant that aims to leverage public sector investment to establish and improve shared infrastructure to improve access, create local economic benefits and optimise the performance of businesses using the facilities. The grant is targeted at qualifying infrastructure (including water) and provides a maximum grant of R5 million upon completion of agreed project milestones. Municipalities, municipal entities and provincial government entities are eligible to apply for the grant for applicable infrastructure projects.
Black Business Supplier Development Program	Cost-sharing grant offered to black-owned small enterprises to assist them to improve their competitiveness and sustainability. The programme provides grants to a maximum of R1 million, of which R800 000 is for tools, machinery and equipment on a 50:50 cost-sharing basis. The remaining R200 000 is for business development and training on an 80:20 cost-sharing basis. Firms need to have a 51% majority black shareholding, achieve a turnover of R250 000-R35 million per year and have been in operation for a minimum of one year.
Cooperative Incentive Program	A 100% grant for registered primary co-operatives[2]. The objective of the grant is to improve the viability and competitiveness of firms by lowering their cost of doing business. The maximum grant that can be offered to one co-operative entity is R350 000. The second leg of the programme is to provide grant funding up to R10 million in order to fund secondary co-operatives as to provide support to the primary co-operatives. Firms that are registered co-operatives, have a majority black ownership with projects in different economic sectors are eligible to apply for the grant.

[2] A primary co-operative consists of five or more members

Commercial Banks

Commercial Banks can provide funding to SMMEs in the form of loans and overdraft facilities. However, these institutions usually require some level of guarantee that the funding will be repaid and it is often difficult for start-up organisations that do not have a track record to provide such a guarantee.

Commercial banks have also launched incubators to support the development of SMEs. An example is the Standard Bank incubator that has been designed to provide space, services, mentoring and coaching to assist new and innovative businesses to become established and profitable (Standard Bank, 2017). Standard Bank has also established the Tswelopele Venture Fund to harness Enterprise and Supplier Development funding from corporates to provide funding in the form of loans or grants to develop SMEs.

Vumela is a fund that was established in 2009 by FNB Business Banking and is managed by Edge Growth. The venture is an innovative model that provides funding to small and medium enterprises. The fund has invested R133 million in 13 high growth investments since its launch. Vumela also functions as FirstRand's primary Enterprise Development and Supply Development vehicle to meet the organisation's corporate objectives. For more information on opportunities arising through commercial banks see Appendix D.

Jobs Fund

The Jobs Fund was launched in June 2011 as a National Treasury initiative with the goal to address the unemployment challenge in South Africa. The Jobs Fund awards grants to organisations across the public, private and non-governmental sector. The Fund has approved 117 projects with R6.1 billion of grant funding being allocated. The funds are allocated across the following areas (The Jobs Fund, 2018):

Table 7: Funding windows for the Jobs Fund

Funding window	Description
Enterprise development	Initiatives that develop commercial approaches to long-term job creation in a manner that combines profitability and high social impact. Projects can include funding "umbrella" initiatives that can act as channels of support for smaller enterprises.
Infrastructure Investment	Co-financing of light infrastructure investment projects that creates trading opportunities, enhances access to markets and unlocks job creation potential in a particular area.
Support for work seekers	The goal of this window is to improve the quality and supply of labour. Projects should be able to demonstrate the ability to leverage skills development to create linkages between those that have completed training and job placement.
Institutional capacity building	Projects that will improve operational efficiencies, remove barriers to doing business, catalyse innovation and scale up the potential for job creation. The focus is to assist organisations that can influence the demand for labour and improve the efficiency of the labour market.

The Jobs Fund only accepts applications during open funding rounds. A two-stage application process (Concept Note and full Business Case Appraisal) is utilised to assess the eligibility and proposed impact of the projects. The minimum funding request is R10 million. Projects are required to meet the pre-determined criteria as stated in the call for proposals issued during each funding round.

Venture Capital and Private Equity

Venture Capital and Private Equity firms may have an interest in investing in SMMEs. Venture Capital is usually focussed on start-up companies that have demonstrated high growth potential whilst private equity firms will consider investing in existing entities that have a demonstrated track record. It is noted that it is possible that venture capital and private equity could also be interested in funding technology demonstration.

Venture Capital and Private Equity firms usually have defined mandates that guide the focus of the fund. These mandates specify the sector within which investments will be made as well as the investment size. Thus, it is important that investors are engaged on a project-by-project basis based on their mandates.

Impact investor and angel investors are subsets of venture capital. Impact investors seek investments, with the minimum requirement of breaking even, that have a positive social or environmental impact, depending on each investor's mandate. Impact is measured according to predefined metrics. Angel investors invest capital or seed funding in start-ups, with less concern for return, focussing on helping the business in its early stages, typically in exchange for equity. Some firms that assist in sourcing this type on investment assist with the development of the entrepreneur's business skills.

It was noted that during the stakeholder engagement there have been limited investments by venture capital and private equity firms in the water sector. It is possible that this was due to limited opportunities being identified or the projects had not been packaged in a manner that was attractive to investors. This category of investors requires a financial return on any investment and the mechanism by which this will be achieved should be detailed in the business plan. For more information on opportunities arising through private equity and venture see Appendix D.

6.3 Partners

Municipalities and water boards are important partners in the development of SMMEs. These organisations often procure goods and services from the private sector. The procurement process is governed by the relevant legislation and is often seen to be quite onerous. SMMEs that intend to provide goods and services will have to comply with these requirements.

It was noted during the stakeholder engagement phase of the study that it is important that service providers deliver a high-quality service to ensure service delivery and value for money for the public-sector institution. There was a concern that emerging SMMEs may not be able to reliably provide goods and services of the required quality.

There may be an opportunity to develop a programme with a municipality or water boards that procures goods and services from SMMEs. These programmes could also include incubators that are able to provide the non-financial support required to ensure the sustainable delivery of services whilst ensuring that SMMEs can remain sustainable post completion of the programme.

IMVELISI is a programme that is funded by the DST that assists young entrepreneurs through the ideation phase of business development and preparing them for pitches to mentors, incubation programmes and early stage entrepreneurship investors (Green Matter ZA, n.d). The IMVELISI programme is focussed on entrepreneurs in the water and environment sectors.

The South African Venture Capital and Private Equity Association (SAVCA) is the industry body and public advocate for private equity and venture capital asset classes in Southern Africa. SAVCA could thus provide insight into the funds that may be interested in investing in technology demonstrations and the development of SMMEs. See Appendix D.

6.4 Conclusion

WADER and IMVELISI are existing programmes that could provide a pipeline of SMMEs to contribute to innovation in the water sector. These innovators may lack the business expertise to commercialise their product. There may be the opportunity to partner with incubators that could provide non-financial support to ensure commercialisation of the product.

Venture capital and private equity funds may have an interest in SMMEs that have high growth potential. However, the SMMEs must be able to demonstrate the market for the product or service as well as the potential financial return on any investment that is made. Venture capital and private equity partners are also able to provide expertise to entrepreneurs to ensure that businesses are sustainable.

Commercial banks may be able to provide funding and incubators to SMMEs but these institutions usually require a sound business plan and a proven track record. Therefore, there may be the potential to partner with public sector institutions and business incubators. The public-sector institutions could provide longer term contracts to SMMEs whilst the incubators could provide the non-financial support to ensure that goods and services of the required quality are delivered.

Enterprise and supplier development are one of five elements of the Broad Based Black Economic Empowerment (BBBEE) Act (Act No. 53 of 2003). This requires medium and large companies working with suppliers to improve their performance. Businesses can also choose to build SMMEs by providing monetary and non-monetary support to the entity to accelerate the development, sustainability and financial independence of the beneficiary. There may be an opportunity to access these funds to support the development of SMMEs in the water sector.

7 PROJECTS AT A CITY OR SMALL SETTLEMENT SCALE

7.1 The opportunity

South Africa's cities, particularly metropolitan municipalities, are experiencing high levels of inward migration. There is thus a high number of citizens living in these cities that are reliant on water services provided by these municipalities but municipalities are operating within a challenging environment characterised by complexity and uncertainty. This meta challenge can only be resolved in a sustainable way if the different fields of expertise work closely together and develop solutions in an integrated way.

The "Water Resilient City" concept has been developed internationally but further research should be conducted within a South African context and implementation of an action research programme regarding integrated urban scale application of climate response plans. The WRC has developed a framework and guidelines for water sensitive urban design to facilitate changes in urban areas from water wasteful to water sensitive settlements (Armitage et al., 2014). A "Water Fund" is one potential avenue to fund project at the city or settlement scale. The City of Cape Town has established a fund, and eThekwini is exploring the possibility of one, to pursue a project that protect the catchment area for the city. More detail on how a fund could be established is included in Appendix C.

There is an opportunity to develop projects and programmes that could be implemented at a city scale that contribute to water security. Projects could be demonstrated in a location and utilised as a concept that could be implemented at other areas within a city.

7.2 Funding

Renewable Energy and Energy Efficiency Partnership

Renewable Energy and Energy Efficiency Partnership (REEEP) is an international multilateral partnership that works to accelerate market-based deployment of renewable energy and energy efficient systems in low- and middle-income countries. REEEP invests in clean energy markets in low-and middle-income countries to carbon dioxide emissions and build prosperity. (REEEP, 2017).

REEEP focusses on sectors that can combat the effects of climate change through avoidance, mitigation or adaptation while contributing to expand access to modern energy. REEEP seeds and de-risks markets by injecting targeted non-profit investments (grants or soft loans) to early stage small and medium enterprises offering

new products or services utilising clean technologies. Investments are typically in the range between €100 000 and €500 000 and is accompanied by technical support services (REEEP, 2017).

REEEP has three focal areas. These are Smart Cities, Cross Sector Systems and Energy Access. REEEP has launched the Urban Water Works project which aims to promote deployment of clean energy technologies and services in municipal waterworks pilot initiatives in South Africa. The project shall include three municipalities and will aim to optimise pumping and water treatment systems and deploy renewable energy systems (REEEP, 2017).

Global Environment Fund

The Global Environment Fund (GEF) is a global alternative asset manager dedicated to the energy-, environmental-, and natural resources sectors. GEF strives to be the premier alternative asset management firm in the domain of energy, environment, and natural resources. To date the GEF has provided more than $12.5 billion in grants and leveraged over $58 billion in co-financing for thousands of projects in developing countries (DBSA, 2017). This type of funding has potential for projects that offer returns on investment at the local or city level. More information on the GEF is available in Appendix I.

Africa-EU Renewable Energy Cooperation Programme

The Africa-EU Renewable Energy Cooperation Programme (RECP) supports the development of markets for renewable energy in Africa. There are 36 funds that are applicable to a South African context. These funds constitute a mixture of grant, equity or debt funding. Details of the funding that may be applicable to a South African Water RDI context is presented in the table below. (RECP, 2017)

Table 8: RECP Funds

Programme	Description
DEG Feasibility Study Funding	DEG will finance feasibility studies for the preparation of realistic investments for new technology, processes and services in developing countries. Funding of up to €200 000 is provided with co-funding from the project sponsor being required. The fund focusses on small hydro, biomass, solar and wind sectors.
DEG Upscaling	The program finances investments of €500 000 to small and medium enterprises that intend to scale up innovative business models with high developmental impact. Funds must be repaid within five years if a venture is successful. However, the funds will be viewed as a grant and do not need to be repaid in the venture is unsuccessful. Sector focus includes small hydro and biomass.
Sustainable Energy Fund for Africa	Provides grants and technical assistance for viable renewable energy and Energy Efficiency projects. Grant funding of up to $1 million can be provided to cover upfront project preparation costs. Also provides equity investments of $1 to $3 million in viable projects.
Energy and Environment Partnership South & East Africa	Provides support to projects that provide support sustainable energy services to the poor and combat climate change. Support is in the form of seed funding that are required to start and develop a business (pilot and demonstration activities). Funding of $0.1-1 million is provided for biomass and waste-to-energy projects

7.3 Partners

100 Resilient Cities

The Rockefeller Foundation has launched the 100 Resilient Cities (100RC) in 2013 with a view to helping cities around the world become more resilient to physical, social and economic challenges that are a growing part of the 21st century. Durban and Cape Town are two South African Cities that have been selected to form part of the 100RC network. Cities that form part of the network are provided with the resources to develop a roadmap to resilience along the following pathways:

- Financial and logistical guidance for establishing a position of 'Chief Resilience Officer', to lead the city's resilience efforts

- Expert support for development of a Resilience Strategy
- Access to solutions and service providers to assist with the development and implementation of the Resilience Strategy
- Membership of a global network that can learn from and assist each other.

The 100RC only provides direct funding to hire a Chief Resilient Officer but will also provide access to private sector and NGOs that can support strategy development and innovation. Craig Kesson is the Chief Resilience Officer at the City of Cape Town whilst Dr Debra Roberts fulfils this role at eThekwini Municipality.

Dr Roberts has advised that eThekwini has taken the decision to leave the 100RC programme as they have identified that the key pillars that will drive their resiliency strategy are not aligned to that of the 100RC programme. The two key pillars are structured around resiliency in informal settlements and land that is under tribal authorities in peri-urban areas of the municipality. These pillars were identified as this serves the most vulnerable communities within the municipality.

eThekwini is in the process of developing the implementation plan for their resiliency strategy and will be engaging the tribal authorities, and community leaders to develop a plan that is pragmatic and can lead to a more resilient city. There is an opportunity for the WRC to engage Dr Roberts and her team to identify potential projects that could meet the objectives of both organisations.

Western Cape Economic Development Partnership

The Western Cape Economic Development Partnership (WCEDP) is a publicly funded entity that is mandated to enable collaborative engagement between different departments in the Western Cape. The organisation is not able to directly fund projects but could be included in programmes in the Western Cape and facilitate the inclusion of other key stakeholders.

National Business Initiative

The National Business initiative expressed an interest in partnering and engaging in area-based programmes focussed on water efficiency and management. It is currently involved in a project focussed on water stewardship in Richards Bay that includes the participation of the municipality, industry, sugar and forestry companies and local communities.

7.4 Conclusion

South African cities, particularly metropolitan municipalities, can develop programmes and projects that could be implemented at scale and contribute to water security. Metropolitan municipalities are developing projects to improve sustainability and build resiliency. There is an opportunity to co-develop projects to access funding from municipalities.

8 CONCLUSIONS AND RECOMMENDATIONS

The focus of the study was to identify and unlock additional funding streams that could be accessed for the implementation of the Water RDI Roadmap. There are existing strong relationships between the WRC and other key stakeholders that have strong interests in the water sector. The opportunity exists to leverage these relationships to unlock funding as well as targeted private sector institutions that could provide funding. The crucial element will be to target organisations for opportunities that are linked to their mandates.

8.1 Development of a programmatic approach

This study has identified potential funders and partners for key themes within the Water RDI roadmap. The next step of the process would be to employ a programmatic approach within each of these themes to ensure implementation. The programmatic approach is a long-term and strategic arrangement of individual and interlinked projects that is structured in a manner to achieve large scale impact (Global Environment Facility, n.d.).

The approach should initially be targeted at institutions within which there are existing relationships to co-develop projects that are structured in a manner that meet the objectives of all partners. This can be seen to represent the “quick wins” as the WRC already has several agreements with several stakeholders that were engaged during the study. These agreements should include the nature and type of projects that these institutions can provide financial and non-financial resources to.

The next step of the process would be to engage newer partners that have been identified in this study to identify potential areas of collaboration. As an example, the representatives from SAVCA and EVS advisory could be engaged during the next round of IMVELISI and WADER to develop a framework that could be used to identify projects that may interest private sector investors. This could catalyse investment in SMMEs and technology demonstrations.

8.2 Development of a focussed water sector fund

There remains the potential to develop a water sector fund that focusses on the following:

- An area in which a funding gap exists
- An area that has funding available but which may be attractive to investors. This could result in a reallocation of available funding to the area in which the funding gap exists.

The City of Cape Town has developed a water fund in partnership with The Nature Conservancy. eThekwini Municipality has also indicated their intention to introduce a water fund. There is the potential to engage eThekwini at this stage to understand the focus of the fund.

There are several processes that need to be completed to develop a water sector fund. An indication of the process that needs to be undertaken is presented in Appendix C of this report.

8.3 Public private partnerships

Public private partnerships (PPPs) are considered as a model that could be employed to unlock additional funding. PPPs may not be directly linked to RDI but the model does need to be understood as viable technologies should be demonstrated in a manner that ensures that it could be employed within a PPP.

PPPs have the benefit of accessing private sector funding and expertise to ensure the successful implementation of a project. However, the PPP project cycle process is onerous, expensive and can take several years to complete. Therefore, a PPP is best suited to large projects due to the high transactional costs associated developing the project.

Municipalities also face challenges in sourcing funding to produce bankable feasibility studies that could be used to determine project risks to ensure that investors are able to price the risk of their investment. The cost of the feasibility studies would be relatively high given the size and scope of the project and it could prove challenging. However, the DBSA may be able to support in this regard.

Further information on PPPs are presented in Appendix B of this report.

REFERENCES

Balzer, T. (2017). National Water & Sanitation Master Plan. *3rd Annual Water Stewardship Event – Municipal Water Infrastucture Financing.*

Banking Association of South Africa. (2014). *South African Banking Sector Overview.*

Bertram, D. (n.d.). *Likert Scales.*

Bodnar, G. (1996). *Project finance teaching note.*

Bryman, A., & Bell, E. (2011). *Business Research Methods.* Oxford University Press.

Celik, S., & Isaksson, M. (2014). *Instituional investors and ownership engagement.* OECD.

Council for Scientific and Industrial Research. (2016). *CSIR Annual Report 2015/16.*

CSIR. (2016). *Annual Report 2015/16.*

Danida Fellowship Centre. (2017). *DFC-Brochure-English.*

DBSA. (2017). *DBSA Project Preparation.*

DBSA. (2017). *Global Environment Facility*. Retrieved from http://www.dbsa.org/EN/prodserv/GEF/Pages/default.aspx

Department of Science and Technology. (2012). *Scientific and Technological Research and Development Tax Incentive in South Africa.*

Department of Science and Technology. (2016). *Annual Report 2015/16.*

Department of Trade and Industry. (2016). *The DTI – Annual Report 2015/16.*

Department of Trade and Industry. (2016). *THRIP Guidelines Interpration Note.*

Department of Trade and Industry. (2016). *THRIP: Programme Guidelines.*

Department of Trade and Industry. (n.d). *Financial Assistance*. Retrieved from https://www.thedti.gov.za/financial_assistance/financial_incentive.jsp?id=48&subthemeid

Department of Water and Sanitation. (2015). *Norms and Standards in respect of tariffs for Water Service Authorities and Bulk Water Service Providers.*

Department of Water and Sanitation. (2015). *Revision of the Pricing Strategy for Water Use Charges.*

Department of Water and Sanitation. (2016). *Annual Report.*

Department: Small Business Development. (2014). *About us*. Retrieved from Department of Small Business Development: http://www.dsbd.gov.za/

Development Bank of Southern Africa. (2016). *Integrated Annual Report 2015/16.*

Dickinson, T. (n.d). *Development Finance Institutions: Profitability Promoting Development.*

ERWAT. (2016). *Draft Annual Report 2015-2016.*

Eskom. (2017). *Annual financial statements.*

Eskom. (2017). *Development Foundation Report.*

Eskom. (2017). *Integrated Report.*

eThekwini Municipality. (2015). *Annual Report 2014/15.*

eThekwini Municipality. (2016). *Annual Report 2015/2016.*

EUREKA. (2017). *About us*. Retrieved from EUREKA Network: http://www.eurekanetwork.org/about-eureka

European Commission. (2017). *Horizon 2020 – Work Programme 2018-2020.*

Eurostars. (2017). *About us*. Retrieved from https://www.eurostars-eureka.eu/about-eurostars

Eurostars. (2017). *Projects*. Retrieved from https://www.eurostars-eureka.eu/project/id/11645

Financial and Fiscal Commision. (2012). *Options analysis associated with .*

Financial and Fiscal Commission. (2013). *Final report on the Financial and Fiscal Commission's Public Hearings on the Review of the Local Government Fiscal Framework.*

Frankson, L. (2015, July). *The road to water conservation*. Retrieved from Infrastructure News: http://www.infrastructurene.ws/2015/07/29/the-road-to-water-conservation/

Global Environment Facility. (n.d.). *Adding value and promoting higher impact through GEF's programmatic approach.*

Green Africa Directory. (2016, August). Retrieved from Green Africa Directory: http://www.greenafricadirectory.org/cape-town-water-fund-a-first-for-south-africa/

Green Matter ZA. (n.d). Retrieved from Enviroprenuers Imvelisi.

Horizon 2020. (2017). *What is Horizon 2020*. Retrieved from https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020

IFC. (2017, June). *IFC Initiates Push to Support South African SMEs with FirstRand*. Retrieved from Word Bank.

Investopedia. (n.d). *Philanthropy*. Retrieved from Investopedia: www.investopedia.com/terms/p/philanthropy.asp

Jacobs, I. (2014). *The WRC's approach to research uptake and the WRC Knowledge Tree.* Water Research Commission.

Johannesburg Water. (2016). *Intergrated Annual Report 2015/16.*

KZN Growth Fund. (n.d.). *Who are we*. Retrieved from KZN Growth Fund: http://www.kzngrowthfund.co.za/whoarewe.html

Lang, T. (n.d.). *An overview of four futures methodologies (Delphi, environmental scanning, issues management and emerging issue analysis).*

Ministry of Foreign Affairs of Denmark. (2018). *Research collaboration projects in growth and transition countries ("Window 2"), 2018.*

National Business Initiative. (2017). *Public-private partnerships: A very brief introduction.*

National Research Foundation. (2016). *Annual Report 2015/16.*

National Research Fund. (2017). *Home*. Retrieved from National Research Fund.

National Treasury. (2004). *PPP Manual: Module 4 – Prefeasibility study.*

National Treasury. (2007). *Introducing Public Private Partnerships in South Africa.*

National Treasury. (2007). *Municipal Service Delivery and PPP Guidelines.*

National Treasury. (2008). *2008 Local Government Budgets and Expenditure Review.*

National Treasury. (2011). *Financial Management and MFMA implementation.*

National Treasury. (2013). *Annexure 1: Explanatory memorandum to the division of revenue.*

National Treasury. (2014). *MFMA Circular No. 71: Uniform Financial Ratios and Norms.*

National Treasury. (2017). *2017 Budget Review.*

National Treasury. (2017). *Division of Revenue Bill.*

National Treasury. (n.d.). *Handbook for municipal finance officers.*

National Treasury PPP Unit. (2007). *Introducing Public Private Partnerships in South Africa.*

Nedbank. (2015, April). *The WWF Nedbank Green Trust funds climate change projects*. Retrieved from Nedbank: https://www.nedbank.co.za/content/nedbank/desktop/gt/en/news/nedbankstories/affinity-projects/2015/the-wwf-nedbank-green-trust-funds-climate-change-projects.html

NEDO. (2016). *About NEDO*. Retrieved from NEDO: http://www.nedo.go.jp/english/introducing_index.html

OECD. (2017). *Development finance institutions and private sector development*. Retrieved from OECD: http://www.oecd.org/dac/stats/development-finance-institutions-private-sector-development.htm

Pillay, C. (2014). *A simple guide to angel investors.* SME South Africa.

PSETA, Green Skills. (2016). *Occupationally Directed Skills Development for Green Public Chain Management.*

RECP. (2017). *Funding Database*. Retrieved from Africa-EU Renewable Energy Programme: https://www.africa-eu-renewables.org/funding-database/

REEEP. (2017). *About REEEP*. Retrieved from http://www.reeep.org/about-reeep

REEEP. (2017). *REEEP Annual Report 2016.*

Saunders, M., Lewis, P., & Thornhill, A. (2003). *Research Methods fos Business Students .*

Schreiner, B. (2013). *Why has the South African National Water Act been so difficult to implement.* Water Alternatives.

South African Venture Capital and Private Equity Association . (2017). *SAVCA 2017: Private Equity Industry Survey.*

South African Venture Capital and Private Equity Association. (2017). *SAVCA 2017 – Venture Capital Survey – Covering the 2016 calender year.*

Standard Bank. (2017). *Standard Bank Incubator.*

Switala, H. (n.d.). *Project finance and obtaining sufficient funding for the successful completion of your project.*

The Banking Association of South Africa. (2018). Retrieved from SME Definition: http://www.banking.org.za/what-we-do/sme/sme-definition

The Jobs Fund. (2018). *Home*. Retrieved from The Jobs Fund: http://www.jobsfund.org.za/

The Nature Conservancy. (2015). *Upper Tana-Nairobi Water Fund Business Case – Version 2.* Nairobi, Kenya: The Nature Conservancy.

The Nature Conservancy. (n.d). *Inside Africa's first Water Fund*. Retrieved from The Nature Conservancy: https://www.nature.org/ourinitiatives/regions/africa/inside-africas-first-water-fund.xml

Trialogue. (2016). *Impact investing in South Africa: what the future holds*. Retrieved from http://trialogue.co.za/impact-investing-south-africa-future-holds/

Umgeni Water. (2016). *Annual Report 2015/2016.*

University of Stellenbosch Business School. (2017). *Academic Programmes: MBA – HCL*. Retrieved from USB: http://www.usb.ac.za/Academicprogrammes/MBA-HCL/

Valla, V. (2017). *DSBD Inputs to Operation Phakisa – Chemical and Waste Economy*.

WADER. (2017). *Water Technologies Demonstration Programme*. Retrieved from http://wader.org.za/

Water Research Commission. (2016). *Annual Report 2015/16.*

Water Research Commission, Gordon Institute of Business Science. (2017). Transforming South Africa's Water Challenges in Enterprise Development & Economic Growth Opportunities. *Critical Thinkers Panel Brief.* Johannesburg.

APPENDIX A: LOCAL GOVERNMENT FUNDING OPPORTUNITIES

Municipalities have a crucial role to play in the provision of water services in South Africa. These institutions are therefore important partners in ensuring the successful implementation of the Water RDI Roadmap. The WRC has many successful partnerships with several municipalities and water boards which could be leveraged for collaboration in research, development and innovation.

Funding opportunity

Municipalities have several revenue streams that could be utilised for funding different elements of the RDI Roadmap, however stakeholders have advised that funding available is constrained due to the competing priorities within the municipal environment. It is therefore likely that metropolitan municipalities and secondary cities will have the budgets available to fund suitable projects without adversely impacting on the delivery of other services.

EWS and Johannesburg Water have existing relationships with tertiary institutions that undertakes research to assist in resolving challenges that they are experiencing. These studies are undertaken by students at a Masters or Doctoral level. Therefore, it may be possible for other municipalities to enter into agreements with tertiary institutions for research to be undertaken.

A project that is funded by a municipality must be reflected on the municipal budget and comply with the relevant procurement legislation. The project should also be seen to meet a need within the municipality and have the potential to have an impact at scale.

Procurement was highlighted by stakeholders as a key challenge for any municipal funded project. The procurement process is onerous and there are several processes that need to be adhered to before requests for goods and services can be advertised. Thereafter, there are processes that need to comply with before a service provider can be appointed.

Partners

It is important to leverage existing relationships with municipalities as these organisations have already demonstrated a willingness to innovate and have budgets and teams that are available that may be accessed to fund elements of the Water RDI implementation plan. However, the projects must be structured in a manner that is seen to meet the needs of the municipality.

Importantly the metropolitan municipalities have the capacity to appoint project champions that able to provide input and drive projects to ensure that these can be successfully completed. Other municipalities will be more likely to implement projects if these have been successfully completed within a metropolitan municipality or secondary city.

There are many potential municipalities that the WRC can engage with to fund or partner with on different elements of the Water RDI Roadmap. The project team engaged eThekwini Water and Sanitation and Johannesburg Water with the other but there are other municipalities that are also undertaking innovative approaches to enhance the delivery of water services.

eThekwini Water and Sanitation

eThekwini Water and Sanitation (EWS) is responsible for the provision of water and sanitation services in eThekwini Municipality. The municipality has noted that water loss in distribution is a serious challenge for the municipality (eThekwini Municipality, 2015). Total revenue generated in the 2015/16 financial year by eThekwini Municipality was R29.0 billion. The bulk of the revenue was generated through property rates and service charges, with operational transfers income being R2.5 billion. The capital budget for the municipality was R5.4 billion in 2015/16. The capital budget for the water and sanitation unit was R1.46 billion (eThekwini Municipality, 2016).

eThekwini (through the work of EWS) has developed a reputation for being a relatively innovative municipal operating department with several water and sanitation projects being trialled in the municipality. These projects include:

- Thermophilic digestion – funded by the municipality
- Ultraviolet (UV) reactor – funded by the municipality
- Co-digestion pilot – funded by the municipality
- Desalination remix plant pilot – funded by the Japanese government
- Biogas to energy – funded by the Department of Energy

Another recent innovation has been the roll-out of communal ablution blocks in informal settlements. These units are connected to the municipal water and sewerage systems and provided in pairs for residents living in informal settlements. EWS was recognised for its transformative and inclusive approach to providing water and sanitation services through the Stockholm Industry Water Award in 2014.

Johannesburg Water

Johannesburg Water is a municipal entity that is wholly-owned by the City of Johannesburg (COJ) that is mandated to provide water and sanitation services to the residents of the municipality. Johannesburg Water supplies 1 572 Ml/day of potable drinking water and treats 864 Ml/day of sewerage at six wastewater treatment works. It generated revenue of R7.9 billion in the 2015/16 financial year with a profit of R672 million, and has a capital budget of R737 million for the 2016/17 financial year (Johannesburg Water, 2016)

Johannesburg Water has an innovation and technology unit that focusses on engaging the team at Johannesburg Water to understand challenges in the delivery of water services and managing the ecosystem in order to develop innovative solutions to these problems. Johannesburg Water also has existing agreements with the CSIR, WRC and Water innovation hub.

East Rand Water Care Company (ERWAT)

The East Rand Water Care Company (ERWAT) was established in 1992 as a Section 21 company. Ekurhuleni Metropolitan Municipality, City of Johannesburg and Lesedi Local Municipality are the shareholders of the company. ERWAT is responsible for the operation of 19 wastewater treatment works with a combined capacity of 737 Ml/day. ERWAT generated R575 million in revenue for the 2015/16 financial year with an accumulated surplus of R1.34 billion. (ERWAT, 2016)

ERWAT partners with role-players like DWS, Ekurhuleni Metropolitan Municipality, conservation specialists and Non-government organisations to achieve social responsibility goals.

South African Local Government Association

The South African Local Government Association (SALGA) is an autonomous association of all South African local government structures. SALGA has a national office and a presence in each province. It has the strategic role of representing the interests of their members and could play a pivotal role in the deployment of technologies to municipalities.

It has also been noted that SALGA is a partner on the WADER programme and currently in the process of conceptualising a series of innovative platforms with the WRC. These platforms require the development of a business models for potential technology forums and test beds that could be used for technology demonstrations.

Water SETA

The Water Sector Education and Training Authority (W-SETA) presents another funding opportunity through the national skills levy. If the requirements of training objectives, course work preparation and accreditation are met, then funding could be offset by the skills levy.

Legislative mandate

The Water Services Act (No. 108 of 1997) provides for:

- the rights of access to basic water supply and sanitation
- the setting of national norms and standards for tariffs
- the establishment and disestablishment of water boards and water services committees and their powers and duties

Water Service Institutions

The Water Services Act (No. 108 of 1997) mandates every Water Services Authority (WSA) to progressively ensure efficient, affordable, economical and sustainable access to water services to all consumers within its area of jurisdiction. A WSA could perform the functions of a water services authority itself, or may enter into a written contract with a water services provider (WSP). All metropolitan municipalities are WSAs with other WSAs being either local municipalities or district municipalities.

A WSP can be appointed by a WSA for a limited period and subject to certain conditions. Section 19(2) of the Water Services Act (No. 108 of 1997) states that a WSA may only enter into a contract with a private sector entity only after it has considered all known public sector WSPs which are willing and able to perform the relevant functions.

Local government fiscal framework

It is often stated that additional grant funding is required at a local government level. However, there are several grants that are transferred from the national fiscus as well as other funding options available to local government. The framework below has been proposed as a framework that could be used to detail funding options available to local government (Financial and Fiscal Commision, 2012).

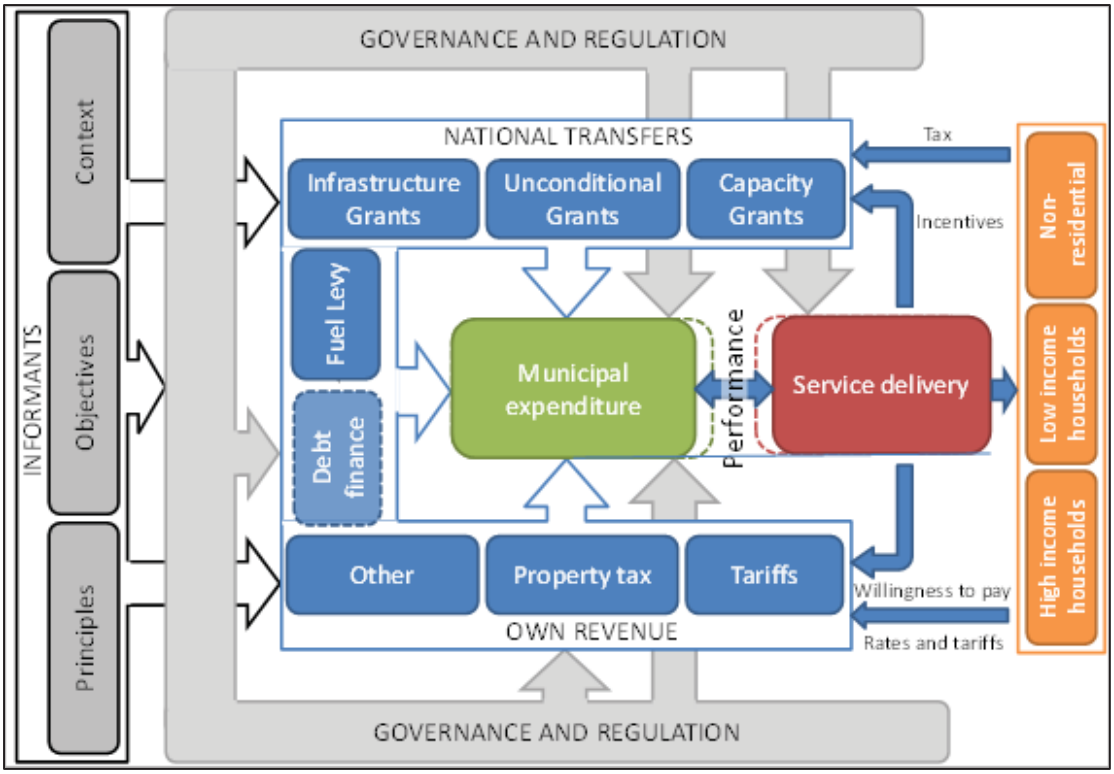

Figure 4: Structure of the local government fiscal framework

As can be seen there are many different funding sources available for funding local government initiatives but these can be broadly separated into transfers received from national government and municipal own revenue. These categories can then be further separated into capital or operating funding sources. The next section of the report shall detail the potential to utilise existing transfers for funding the RDI roadmap.

The transfers have been separated into capital, operating, capacity building and transfers aimed at sustainability.

National Treasury have indicated that the norm for the Total Borrowings (Debt) of municipalities is 45% of total operating revenue. A norm below 45% suggests that the municipality has the capacity to increase funding from borrowings should the organisation have the cash flow required to access the debt (National Treasury, 2014). As an example, should a municipality have operating revenue of R100 million but debt of R20 million, the municipality should be able to access an additional R35 million of debt. The willingness to raise additional debt would be dependent on the risk appetite of the municipality.

Capital funding streams

Only capital transfers that are relevant to the development of water and sanitation infrastructure are considered in the study. Capital transfers may be made directly to a

municipality (direct allocation) or to another sphere of government that is tasked to perform services on behalf of a municipality (indirect allocation) (National Treasury, 2008). Other spheres of governments include national departments such as the Department of Water and Sanitation and Eskom.

Municipal Infrastructure Grant

The Municipal Infrastructure Grant (MIG) is the largest infrastructure transfer to municipalities, at R15.8 billion in 2017/18. The purpose of the grant is to provide capital finance to eradicate basic municipal infrastructure backlogs for poor households, microenterprises and social institutions servicing poor communities. The grant funds the provision of infrastructure for basic services, roads and social infrastructure for poor households in non-metropolitan municipalities. Basic services include the provision of basic water and sanitation services (National Treasury, 2017).

Regional Bulk Infrastructure Grant

The Regional Bulk Infrastructure Grant (RBIG) aims to provide access to bulk water and sanitation services by successfully executing projects of regional significance. These projects may be located across multiple municipalities or within a single municipality. The direct transfer allocation for 2017/18 is R1.9 billion with a further allocation in kind of R2.8 billion. There is also a similar programme operated by the DWS that funds the construction of bulk projects undertaken by Water Boards (National Treasury, 2017).

The RBIG could be used for the development of new or upgrading of regional water and wastewater assets as well as to pilot regional Water Conservation and Water Demand Management (WCWDM) or implement local WCWDM projects that directly impact on bulk infrastructure requirements.

Urban Settlements Development Grant

The Urban Settlements Development Grant (USDG) supplements the capital revenue of the eight metropolitan municipalities to provide infrastructure for municipal services and upgrade informal settlements. The USDG allocation for 2017/18 is R11.4 billion (National Treasury, 2017).

At least 50% of the USDG must be spent on the provision of basic services to households living in informal settlements. A further 3% may be spent on the procurement of capacity to support the implementation of the USDG human settlements programme outputs.

Water Services Infrastructure Grant

The Water Services Infrastructure Grant (WSIG) aims to accelerate the delivery of clean water and sanitation facilities to communities that do not currently have access to a basic level of service. The grant has a direct and indirect component and a portion of the grant can be used for capacity building. The capacity development portion of the grant could be utilised to develop skills within the municipality to successfully undertake similar projects in future. The direct transfer allocation for 2017/18 is R3.3 billion with a further allocation in kind of R587 million. The allocation in kind is managed by DWS and projects are undertaken once an agreement has been signed with the relevant Water Services Authority. DWS is then able to appoint an implementing agent to undertake the study.

The grant can also be used to support the completion of the bucket eradication programme as the bucket eradication grant came to an end in 2016/17. The allocations are based on the number of households with water and sanitation backlogs, prioritising the 27 priority district municipalities (National Treasury, 2017). The 27 priority municipalities are:

- Amathole
- Chris Hani
- Joe Gqabi
- OR Tambo
- Ugu
- uMgungundlovu
- Uthukela
- Umzinyathi
- Amajuba
- Zululand
- Umkhanyakude
- uThungulu
- iLembe
- Ehlanzeni
- Mopani
- Vhembe
- Capricorn
- Waterberg
- Bonjala

- Ngaka Modiri Molema
- Dr Ruth Segomotsi Mompati
- Sisonke
- Alfred Nzo
- Joe Taolo Gaetsewe
- Greater Sekhukhune
- West Rand

The following grants that were available in 2015/16 have been consolidated into the WSIG for the 2017/18 financial year:

- Municipal Water Infrastructure Grant
- Water Services Operating Subsidy
- Rural Households Infrastructure Grant

Other capital funding sources

Municipalities are also able to access the capital markets to access funding for the development of infrastructure. Traditionally, funding streams can be in the form of loans from financial service providers or through the issuance of bonds. However, these loans need to be repaid over a period and include a component for interest over and above the capital that has been raised.

Many municipalities remain reliant on grant funding for capital expenditure. This could be attributable to a low revenue base, poor governance or a lack of appetite to access capital that has to be repaid. However, the larger municipalities do often access the capital market to supplement grant funding that is received.

Capital funds are usually used to develop infrastructure. However, there may be a possibility that this could be used for **innovation and deployment activities** if projects are seen to be in the long-term interests of a city.

Capital projects are usually completed after a feasibility study has been completed. It may be possible to include alternate technologies within the scope of a feasibility study.

Operating funding streams

Equitable share

Local government receives an equitable share of nationally raised revenue order to provide basic services and perform its allocated functions as per Section 227 of the Constitution. Equitable share is an unconditional transfer that is intended to

supplement the revenue that municipalities can raise themselves. This allocation amounts to R57 billion in 2017/18 and includes the Regional Services Council (RSC)/Joint Services Board (JSB) levies replacement grant[3] and special support for councillor remuneration and ward committees.

The allocation to each municipality is determined by a formula that considers demographic and other data. The current formula was introduced in 2013/14 following a review process that included National Treasury, the Department of Cooperative Governance and SALGA in partnership with the Financial and Fiscal Commission (National Treasury, 2013). Included within the formula is a component for water and sanitation services provided by municipalities. The allocation by the formula for water and sanitation is R23.7 billion for the 2017/18 financial year (National Treasury, 2017).

Water services tariff

Municipalities can charge tariffs for the services that are provided (a WSA levy and water and sanitation tariff for services provided). The WSA must set its water supply and sanitation tariff in a manner that ensures that the revenue, inclusive of transfers and grants, is sufficient to recover all reasonable costs associated with the provision of the service. This includes direct and indirect costs associated with operations, maintenance, refurbishment of water services infrastructure. Reasonable costs also include indirect costs allocated to the water services function by the WSA (Department of Water and Sanitation, 2015).

There is a view that that current water services tariffs may not be insufficient to fully cover the costs of the services that are provided. It is possible that this may be the case but this view also assumes that:

- The actual costs of providing water services is known. This may not always be the case as it may be possible to quantify the direct costs of providing the service but there may be overheads that are not costed.
- The services are being provided in the most cost-effective manner. There may be an opportunity to improve efficiency in the system in a manner that does not

[3] The RSC/JSB levy was a major source of revenue for municipalities up until 2006. The RSC/JSB was a tax that was levied on businesses within district and metropolitan municipalities. The RSC/JSB replacement grant was introduced to protect municipal budgets from loss of revenue when the tax was abolished in 2006/07 due to several economic, legal and administrative deficiencies (Financial and Fiscal Commission, 2013)

impact negatively on service delivery. This could ensure that tariffs do not have to be increased.

Other funding streams

Municipalities also receive revenue from other services that are provided (electricity and solid waste removal) as well as property rates – termed "Own Revenue". Municipalities can make strategic decisions that enable surpluses or deficits to be made on services provided to achieve their mandate. As an example, municipalities can generate a surplus in the provision of electricity services that could then be used to fund the operation of sanitation services.

Operating funding streams are used to finance the operational activities of municipalities. Included in this is the training and development of staff. There is thus an argument to be made that operating funds could be used to fund knowledge economy issues.

There are also elements of the Water RDI implementation plan that will improve the ability of municipalities to improve their service provision.

Capacity building transfers

The purpose of capacity building grants is to help develop municipalities' management, planning, technical and financial management skills. Capacity building grants such as the local government financial management grant and municipal systems improvement grant are not seen to be relevant to the Water RDI Roadmap as they are for general skills development rather than water infrastructure development and/or operation and maintenance. Capacity building grants that are seen to be relevant are detailed below.

Infrastructure skills development grant

The Infrastructure Skills Development Grant (ISDG) aims to develop capacity within municipalities by recruiting unemployed graduates to municipalities to be trained and developed. This grant will thus establish a pool of young professionals that have technical skills related to municipal services. Municipal services are understood to be water, sanitation, electricity and town planning.

The allocation of this grant is based on the business plans submitted by the municipality, along with the municipality's ability to provide training and professional development of graduates. The grant allocation is R141 million in 2017/18 and increases to R157 million in 2019/20.

Expanded public works programme integrated grants for municipalities

The purpose of the Expanded Public Works Programme Integrated Grant (EPWPIG) for municipalities is to incentivise the expansion of work creation efforts using labour intensive delivery methods in key focus areas such as basic services infrastructure, including water and sanitation reticulation. The EPWPIG grant allocation to all municipalities is R691 million in 2017/18.

The focus of capacity building grants is to improve the skills of officials within the sector. This is linked to the aim of establishing high-level technical, research and leadership capacity in the water sector.

Municipal budgeting process

It is important to note that there are different budgeting processes in a municipality. The municipality has an aggregated budget that includes revenue and expenditure for all services provided. In addition to this, each department within the municipality will develop the proposed budgets and to access funding.

At an institutional level, the municipality shall decide on the overall funding mix of the capital and operating budget. This will include the unconditional grant allocations to each service and the level of debt that will be incurred to fund the capital expenditure programme. As an example, Joburg Water has previously stated that they receive no equitable share allocation from the City of Johannesburg and is required to cross-subsidize the free basic water and sanitation services from other consumers.

Institutional budgeting process

Section 153 of the Constitution states that ‘a municipality must structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community’. The three-year budget sets out the revenue raising and expenditure plan of the municipality for approval by council. The allocation of funds must be in alignment with the priorities provided in the Integrated Development Plan. Each phase of the municipal budgeting process is presented in the table below: (National Treasury, 2011)

Table 9: Municipal budgeting process

Phase	Description
Budget planning	The budget process schedule is tabled by the mayor in August. This schedule will contain key dates for the budget process.
Budget preparation	This involves an analysis of expenditure and revenue projections, revising budget related policies and considering local, provincial and national priorities.
Tabling and public consultation	The proposed budget should be tabled in council by the end of March. The municipality is required to conduct public budget consultations during April and May. The municipality must also obtain input from National Treasury, relevant provincial treasury and other organs of state and municipalities.
Revision and debate	This period can be used to revise the proposed budget based on input that has been received.
Approval of the budget	The budget must be approved by council before 01 July. The budget must also be published on the municipal website.

It must be noted that the municipal budget that is tabled in Council is presented at a reasonably high level to allow Senior Managers within the municipality to move expenditure and revenue within a budget allocation. Any expenditure that is not in accordance with the budget allocation will be classified as unauthorised expenditure (National Treasury, n.d.)

Unauthorised expenditure can be authorised by the municipal council in an adjustments budget as per Section 32 of the MFMA. Expenditure must be recovered from the person liable for the expenditure or written off by council if the unauthorised expenditure is not authorised. (National Treasury, 2011)

Municipal departments budgets

Municipalities comprise many different departments that are tasked with providing different services within their municipal boundaries. Thus, there is an internal process with each municipality that develops the budget for each department to compile the 'rolled-up' budget that is tabled in council. This process will vary between municipalities, as larger metropolitan municipalities may have an allocated accountant within each department that engages with the central municipal treasury office. Smaller municipalities may only have a central treasury team that engages directly with the technical team in each department.

Technical departments (such as the Water and Sanitation Department) are required to motivate their proposed tariff increases. However, the decision as to the final tariff increase is taken at council level and the department must undertake to manage expenditure in line with the proposed revenue target.

APPENDIX B: PUBLIC PRIVATE PARTNERSHIPS

The South African water sector requires R899 billion over the ten years in order develop new and rehabilitate and upgrade existing infrastructure. However, total funding that is available is R566 billion over the next ten years. This creates a funding gap of R333 billion (Balzer, 2017). Public private partnerships are a viable option to increase investment in the sector.

Public-private partnerships are also seen a possible model that could be used to implement technologies at scale and contribute to water security. Public private partnerships (PPPs) are long-term contracts between the public and private sector, with the main objective being to ensure the delivery of public services by leveraging public sector expertise as well as transferring risk to the private sector.

This section of the report does not represent a comprehensive overview of public private partnerships but rather presents an overview of the opportunity and associated challenges. PPPs may not be directly linked to RDI but the mechanism needs to be understood, as viable technologies should be demonstrated in a manner that would ensure implementation as part of a PPP.

What is a public private partnership?

Public private partnerships (PPPs) are long-term contracts between the public and private sector. A PPP is defined in South African law as a contract between a government institution and a private party, where (National Treasury, 2007):

- The private party performs an institutional function and/or uses state property in terms of output specification
- Substantial project risk (financial, technical, operational) is transferred to the private party
- The private party benefits through unitary payments from government budgets and/or user fees
- Payment arrangements for PPPs are based on outputs related to the provision of services and/or infrastructure and services
- Risks are allocated to the party that is most able to carry them. This means that risks are mitigated and/or the institution can absorb the consequences of the risk.

The table below details reasons for choosing a PPP.

Table 10: Reasons to consider PPPs

Reasons for choosing a PPP	Description
Leverage private sector skills	The public sector can access skills that may be available in a private sector institution, but not the procuring institution. The PPP can then be used as an opportunity to contribute to skills transfer and capacity building within the procuring institution. This is an important consideration given the perceived skills shortage within water sector institutions.
Private sector takes financial risk over the lifecycle of the project	The private party will be responsible for managing risks over the entire duration of the project. The use of debt within the project ensures that lenders of capital also apply their rigorous monitoring and control mechanisms over the duration of the loan period.
PPPs deliver budget certainty	The future cost of a project is known once the PPP agreement has been signed. This will include the cost associated with the operation and maintenance of the asset over the full lifecycle of the project.

In addition to the reasons provided in the table above, a Finance-, Design-, Build-, Operate- and Transfer PPP affords the public sector to develop a project using limited funding, and utilising future cash flows generated by the service provided to pay for the project.

PPP Project cycle

The PPP project cycle reflects the Municipal Financial Management Act (Act 56 of 2003), Municipal Systems Act (Act 32 of 2000) and the Municipal Private Partnership Regulations. The Municipal PPP project cycle is reflected in the diagram below.

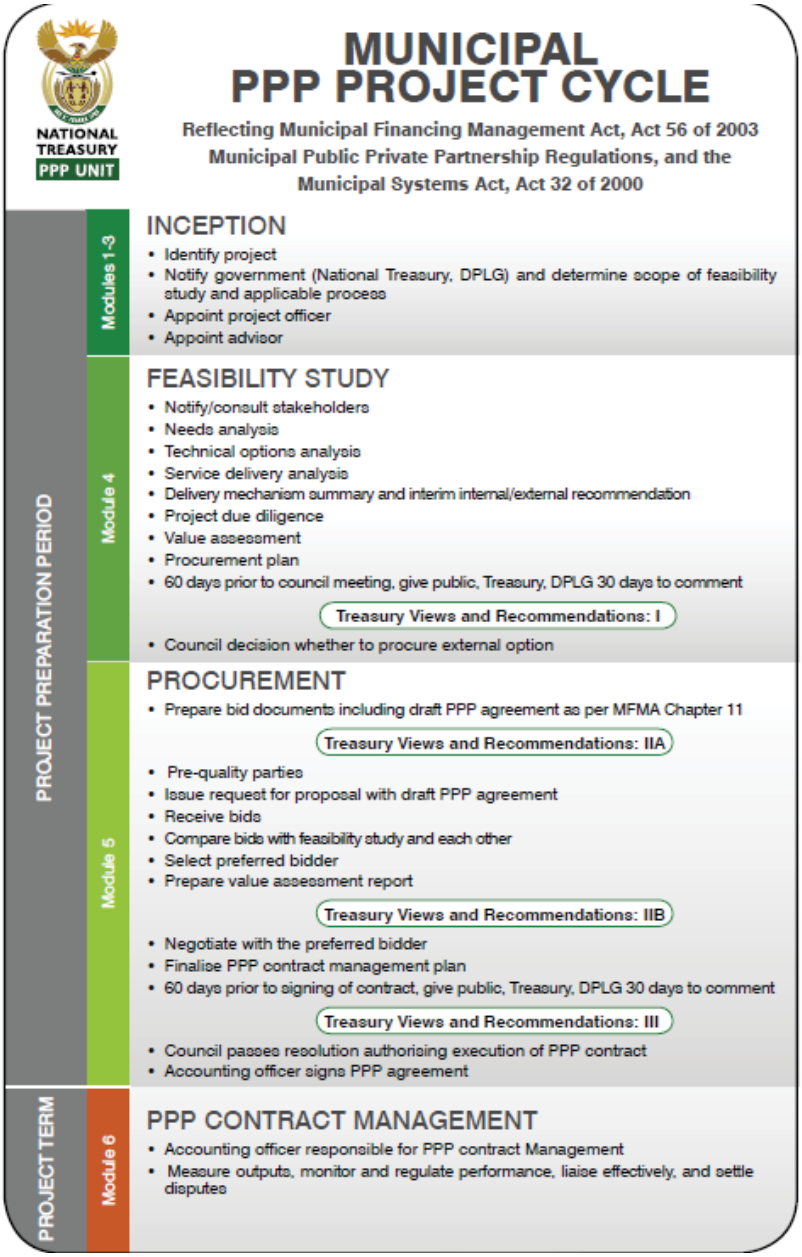

Figure 5: Municipal PPP project cycle

Source: National Treasury, (2007)

The project cycle detailed above requires that municipalities need to inform National Treasury of their intention to consider a PPP. The PPP project cycle also requires three regulatory tests of affordability, value for monet and risk transfer to be applied at project preparation, procurement and management stages of the PPP project cycle. (National Treasury, 2007)

As indicated by the Figure above, the PPP project cycle comprises several steps which requires several items to be addressed at each step. As an example, the figure below provides an indication of the different stages of the PPP feasibility study.

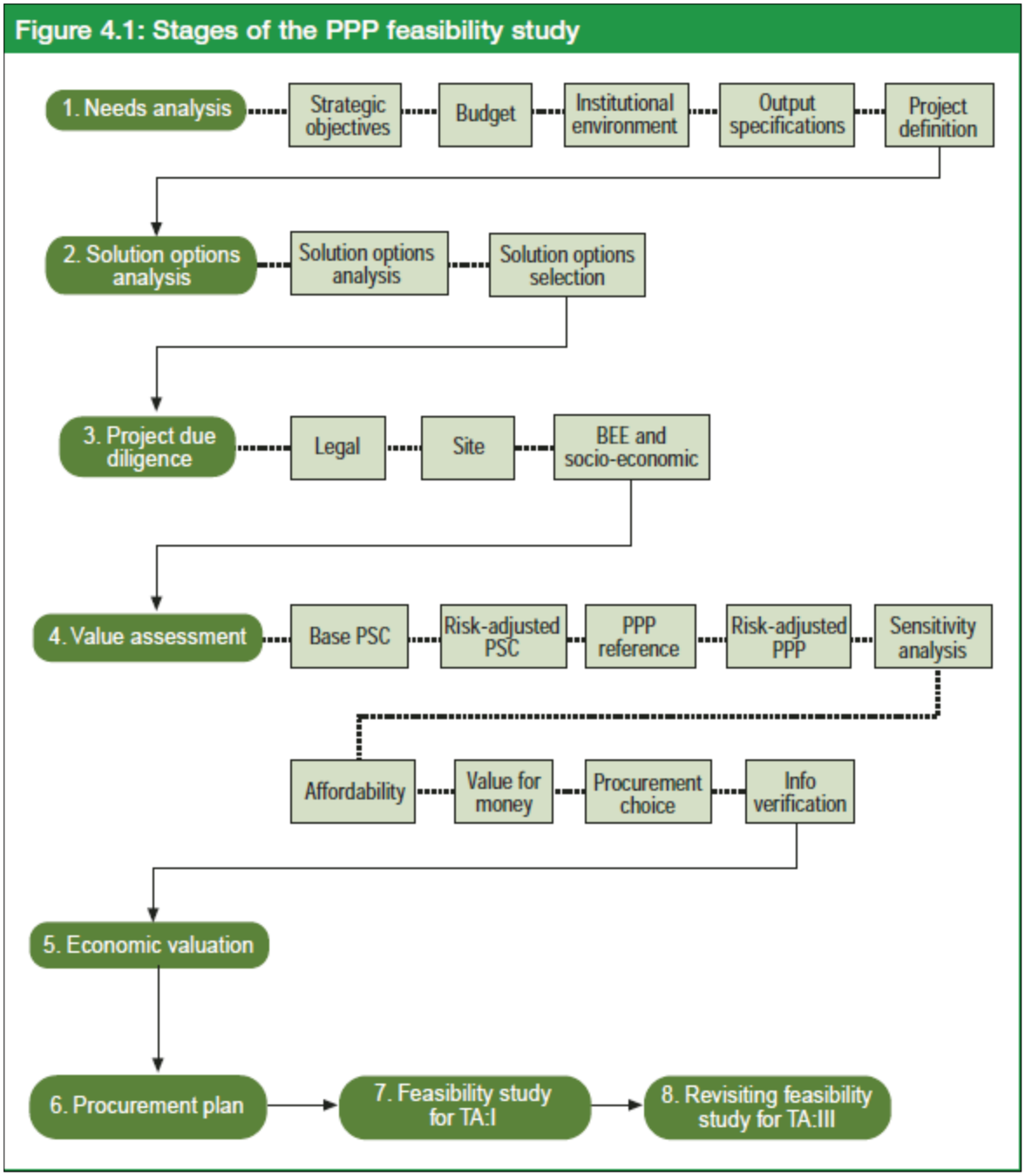

Figure 6: PPP Project Cycle

Source: (National Treasury, 2004)

Structure of PPP

PPPs usually involve the private party raising debt and equity to finance the project and establish a Special Purpose Vehicle (SPV) to deliver the project. However, some PPP projects may not include debt finance and may be funded by a combination of government funds and private equity. A typical structure of a PPP project is presented in the diagram below. (National Treasury PPP Unit, 2007)

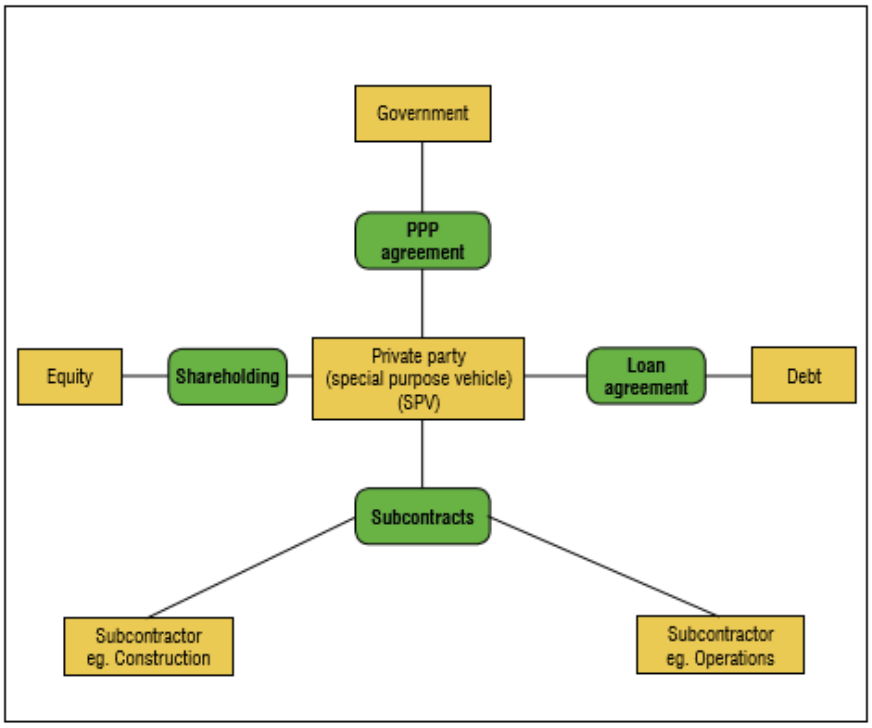

Figure 7: Typical SPV structure for PPPs

Other types of public private partnerships include lease contracts, operation and maintenance contracts as well as Build, Operate and Transfer Contracts (National Business Initiative, 2017).

A PPPs project financing structure and sources of funding will be determined by the affordability limits, value for money considerations and the risk profile of the municipality. (National Treasury, 2007)

Water-related public private partnerships

As per National Treasury, the total value of all PPP projects that have been completed in South Africa since 1998 amounts to R65.3 billion. The total number of projects concluded is 31 and have been completed in the hospitals, transports and roads and water services. This includes the Dolphin Coast water and sanitation concession that began in 1999 and has a project value of R130 million and the Mbombela water and sanitation concession, that began in 1999 and has a project value of R189 million (National Treasury, 2017).

Other notable PPPs in the water sector include the Durban Water Recycling facility in eThekwini Municipality that began in 2001, and a management contract for Johannesburg Water that was concluded during 2001-2006 (National Business Initiative, 2017).

Conclusion

PPPs provide a viable solution to enhance service delivery in the water sector by leveraging private sector funding and expertise. However, the PPP project cycle process is onerous, expensive and can take several years to complete.

The ability of the public sector to implement and manage PPPs is a further challenge that needs to be considered. There is a dire need for PPP type project/contract managers to ensure the PPP contract is adhered to, risk is transferred and there is value for money for the public sector. The private sector also needs to ensure that quality of advisory services to institutions are improved, whilst striving to offer better value for money.

PPPs are best suited to large projects due to the high transactional costs associated with developing the project. Municipalities also face challenges in sourcing funding to produce bankable feasibility studies that could be used to determine project risks to ensure that investors are able to price the risk of their investment. The cost of the feasibility studies would be relatively high given the size and scope of the project and it could prove challenging for the water and sanitation units given the competing priorities of municipalities. The DBSA may be able to provide funding via the project preparation fund but would require the project to proceed if it is seen to be viable.

APPENDIX C: A FUND FOCUSSED ON THE WATER SECTOR

There is potential to develop a fund that could be used to invest in different aspects of the water sector that is linked to the Water RDI implementation plan. Private and public-sector funding could be used to establish the fund. At this stage, there is potential to establish a fund focussed on:

- Technology
- SMME Development
- Infrastructure Development.

An example of a fund that was established as a public-private partnership is the KwaZulu-Natal Growth Fund (KGFT). The KGFT was established in 2008 as an initiative of the KZN Government's Department of Economic Development, Tourism and Environmental Affairs (EDTEA). The fund was initially structured as a 15-year R1.087 billion public-private partnerships between EDTEA and other organisations. The table below details the initial investment that was made in 2008.

Table 11: Investment in KZN Growth Fund

Investor	Initial investment
EDTEA	R362.5 million
Standard Bank of South Africa	R200 million
Infrastructure Finance Corporation	R300 million
Development Bank of South Africa	R225 million

Source: (KZN Growth Fund, n.d.)

This initiative was a first in South Africa, aimed at creating sustainable economic development, job creation, broad-based black economic empowerment (B-BBEE) and reducing inequality in KZN. KGFT had committed and disbursed R832 million to projects in the healthcare, manufacturing, telecommunications and logistics sector with the potential to unlock more than R3 billion of investment.

City of Cape Town Water Fund

The City of Cape Town in partnership with The Nature Conservancy have agreed to establish a Water Fund for Cape Town. The fund aims to enhance water security and biodiversity whilst supporting local livelihoods. National Government, the Western Cape Government and Cape Nature are other partners that are involved in the project. (Green Africa Directory, 2016)

The Nature Conservancy has established more than 30 water funds across the world with the Upper Tana-Nairobi Water Fund being the first to be established in Africa.

These water funds are established on the principle that it is cheaper to prevent water problems at source than further downstream. (The Nature Conservancy, n.d)

The water fund established by Nature Conservancy is funded by public and private institutions and major water consumers. These funds are used to support water and soil conservation measures in the upper catchment. Farmers benefit through increasing agricultural yields by reduced soil erosion and consumers benefit from increased security of water supply. The business case for the fund indicated that a US $10 million investment would yield a return of $21.5 million in economic benefits over a 30-year timeframe. (The Nature Conservancy, 2015)

Water funds does not necessarily have to be focussed on upper catchment initiatives but could also be targeted at different areas of the water value chain. The subsequent section of this report provides a broad outline of the process to be employed to establish a fund[4].

Conceptualising the fund

Qualitative and quantitative research will be required to conceptualise the fund and develop the proposed Fund strategy, structure and mandate if the purpose of the Fund is to be different to that conceptualised by The Nature Conservancy. There are many different aspects of the water sector and the research needs to provide clarity on the focus, objectives and the type of fund.

There is a need to engage directly with funders as well as decision makers in the sector that will require funding during the conceptualisation of the fund. The output of this phase of the study should be a business plan that details all elements of the fund, and details the financial and non-financial returns to investors.

Indicative financial model

There is also a need to develop an indicative financial model for the Fund. This should comprise a Balance Sheet, Income Sheet and Cashflow statement based on the proposed funding strategy, forecasted operating costs and revenues of the Fund. The operating costs of the fund should be clearly indicated, including salaries and other operational costs. The financial model should also forecast cashflows available to

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This is based on work that Bosch Capital has undertaken during the process of responding to Requests for proposals as issued by the National Youth Development Agency (NYDA) and the Industrial Development Corporation.

service/pay back the capital raised by the Fund and forecast returns on capital invested.

Fundraising campaign

The next step of the process will be to capitalise the fund. This will require the development of a funding strategy. The funding strategy will define the desired funding plan, incorporating the optimal funding sources, anticipated returns and the desired impact of the fund.

The project team will need to develop a Project Information Memorandum (PIM) for potential investors. The PIM should include the following information:

- Description of the project fund
- Funding strategy, indicating the sources and applications of the funds
- Summary of the financial model and budget, along with the indicative returns
- Indicate governance and operating structures
- The investment team and their experience and credentials
- Motivation for fundraising

It is possible that grant funding could be used as seed capital for the Fund. This could be used to crowd in other investors and provide a return that could render the Fund sustainable over the medium to long term. The funding structure shall be dependent on the objectives of the Fund.

Fundraising roadshow

After the completion of the PIM, there is a need to develop a list of funders that could be approached to capitalise the fund. The funders should be identified based on their mandates and the alignment to the Fund. Potential funders could include government donors, national and provincial DFIs and commercial banks. The following process should be employed once the list of potential funders has been identified:

- Develop a roadshow schedule with indicative meeting dates and times
- Identities of people to be met (names and designations)
- Copies of the PIM and indicative financial model
- PowerPoint presentation of the salient features of the PIM

Approval of funds and negotiations

There will be a need to host follow-up meetings with interested funders as the interested funders will need to seek approval from their relevant investment or credit committees. Funders shall provide draft term sheets or loan agreements detailing the

terms and conditions of funding provided. The agreements would need to be negotiated to ensure that conditions are either fulfilled or waived in order access funding.

Financial close and commitment of funds

The funders shall sign the negotiated funding agreements and any other agreements that will be required to be completed. The outcome from this process will be the commitment of funds which may include the physical transfer of funders from the investor to the Fund.

Operationalisation of the Fund

The next step of the process will require certain activities to be performed in order to operationalise the Fund. The table below details the activities that will need to be undertaken.

Activity	Description
Legal structure for the Fund	• Fund ownership structure • Juristic personality (trust? partnership? limited liability company?) • Tax structure / status (i.e. does the Fund enjoy income tax exemption? is it VAT vendor?) • Statutory incorporation of the Fund: • Registration of the fund • Appointment of trustees or directors • Appointment of auditors • Account bank / opening of the Fund bank accounts
Fund's governance structure and processes	• Establish Board and Credit and Investment committee • Define limits of authority • Develop documentation (i.e. standardised loan application forms and loan agreement(s), standardised business skills assessment forms, etc.)
Funds operating structure	Define and document the following: • new business acquisition process (includes deal screening, and processing of investment reports) • credit application and approval process • process for dealing with credit risk management (i.e. collection of repayments, defaulters / non-performing

Activity	Description
	loans, and turnaround of non-performing loans / investments) • process for finance, IT, administration and legal • process for allocation of mentors / coaches to youth entrepreneurs / businesses funded by the Fund to transfer required business skills • Develop an operating organogram for the Fund
Institutional capacity	• Develop job descriptions for the Fund • Recruitment process for the appointment of Fund staff • Training, etc. • Appointment of independent fund manager, if applicable • Define interface between the Fund and the independent fund manager, if applicable

The optimal Fund management model shall be refined during this phase based on the research that has been conducted and based on feedback received during the capital raising phase of the study.

Conclusion

A Fund focussed on a specific area of the water sector has the potential to unlock the additional investment required to reduce the existing funding gap. However, the Fund would need to be structured in a manner that meets the need of investors as well as those of practitioners in the water sector. Grant funding could initially be used as seed funding to crowd in other investors.

eThekwini Municipality is currently in the process of conceptualising and developing a Fund that could be utilised for upper catchment management activities. The process is in infant stage but there is the potential for the WRC to engage Jo Douws to support the process, and develop a Fund that can be mutually beneficial.

APPENDIX D: INSTITUTIONAL INVESTORS

This section of the report details the potential for institutional investors to be involved in funding elements of the RDI Roadmap and other elements of the water sector. Institutional investors are organised legal entities that pool money, manage and invest on behalf of other investors (Celik & Isaksson, 2014).

Commercial banks

A commercial bank is a financial institution that provides various financial services, such as accepting deposits, investing and issuing loans. Customers of commercial banks include individuals and institutions. Commercial banks offer a range of investment products such as savings accounts and certificates of deposit. Commercial banks provide financial services to private individuals, private sector and public-sector entities.

Commercial banks often offer a comprehensive suite of financing and advisory solutions for the power and infrastructure sector, including financial advisory services, project equity placement and corporate equity raising. They can also provide project finance, asset and structured finance, working capital facilities, acquisition finance facilities and equity investments.

Commercial banks respond to bids issued from municipalities and water boards requesting funding for capital expenditure programmes. These funds are used to supplement the grant funding that is received by these public-sector institutions. These loans are usually repaid utilising a combination of revenue that is generated from the development of infrastructure and equitable share.

Project requirements

Commercial banks have been investing in the water sector for a period of time. These organisations house bank accounts of public sector institutions. Commercial banks also advance loans to institutions that have appropriate risk profiles and can service the debt that has been issued. Commercial banks can provide funding at an institutional level, or a project level.

Potential investors adhere to the following investment criteria when looking to invest in a new business plan. Businesses should demonstrate recurring annual earnings before tax and management must be competent, understand their business and industry intimately, and demonstrate enormous passion to succeed. Businesses should also be well positioned in their respective markets and management should be able to show a defendable business model.

With a prime lending rate of 9.5 percent in mid-2015, access to affordable finance in South Africa is better than in most other markets in the region. Commercial banks can provide debt that is easy to understand and manage, and can be easily accessed. The interest rate charged will be dependent on the risk profile of the institution and term of the loan.

Commercial banks are usually easily accessible and most cities and towns have operating branches in which clients can access services that are offered. South Africa has a well-regulated banking sector with companies required to comply with the relevant legislation as well as the King Code of Corporate Governance and Basel III (Banking Association of South Africa, 2014).

Nedbank

Nedbank recognises significant opportunities across Africa and has long been considered the market leader in the financing of large infrastructure, energy-related and telecommunications projects across the continent. Nedbank has a team of sector specialists that are responsible for initiating, executing and managing transactions that include:

- Limited-recourse finance
- Acquisition finance
- Public-private partnerships, and
- Project finance deals.

Nedbank's infrastructure projects span across the continent and include commercial infrastructure, such as roads, rail links, ports, airports, power plants and pipelines, and public or social infrastructure. Relevant water sector projects that Nedbank have been involved in are presented in the table below.

Table 12: Projects involving Nedbank

Programme	Description
Komati Water Scheme Augmentation Project (KWSAP)	This project includes the development of the Duvha water pipeline, where Eskom Holdings proposed to augment the Komati Water Scheme for operating the Duvha and Matla power stations with R400 million funding provided by Nedbank.
WWF Nedbank Green Trust	Nedbank has also partnered with the World Wildlife Fund (WWF) and launched the Trust in 1990. The aim of the trust was to promote 'conversation and community development' to promote

Programme	Description
	the ideal of people living and working in harmony with one another and the environment. The Trust is funded through the Nedbank Green Affinity Programme which has helped to raise more than R170 million to support over 200 projects. The Enkangala Grassland Project has been funded by the Trust since 2002 and focusses on secure water production by conserving the grasslands and encouraging sustainable livestock farming practices over 1.6 million hectares of grasslands. (Nedbank, 2015).
Water Balance Programme	The Nedbank Group has also invested R9 million in the Water Balance Programme, an initiative by WWF South Africa (Nedbank, 2011). The Water Balance Programme encourages businesses to take ownership of the water challenge in SA by reducing their own water demand and investing into water provision ecosystems in relation to the size of their operational water use. Other partners of the Programme includes Nissan and Woolworths. (Frankson, 2015).

Nedbank's increased focus on water is a key part of their climate change response strategy. Their sustainability initiatives have encouraged them to invest in a range of water-related projects in line with their water stewardship programme, which addresses water scarcity, water quality and access to water.

ABSA

Absa's Resource and Project Finance (RPF) team is a leading provider of project financing solutions across the African continent in a variety of sectors, including resources, power, infrastructure, telecommunications and the industrial sector. The RPF's services range from project finance advisory and debt arranging, underwriting and syndication services, to agent and account banking services for project finance deals as well as risk management solutions, including interest rate, commodity price and currency hedging. The funding provided is structured and customised for any given project that requires working capital facilities or project finance loans.

Absa's Corporate Social Investment (CSI) is aimed at facilitating and creating platforms for contributing to nation building by delivering on the Group's mandate towards social upliftment while enhancing business relevance and sustainability. Key to Absa's CSI strategy are deliberate partnerships with government and reputable non-profit

organisations whose development goals are aimed at viable, innovative and sustainable solutions in response to national and global priorities.

Absa provides financing to multiple BEE initiatives and has been involved in funding projects in the water sector. Projects include:

- Berg Water Project

  ABSA underwrote a project finance revolving facility for R300 million for the Trans-Caledon Tunnel Authority for the Berg Water Project. This financing is going towards the construction of a dam with a gross storage capacity of 130 million m^3 on the Berg River and a supplemental scheme on the Dwars River outside Franschhoek.

- Vaal River Eastern Subsystem Augmentation Project

  ABSA underwrote a revolving project finance facility for R1 billion and a bridging facility for R100 million. These funds will be used for the project which involves the construction of a 122-km pipeline to deliver water from the Vaal Dam to the Knoppiesfontein diversion structure.

Private equity

Private equity is capital that is not noted on a public exchange. Private equity is composed of funds and investors that directly invest in private companies, or that engage in buyouts of public companies, resulting in the delisting of public equity. There is currently R171.8 billion being managed in private equity funds in South Africa of which R24.6 billion was available for future investments in South Africa (South African Venture Capital and Private Equity Association , 2017).

Focus and mandates of investor types

Institutional and retail investors provide the capital for private equity, and the capital can be utilised to fund new technology, make acquisitions, expand working capital, and to bolster and solidify a balance sheet.

Project requirements

Private equity investors often contribute funding for improved energy and resource efficiency measures across business activities that span key sectors in sub-Saharan Africa. Private equity firms such as Inspired Evolution believe that these sectors are experiencing increasing energy and resource insecurity. Within this changing resource landscape, the responsible deployment of capital to companies that are ‘doing more with less’ is a compelling private equity growth story. Most business activities are

located within the food, energy and water relationship that informs the climate mitigation and adaptation response priority within sub-Saharan Africa.

To actively participate in this growth and meet the increasing demand for suitable infrastructure, STANLIB has launched an Infrastructure Fund, which will invest in equity stakes in private infrastructure projects across Africa. Renewable energy will be a key focus of the ten-year Fund, which will also invest in water, power, transport, telecommunications, oil, and gas infrastructure projects. With R500 million seed capital, STANLIB will be seeking to raise an additional R500 million from Institutional investors. The bulk of the Fund will be channelled into South African new-build infrastructure projects, with the remainder to be invested across Sub Saharan Africa. A second fund, focusing on more mature infrastructure assets, is also under development.

One of the main advantages of private equity investments is the availability of long-term equity finance with no interest charges and no sudden requirement to repay. As well as finance, the investor can bring skills, contacts and experience to the business. The investor's interests are closely aligned to those of the entrepreneur in helping to make the business work.

One of the main limiting factors of private equity investment is the dilution of ownership, which can be further diluted with each successive funding round. The cost of capital can be expensive in the long term, as investors may look for a return of at least 50%. It also takes time to raise private equity, anything up to 12 months. This can deter many entrepreneurs who find it too distracting at a crucial time for the business (i.e. early stage and high growth). Possible loss of control with the investor agreement can also occur, allowing investors to regulate key strategic and financial issues.

Pension funds

A pension plan is a retirement plan that requires an employer and employee to contribute into a pool of funds set aside for a worker's future benefit. Fund managers then invest the pool of funds on the employee's behalf, and the earnings on the investments generate income to the worker upon retirement.

Focus and mandates of investor types

Pension funds invest in a wide variety of institutions. The objectives of the investments is to provide a return on individuals' investments when they withdraw from the pension funds. Pension funds are usually long-term investors aiming to achieve good long-term capital returns.

Due to the quantum of funding available and to reduce risk, pension funds usually diversify their portfolio based on geographic, sector, size and duration of their investment. Pension funds are managed by fund managers that are responsible for making decisions on investments.

Project requirements

The funds' managers sensibly manage assets in a method meant to ensure that retirees receive promised benefits. For many years, this has meant that funds were limited to investing primarily in government securities and investment-grade bonds. Changing market conditions and the need to maintain a high rate of return have resulted in pension plan rules that allow investments in most asset classes. Infrastructure investments are a small part of most pension plan assets, but they are a potentially growing market. A diverse assortment of public or private developments that involving power, water, roads and energy. Private projects require large sums of money that are either expensive or difficult to raise. Pension plans can invest with a longer-term outlook and the ability to structure creative financing.

Pension fund managers generally help finance companies or projects that abide by the following defined criteria. Companies should monitor and address staff turnover within the organization, the progression towards Department of Trade and Industry scorecard targets (for South African companies) and the training they provide to increase employees' competency. Companies must comply with laws around labour and working conditions, and must identify and manage the health and safety risks posed to employees, consumers and the community in which the company operates. Companies must be aware of the potential adverse impact of its activities on local communities and other stakeholders, and work to minimize that impact. Companies should also commit to a social investment outreach program and ensure both financial support and employee involvement.

Pension funds have become significant institutional investors internationally. In the case of African stock markets, the small size and illiquidity of the stock markets make it difficult for pension funds to play the constructive role as experienced in countries with developed financial markets. Nonetheless, there is a place for pension funds and other institutional funds to contribute to stock markets; namely improving governance, encouraging financial instrument innovation, enhancing information flow, and making long term financing available. Pension funds can also play an instrumental role in mobilising capital for infrastructure investment in Africa. The current accumulation for infrastructure in Africa is estimated at USD93 billion per annum, over 40% is in the

energy sector, 20% in water supply and sanitation, and 20% in the transport sector (V Foster, C Briceno-Garmendia, 2010).

Venture capital

Venture capital (VC) is a form of financing that is provided by firms or funds to small, early-stage, emerging firms that are deemed to have high growth potential, or which have demonstrated high growth (in terms of number of employees, annual revenue, or both). The reported value of VC investments made during 2016 was R872 million (South African Venture Capital and Private Equity Association, 2017).

Focus and mandates of investor types

Venture capital firms or funds invest in these early-stage companies in exchange for equity – an ownership stake – in the companies they invest in. Venture capitalists take on the risk of financing risky start-ups in the hopes that some of the firms they support will become successful and therefore expect a relatively high return. The start-ups are usually based on an innovative technology or business model and they are usually from the high technology industries, such as information technology (IT), social media or biotechnology. The categories of VC investors are (South African Venture Capital and Private Equity Association, 2017):

- Start-up capital: Funding that is used to establish operations, commercialise intellectual property and other start-up activities
- Development Capital: Funding that can be used to further launch a business and to support growth in market share to enhance profitability
- Growth Capital: Funding used to assist established organisations expand their current operations into new markets or by developing new products.

Seed funding is the initial capital required to start a business. This is often provided for by the company founders. This type of funding is not usually provided for by VC managers in South Africa (South African Venture Capital and Private Equity Association, 2017).

Project requirements

Venture capital is attractive for new companies with limited operating history that are too small to raise capital in the public markets and have not reached the point where they are able to secure a bank loan or complete a debt offering. In exchange for the high risk that venture capitalists assume by investing in smaller and early-stage companies, venture capitalists usually get significant control over company decisions, in addition to a significant portion of the companies' ownership.

Venture capitalists will usually provide between R1 and 10 million rand in investments for a business or project plan that has been deemed acceptable. These candidates would be interested in projects or businesses that require funding for growth or expansion, along with a strong management team or a dynamic entrepreneur. The company will have to demonstrate the ability to execute their business plan effectively and have an extensive expertise in the subject matter.

The project must possess a clearly defined realisation strategy, a scalable business model and large addressable market to be desirable to a venture capital company. Once due diligence has been completed, the firm or the investor will pledge an investment in exchange for equity in the company. The firm or investor then takes an active role in the funded company. Because capital is typically provided in rounds, the firm or investor actively ensures the venture meets certain milestones before receiving another round of capital.

Venture capital does not always take a monetary form; it can be provided in the form of technical or managerial expertise. For new companies or start-up ventures that have a limited operating history, venture capital funding is increasingly becoming a popular capital-raising source, as funding through loans or other debt instruments is not readily available.

High-tech businesses are the primary source of high-growth returns for VC investors, but there may be potential opportunity to fund opportunities in the water sector. The opportunities need to be attractive to VC investors and meet their funds mandate in order to invest. There is a view that the limited investment by VC in the water sector could be attributed to a lack of projects that are structured in a manner that would attract interest from VC.

Impact investors

Impact investing refers to investments made into companies, organisations, and funds with the intention to generate a measurable, beneficial social or environmental impact alongside a financial return.

Focus and mandates of investor types

Impact investments can be made in both emerging and developed markets in the housing, water, health and education sectors. Investors target a range of returns, from below-market to above-market rates, depending upon the circumstances. Impact investors actively seek to place capital in businesses, non-profits, and funds that can harness the positive power of enterprise.

Project requirements

Impact investors actively invest in assets and regions where gaps or backlogs in social infrastructure have been identified. Investor expertise primarily lies in the initiation and on-going management of the assets in the funds. These assets include the creation of affordable housing, small, medium and micro-sized enterprise financing and providing access to quality education, clean water and sanitation services. The knock-on effects of these initiatives are tangible economic development and job creation. The benefits of the investment will need to be easily and accurately quantified.

Impact investor approach is predicated on the principle that there is no inherent necessary trade-off between financial return and social impact. Building on this dual motivation, investors have developed a multi-dimensional approach to impact investing, resulting in a methodology, which translates the fundamental model into a viable investment strategy. The approach to impact investing consists of pre-investment evaluation and post investment monitoring and measurements. Intrinsic to this approach is the idea of value creation: developing and implementing solutions that create value for the target communities.

Because socially and environmentally responsible practices tend to attract impact investors, companies can financially benefit from committing to socially responsible practices, and investors tend to profit. A 2013 study by GIIN and JP Morgan found that over 90% of impact investors reported that their investments were meeting or surpassing their projections.

By impact investing, individuals or entities essentially state that they support the message and the mission of the company in which they are investing, and they have a stake in the company's welfare. As more people realize the social and financial benefits of impact investing, more companies will engage in social responsibility.

Engage an Impact Investment fund manager to determine funding that could be accessed for interventions geared towards the following purposes:

- Establishing high-level, technical and leadership capacity
- Innovation and deployment activities
- Innovation and deployment

APPENDIX E: DEPARTMENT OF WATER AND SANITATION

The Department of Water and Sanitation (DWS) is the regulator of the water sector in South Africa. The Department has the following strategic objectives (Department of Water and Sanitation, 2016):

- An efficient, effective and development orientated sector leader
- Ensure equitable and sustainable water and sanitation services
- Protection of water across the value chain

Legislative mandate

The South African Constitution states that water resources management is a national competency. Further to this, the National Water Act (Act No. 36 of 1998) states that national government is the public trustee of water resources. Acting through the Minister, it has the power to regulate the allocation, use, flow and control of all the water in South Africa.

The National Water Act also provides for the fundamental reform of the law relating to water resources and recognises the need for integrated management of all aspects of water resources. The Act allows for the establishment of Catchment Management Agencies (CMAs) water management areas.

The purpose of establishing CMAs is to delegate water resource management to a regional or catchment level and to involve local communities within the framework of the national resource strategy. DWS acts as the CMA in areas where one has not yet been established.

Funding streams

DWS noted revenue of R15.7 billion with total expenditure of R15.5 billion in the 2015/16 financial year. This included annual appropriation of R15.7 billion and R11 millions of departmental revenue. R5.0 billion of indirect capital grant allocation for RBIG, MWIG and RHIG have also been included in the revenue received by DWS.[5]

DWS is required to fulfil several different functions. The 2015/16 strategic programmes of DWS are outlined in the table below.

[5] This needs to be confirmed by DWS

Table 13: DWS Strategic Priorities

Programme	Purpose
Eco-Schools Programme Water Conservation Award	Aims to encourage water literate citizenry and support Education for sustainable development.
Water planning and information management	Ensure that water resources are protected, used, developed and managed in a sustainable and equitable manner.
Water infrastructure development	To develop, rehabilitate and refurbish raw water resources and water services infrastructure to meet the socio-economic and environmental needs of South Africa.
Water and Sanitation Services	To develop, rehabilitate and refurbish raw water resources and water services infrastructure to meet the socio-economic and environmental needs of South Africa.
Water Sector Regulation	Ensure the development, implementation, motoring and review of the National Water Act (1998) and Water Services Act (1997).

Source: (Department of Water and Sanitation, 2016)

DWS has undertaken to complete an organisational restructuring process that was expected to be completed by April 2017. At the start of the 2016/17 financial year, DWS employed 7 393 people. DWS successfully completed training and development for 5 746 employees in the 2016/17 financial year. The Learning Academy managed to place 74 candidate engineers and scientists into permanent positions during this time.

In addition to meeting the objectives of the programmes listed in the table above, there are thirteen entities that reported to the Minister of Water and Sanitation in 2015/16. These are:

- Trans Caledon Tunnel Authority
- Water Research Commission
- Inkomati-Usuthu Catchment Management Agency
- Breed-Gouritz Catchment Management Agency
- Water Boards (9)

Water Trading Entity

The Water Trading Entity (WTE) within DWS reports directly to the Accounting Officer of the Department of Water Affairs. The WTE was created to separate departmental

revenue through the sale of bulk water and related services from appropriated funds. The WTE is responsible for the development, operation and maintenance of specific water resources infrastructure and managing water resources in specific water management areas.

The trading entity is divided into the Water Resource Management Unit as well as the Infrastructure Branch. The Water Resource Management component addresses the use, conversion and allocation of water resources in a water management area. Funding for this is generated in the form of revenue from water users in an area. The fiscus covers the shortfall where revenue is not sufficient to cover the operations. The infrastructure branch of the WTE deals with the development of new infrastructure as well as the operations and maintenance of existing infrastructure.

The WTE received total income of R11.1 billion for the 2015/16 financial year with revenue received from exchange transactions at R9.5 billion and revenue from non-exchange transactions at R1.5 billion. Exchange transactions include the sale of water services (R8.6 billion), construction revenue (R449 million) and commission earned on the WRC levy (R2.7 million). Commission is charged at 2% of the amount billed. Revenue from non-exchange transactions included a transfer of R1.5 billion from DWS. This funding was transferred as an augmentation to revenue earned to ensure that the WTE can carry out its operating activities. Total expenditure of the WTE was R7.5 billion in 2015/16. This resulted in an operating surplus of R3.6 billion for the financial year.

The WTE also incurred expenditure of R23.1 million on the training and development of staff in 2015/16. In addition, it incurred expenditure of R1.02 billion on professional services provided to the institutions. Thus, an argument could be raised that increasing the training and development of staff could lead to a reduction in the expenditure on professional services. It is unlikely that expenditure on professional services could be completely eradicated.

Raw water tariff

A raw water tariff is levied on water users that abstract water from water resources. The different elements of the tariff are detailed in the table below.

Table 14: Components of the raw water tariff

Raw water tariff component	Description
Water Resources Management Charge (WRMC)	Fund water resource management activities in each of the Water Management Areas. There are two aspects of the WRMC, namely, abstraction water charge and waste discharge related water use charge.
Water Resources Infrastructure Charge (WRIC)	This charge provides for the development and use of government waterworks and may include related costs for investigation, planning, design and construction of water schemes, which constitute the capital costs of projects.
Waste Discharge Charges	The Waste Discharge Charge System (WCDS) is based on the "polluter pays principle" and provides for a differential rate that accounts for the amount and quality of waste discharge and the impact on the water resource.
Water Research Commission Charges	The Water Research Commission Charge is used for the promotion of water research and development on behalf of the nation.
Economic Regulator Charge	The Economic Regulator Charge is intended to fund the activities of the Economic Regulator. This charge is yet to be implemented and requires necessary legislation to be adopted before implementation.

Source: (Department of Water and Sanitation, 2015)

The WRMC could possibly be a source of funding for research and activities related to CMAs.

Trans-Caledon Tunnel Authority

Trans-Caledon Tunnel Authority (TCTA) is a State-Owned entity that aims to finance and implement bulk raw water infrastructure. TCTA was originally established to seek off-balance sheet funding options for infrastructure projects that can recover their costs from end user tariffs. This was done to fulfil South Africa's Treaty obligations in respect of the Lesotho Highlands Water Project.

TCTA has undertaken further work, which can vary from the functions which it was originally conceived to perform on direction from the Minister. This further work includes a project for the establishment of a large-scale desalination and water reuse knowledge hub within their Knowledge Management Division, including the development of a knowledge sharing forum between the CSIR, WRC, DST, DWS, Umgeni Water and the City of Cape Town. During the 2015/16 financial year, the TCTA also conducted research around the following themes:

- Water conservation and the impact on economic growth

- Water demand management and drought mitigation
- Performance of infrastructure services
- Process of taking infrastructure projects to bankability
- Financing of infrastructure on a commercial basis
- Use of the boundary spanning and dynamic capability framework as an inclusive learning model

TCTA is leading an Acid Mine Drainage (AMD) project in the Western, Eastern and Central Basins of the Witwatersrand Goldfields. The project entails the development of infrastructure to extract and treat acid mine water prior to conveying the treated water to a water source. National Treasury has allocated R225 million for Phase 1 of the project which is expected to be carried out over a 2-year period.

APPENDIX F: WATER BOARDS

There are nine water boards in South Africa. These institutions are predominantly tasked with bulk service provision. Water boards raise capital through loans and in some cases, the issuance of bonds. Water Boards can also act as an implementing agent for DWS.

Operating revenue is generated through the bulk water tariff. This section of the report provides details on the services provided by the water boards as well as details of two of the larger water boards in South Africa.

A bulk water services provider must set tariffs so that revenue is sufficient to recover all reasonable costs directly and indirectly associated with the operations, maintenance, refurbishment and development of bulk water services. Reasonable costs also include indirect costs allocated to the water services function by the bulk water services provider (Department of Water and Sanitation, 2015).

Legislative mandate

Section 28 of the Water Services Act provides for the establishment of water boards. The primary activity of water boards is to provide bulk water services to other water service institutions within its area. However, a water board may perform secondary activities if it is not likely to limit the water board's capacity to perform its primary activities, and it is not likely to financially prejudice itself or its customers within its service area.

Secondary activities that a water board could perform include:

- Providing management services, training and other support services to water services institutions, to promote co-operation in the provision of water services
- Providing catchment management services to or on behalf of the responsible authorities, and
- Performing water conservation functions.

Rand Water

Rand Water is the largest water utility in Africa and received revenue of R10.9 billion for the 2015/16 financial year with accumulated reserves of R13.2 billion. Revenue was predominantly generated from the sale of water, with additional revenue being generated from work undertaken as implementing agent on behalf of municipalities and other government departments.

Rand Water developed and approved an innovation strategy and innovation piloting policy during the 2015/16 financial year. The utility is currently testing, evaluating and piloting projects in the following areas:

- Data analytics and water quality analytics
- Low-energy and high-water recovery technologies for water re-use
- Ultra-violet treatment technologies
- Fluidised bed reactor technology for water treatment residues

Rand Water provides skills development projects through EWSETA co-funding to support the National Skills Development Strategy to build feeder pipelines for key skills in critical positions. Rand Water has also provided bursaries to 181 candidates during the 2015/16 financial year.

The Rand Water Foundation is mandated to promote the delivery of water-related services to communities as well as manage the utility's Corporate Social Investment. The Foundation completed projects in the following areas during the 2015/16 financial year:

- Water and sanitation projects
- Environmental Conservation Projects
- Enterprise Development Projects
- Education and Training Programme
- Health (including HIV and AIDs)

Umgeni Water

Umgeni Water was established in 1974 to provide water services to water service institutions within its service area (Umgeni Water, 2016). Umgeni Water provided 1 194 Ml/day of bulk potable water and treated 86 Ml/day of wastewater in 2016. Total income generated by the utility was R2.38 billion with a net surplus of R781 million for the 2015/16 financial year.

Umgeni Water has identified the need for operational resiliency to provide sustainable services to customers. The water board has thus invested in innovation, research and development projects that are undertaken in partnerships with academia, notably through the Umgeni Water-University of KwaZulu-Natal Chair of Water Resource Management (Umgeni Water, 2016). The outcomes of these investments are expected to benefit not only the water board but also advance Human Capital Development through research training in postgraduate studies.

The laboratory service at the water board has undertaken research and development and generation of scientific data for new infrastructure developments. The value of intangible assets listed in the Annual Financial Statements is R12.0 million, including capitalised research and development costs.

APPENDIX G: DEPARTMENT OF SCIENCE AND TECHNOLOGY

The Department of Science and Technology (DST) was involved in the development of the Water RDI Roadmap and is a key stakeholder to its implementation. DST was allocated a budget of R7.4 billion from the national fiscus for the 2015/16 financial year and prioritised investment in research and development towards new knowledge, industries and technology (Department of Science and Technology, 2016). DST also generated revenue of R514 000 and received aid of R154 million. This contributed to total revenue of R7.6 billion in 2015/16. The bulk of funds are allocated to entities that report to the Minister of Science and Technology.

A list of institutions that receive the bulk of the funding from DST is provided in the table below.

Table 15: Institutions that receive the bulk of the funding from DST

Revenue stream	R million
National Research Foundation	4 215
Council for Scientific and Industrial Research	1 165[6]
Technology Innovation Agency	460
Human Sciences Research Council	345
Universities and Universities of Technology	114

The WRC also received a transfer of R9 million in the 2015/16 financial year.

Sector Innovation Funds

DST intends to create an environment where government can effectively partner with industry and support co-investments in research, development and innovation in key strategic sectors of the economy. Nine sector innovation funds had received support by 31 March 2016.

[6] This amount comprises R348 million in transfers and a R820 million subsidy

Engage DST to determine how capital and operating funds could be accessed for interventions geared towards the following purposes:

- Establishing high-level, technical and leadership capacity
- Knowledge economy activities
- Innovation and deployment
- Links Water RDI implementation plan to sector innovation plan

National Research Foundation

The National Research Foundation (NRF) was established as an independent government agency through the National Research Foundation Act (Act No. 23 of 1998). The organisation is mandated to promote and support research funding, human resource development and the provision of the research facilities to facilitate the creation of knowledge, innovation development in all fields of science and technology. The NRF received income of R4.1 billion in the 2015/16 financial year. The sources of revenue are detailed in the table below (National Research Foundation, 2016):

Table 16: National Research Foundation Funding Sources

Revenue source	Description	R million
Parliamentary grant	MTEF parliamentary grant is utilised primarily to fund the programme and operational activities from the NRF	878
Ring-fenced funding	A portion of funding that is received from the DST and can be used for funding specific projects only	1 735
Designated income	Funding is received from sponsors. This funding can only be utilised per the objectives of sponsors	1 305
Other income	This is interest received on funds invested and trading income for non-core business activities	242
Total		4 160

Source: (National Research Foundation, 2016)

The table above indicates that there may be potential to access funding for skills development and knowledge economy activities. The table below presents the broad focus areas of the NRF.

Table 17: Focus areas of the National Research Foundation

Programme	Description
Corporate	Cross-cutting support function that is responsible for providing enabling systems that support the organisation.
Science engagement	Transforming from a resource-based to a knowledge-based economy demands a shift in strategic emphasis. In a knowledge economy, generating and distributing knowledge is a key priority, and this knowledge must be disseminated to the wider public. To foster an innovation culture, awareness of the necessity for science and research must be entrenched in society.
Research and Innovation Support and Advancement division (RISA)	Supports and promotes human capacity development, knowledge generation and platform provisioning through the provision and administration of, among other initiatives, a world class granting system.
National Research Facilities (excluding Astronomy)	Provide cutting-edge research platforms for Nuclear, Biodiversity, Environmental and Conservation Sciences.
National Research Facilities – Astronomy including SKA SA	Provides cutting-edge research platforms for multiwavelength astronomy.

DST's ring-fenced infrastructure allocation allowed it to award 84 research infrastructure grants through the National Research Foundation.

Research and Innovation Support and Advancement

The Research and Innovation Support and Advancement Unit (RISA) expensed R2.7 billion over the 2015/16 financial year in support of students, researchers and research across the National System of innovation. RISA invested R1.75 billion to Human Capacity Development.

Strategic investments associated within Human Capacity Development received R584 million. These investments include the South African Research Chairs initiative (SARChi) and Centres of Excellence (CoEs). 42 new research chairs were funded during 2015/16. Total SARChi chairs at the end of the 2015/16 financial year was 199.

Programmes of interest

The NRF has contributed to the DST's grand challenges. Global change and Human Social Dynamics are two grand challenges that may be of interest to the WRC. Each of these programmes are part of SARChi. It may be necessary for the Global Challenge

PMU at the NRF to partner with the WRC to complement research projects that are co-funded by the WRC.

Council for Scientific and Industrial Research

The Council for Scientific and Industrial Research (CSIR) is mandated to contribute to the improvement in the quality of life of South Africans, through directed and multidisciplinary research and technological innovation, to foster, industrial and scientific development. This can be done solely by the CSIR or in co-operation with principals from the private or public sector (Council for Scientific and Industrial Research, 2016).

The CSIR is funded through base-line and ring-fenced grants from the Department of Science and Technology (DST) as well as from contract revenue received from local and international institutions in the public and private sector. Total income to the CSIR in the 2015/16 financial year was R2.7 billion. The breakdown of revenue received is presented in the table below. (CSIR, 2016)

Table 18: Breakdown of revenue received

Income type	R million
Parliamentary Grant	680
Local private and international sectors	320
Local public sector	1 645
Royalties and other income	49
Net finance income	39
Total	**2 733**

The CSIR has organised Research and Development activities around six Research Impact Areas (RIAs). The RIA that is seen to be of most relevant to the Water RDI Roadmap is the Natural Environment RIA[7]. This impact area is intended to support long-term economic growth and transition to a low-carbon economy by:

- Developing models to improve our understanding of the scale and impact of climate change;

[7] Other RIAs include the Defence and Security RIA, Industry RIA, Energy RIA, Health RIA and the Built Environment RIA

- Developing and implementing interventions to facilitate the growth of the green economy; and
- Developing and implementing the tools and methods that improve our ability to understand, measure and sustainably manage our natural resources.

Technology Innovation Agency

The Technology Innovation Agency (TIA) has been established to promote the development and exploitation, in the public interest, of discoveries, inventions, innovations and improvements. TIA is a national public entity that bridges the innovation gap between research and development from higher education institutions, science councils, public entities and private sector and commercialisation.

TIA provides risk funding and support for innovators to progress ideas towards market entry and commercialisation. TIA is also able to attract and facilitate late stage funding from companies, industries, venture capital firms and DFIs for the commercialisation of market ready technologies.

Commercialisation Support Fund

The Commercialisation Support Fund (CSF) is administered by the Technology Innovation Agency and focusses on Technology Development and Market Validation. The objective of the CSF is to prepare innovators for follow-on funding through support for market testing and validation. Higher institutions, SMMEs and start-up companies are potential beneficiaries of the fund, with R50 million being the maximum amount of funding available.

Technology Development Fund

The Technology Development Fund is aimed at assisting innovators to advance technology along the innovation value chain, from proof of concept to technology demonstration.

Seed Fund

The Seed Fund is focussed on assisting higher education institutions, science councils, technology entrepreneurs and SMMEs to advance their research outputs and ideas for proof of concept, development of prototypes and business cases that could be used for further development.

Applicants for seed funding should approach the Technology Transfer Office at a suitable university to access funding. Seed funding cannot be accessed by completing an online application. Grant funding up to R500 000 per application is available.

TIA Fund Application Process

TIA has a three-stage application process as detailed in the diagram below.

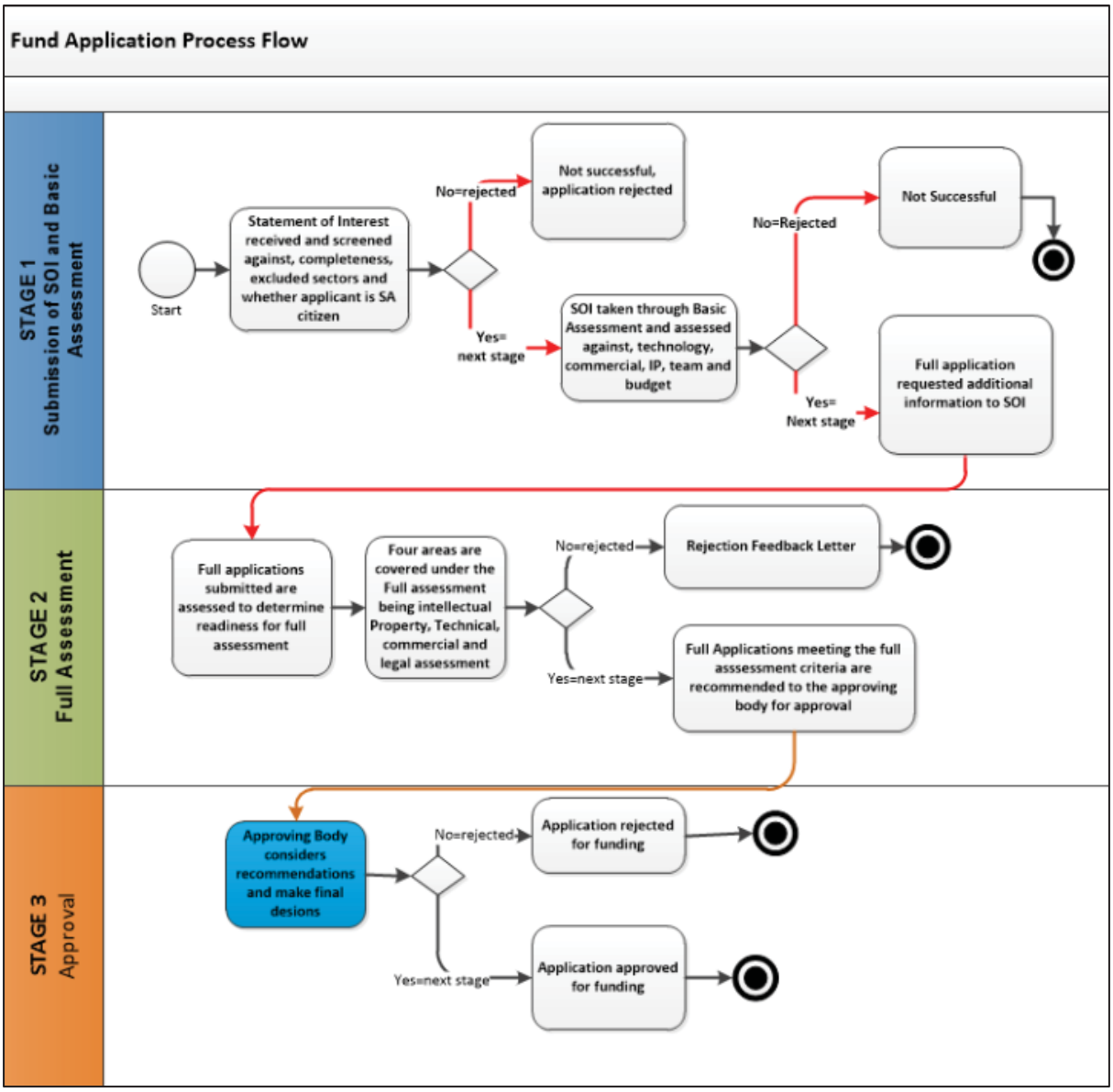

Figure 8: TIA application process

APPENDIX H: DEPARTMENT OF TRADE AND INDUSTRY

The Department of Trade and Industry (DTI) is the custodian of South Africa's industrial policy. The DTI is tasked with facilitating industrialisation and economic development that results in the promotion of trade, inclusive growth and the creation of sustainable employment. The department had a budget allocation of R9.5 billion in 2015/16 (Department of Trade and Industry, 2016).

The DTI has organised the work that needs to be undertaken to promote a more effective and co-ordinated approach to the implementation of its strategic objectives, for an enhanced and long-term impact on the South African economy and its citizenry around key themes. Details of each theme is presented in the table below.

Table 19: Description of DTI clusters

Cluster	Description
Industrial Development	Focussed on the development and implementation of the upscaled Industrial Policy Action Plan (IPAP2). The theme is structured around three clusters with details as follows: **Cluster 1:** Metals fabrication, capital and transport equipment, green and energy-saving industries, and agro-processing sectors. **Cluster 2:** Automotive and components, medium and heavy vehicles, plastics, pharmaceuticals and chemicals, clothing, textiles, footwear and leather, bio-fuels, forestry, paper, pulp and furniture, cultural industries and tourism, and Business Process Outsourcing and Offshoring (BPO&O) services. **Cluster 3:** Nuclear, advanced materials and aerospace sectors, to enable the country´s long-term advanced capabilities.
Trade, Export and Investment	Focused on increasing levels of international trade, foreign direct investment and economic co-operation on regional, continental and international levels. This thematic area also aims to encourage global competitiveness of exports and beneficiation of products, expand market access and develop programmes to encourage trade and investment activities.
Broadening Participation	Focused on developing interventions and strategies that broaden the participation of previously marginalised groups in the mainstream economy.
Regulation	Focused on the development and implementation of a coherent, predictable and transparent legislative and regulatory framework.
Administration and Co-ordination	Focused on the effective co-ordination and implementation of the Department and its group of specialised agencies´ programmes, as well as integration of the DTI´s work into government´s broader Plan of Action.

The DTI currently have over twenty financial incentive schemes listed on their website. The figure below provides an indication of the innovation and technology funding instruments that are available from the DTI.

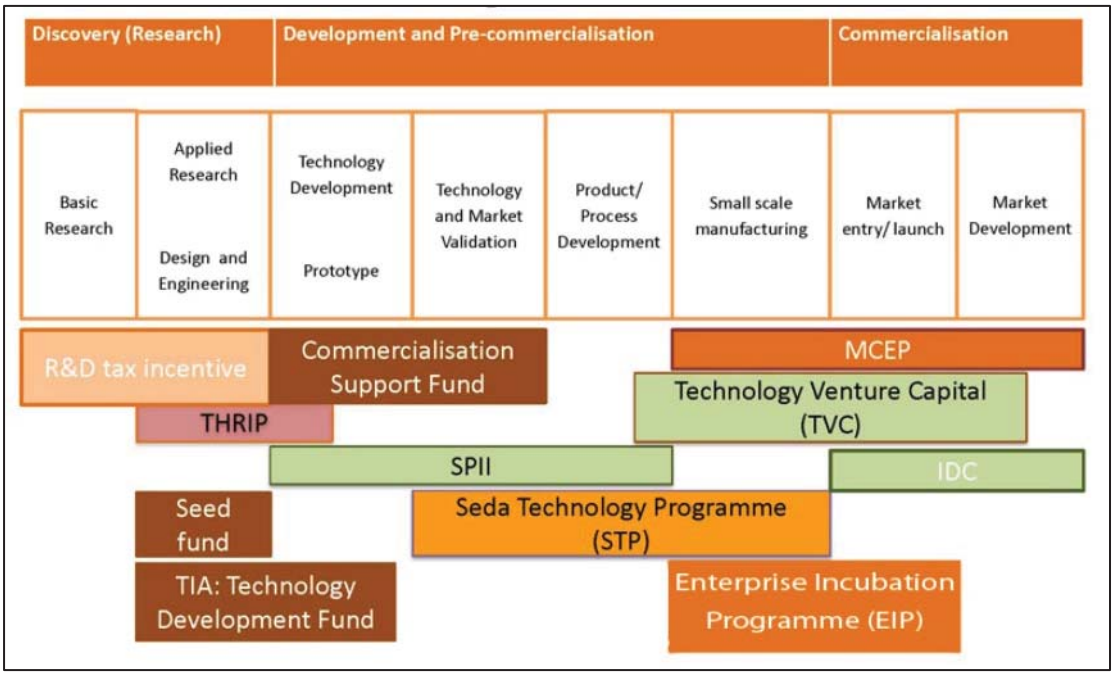

Figure 9: DTI Innovation and Technology instruments

Details of incentive schemes that could be relevant to the RDI Roadmap implementation plan are provided in the section below. The Commercialisation Support Fund, Seed Fund and Technology Development Fund are administered by the Technology Innovation Agency (TIA).

Technology and Human Resources for Industry Programme

The Technology and Human Resources for Industry Programme (THRIP) is intended to leverage collaborative partnerships between government, industry and academia. The objective of THRIP is to promote research and development in science, engineering and technology on a cost-sharing basis in order to produce highly skilled human resources and technology that improves industry competitiveness (Department of Trade and Industry, 2016).

THRIP provides a maximum grant of R500 000 per candidate per annum for the transfer of knowledge process over a three-year cycle. The transfer of knowledge must include the physical relocation of participants involved in the projects. This funding stream caters for academic researchers or students at postgraduate level in a Higher Education Institution to work industrial laboratories for a maximum period of three years (Department of Trade and Industry, 2016).

The DTI issues calls for applications to THRIP. The most recent call for applications closed on 21 April 2017. The next window is expected to commence in September 2017 to ensure alignment with the academic calendar. THRIP applications can be accessed through https://www.thedti.gov.za/financial_assistance/financial_incentive.jsp?id=52&subthemeid.

Support Programme for Industrial Innovation

The Support Programme for Industrial Innovation (SPII) is designed to promote technology development in South Africa's industry, through the provision of financial assistance for the development of innovative products or processes. SPII is focussed specifically on the development phase, which begins after basic research has been concluded and ends when a pre-production prototype has been produced.

There are two types of SPII schemes on offer. These are the SPII Product Process Development Scheme and the SPII matching scheme. The product process development scheme provides financial assistance to SMME and individuals in the form of non-repayable grants to a maximum of R2 million. The matching scheme provides financial assistance for all enterprises and individuals in the form of a non-repayable grant up to a maximum of R5 million.

Government-funded institutions do not directly qualify for support from SPII but may qualify as subcontractors. Application forms are available on the DTI website.

Seda Technology Programme

The Seda Technology Programme (STP) is a division of the Small Enterprise Development Agency (SEDA) and seeks to stimulate economic growth through facilitating technological innovation, increasing the accessibility to and utilisation of technology, and technical support for small enterprises.

APPENDIX I: DEVELOPMENT FINANCE INSTITUTIONS

Development finance institutions (DFIs) are development banks or subsidiaries that have been set up to support private sector development in developing countries. These DFIs are usually majority owned by national governments, which usually enables them to raise money on the international capital markets and provide financing on very competitive terms (OECD, 2017).

DFIs occupy the intermediary space between public aid and private investment, as they focus on profitable investment and operations according market rules but also aim to promote economic growth and sustainable development impact. DFIs can provide loans or guarantees to investors and entrepreneurs, equity participation in firms or investment funds and financing for public infrastructure projects (Dickinson, n.d).

The Development Bank of South Africa (DBSA) and the IDC are examples of South African DFIs. The African Development Bank and International Finance Corporation are examples of multilateral DFIs. Other DFIs include EIB, KFW, AFD, SIMEST, FMO, NORFUND, SWEDFUND, and CDC.

Focus and mandates of investor types

DFIs can be classified as either bilateral or multilateral. Multilateral DFIs are private sector arms of international financial institutions that have been established by more than one country and are subject to international law. Shareholders of multilateral DFIs are generally national governments but could also include other international or private institutions. Financial products from these institutions include equity investments, long-term loans and guarantees (OECD, 2017).

Development banks aim to provide medium- and long-term capital. The funding is also often accompanied by technical assistance in poor countries. The objective of DFIs is to encourage sustainable economic development and social progress in regional member countries, thus contributing to poverty reduction.

Project requirements

DFIs require that all financing decisions concerning the project be based on an in-depth analysis of the various risk factors (socio-economic, financial, legal, environmental, institutional and technical) related to its client and its project: reliability of accounts, quality of in-house governance, etc. DFIs also assess the capacity of the companies it finances to withstand and recover from potential shocks, which is essential to ensuring that its investments are relevant and viable. The economic viability of companies and projects is an important selection criterion.

Most prominently the DBSA supports sustainable infrastructure through the government-funded Green Fund in the areas of water and sanitation.

What would the investor require prior to investment?

As a lending institution, return on an investment is an important criterion as this is essential to ensuring the sustainability of DFIs. The contribution that the projects they finance make to local development is central to DFI's approach to investment. Depending on the type of client, DFIs assess the impacts that the projects have on maintaining and creating employment, environmental, social and governance practices, improvements in access to essential goods and services for disadvantaged populations and the public revenue generated.

DFIs usually require that each project submitted for financing be subject to an in-depth analysis. Control measures are put in place in the financing criteria to prevent against corruption, fraud, anti-competitive practices, money-laundering and terrorist financing, in accordance with the in-house procedures for each DFI's financial security.

The advantages of receiving funding from a DFI include a catalytic effect on fund raising due to the credit-worthiness of these institutions. As well as the participation of an experienced investment team with private equity expertise and usually extensive industry knowledge of economics and engineering. Funding provided by DFIs is also provided early on in projects so that they can ensure the project requirements are fulfilled and they can provide expert advice on the most efficient and sustainable project initialisation.

The concern regarding finance from financial institutions is that the company must submit itself to a thorough investigation that involves several formalities and documents. Many deserving companies may fail to get financial assistance for want of security and other conditions laid down by these institutions. Sometimes, these institutions place restrictions on the autonomy of management and may even lay down convertibility clauses in loan agreements. In some cases, DFIs insist on the appointment of their nominees to the Board of Directors of the borrowing company.

Development Bank of Southern Africa

The DBSA was established in 1982 to advance the delivery of developmental infrastructure primarily in South Africa and the rest of the Continent. The DBSA is involved in the preparation, funding and building phases of the infrastructure value chain. The DBSA focusses on large scale infrastructure projects within the public and private sectors in the water, transport, education, energy and ICT sectors. The services

offered by the bank as well as key targets per segment are illustrated in the diagram below.

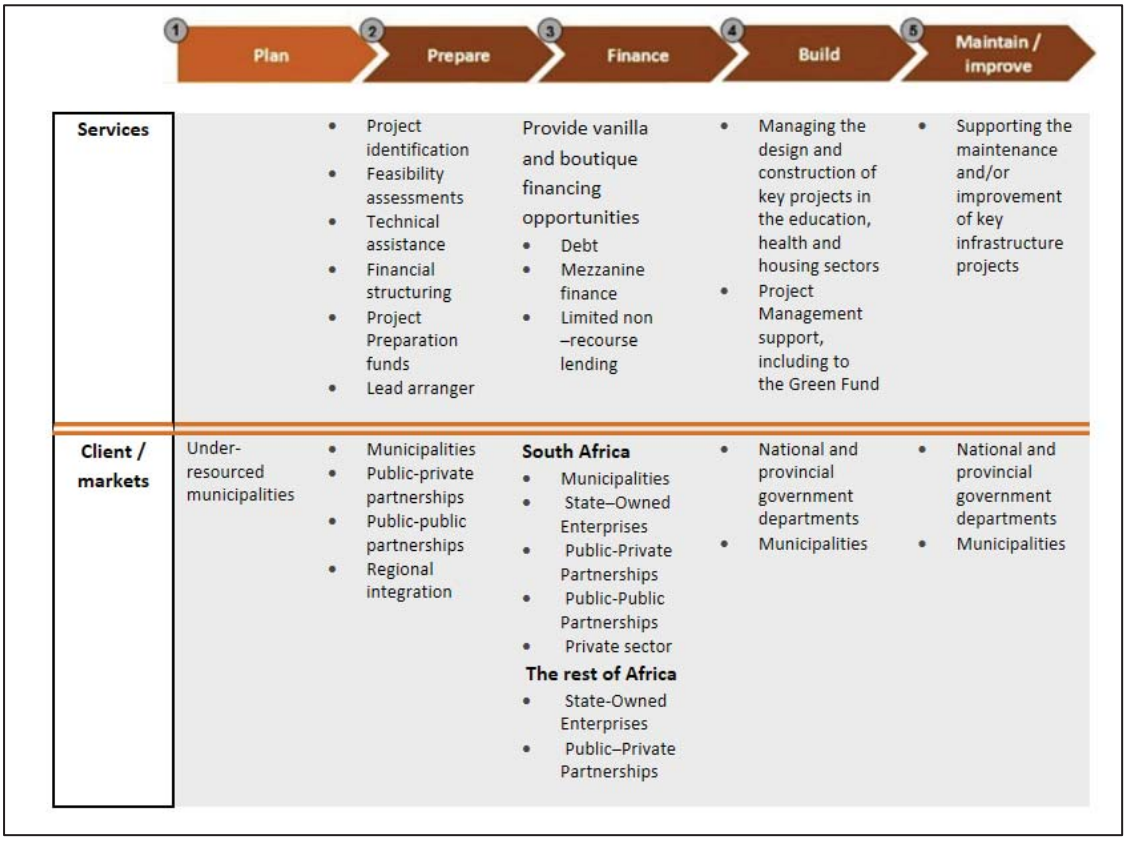

Figure 10: Services and clients of DBSA

The Banks provides debt finance, mezzanine finance and limited non-recourse lending with concessionary lending being provided in certain instances. The DBSA also manages four funds. Details of each of these funds are provided below.

SADC Project Preparation & Development Facility (PPDF)

The SADC Project Preparation and Development Facility (PPDF) was created to address the shortage in project preparation funding for infrastructure projects in the region. The PPDF is administered, managed and disbursed by the DBSA and is funded by the European Union and KFW Investment Bank. The grant facility is made available for 95% of the required amount with the remainder being funded by the recipient.

Infrastructure Investment Programme for South Africa (IIPSA)

The Infrastructure Investment Programme for South Africa (IIPSA) is a €100 million fund that has been developed by the South Africa government and European Union to support the National Development Plan as well as the Regional Infrastructure Master

Plan of SADC. DBSA serves as the implementing agent and fund manager for the programme.

The main purpose of IIPSA funding is to enhance sustainable economic growth and the delivery of key services in South Africa and the SADC region. The programme will support the development of both national and regional infrastructure projects. IIPSA funding can take the form of technical assistance or a direct investment grant. It should be noted that IIPSA will in principle consider projects or programmes with a minimum capital investment value of R500 million.

Green Fund

The Green Fund provides grants, loans and equity funding to projects that are focused on green cities and towns, low carbon economy and environmental and natural resource management. The Fund is managed by the DBSA on behalf of the Department of Environmental Affairs. The Fund has fully committed the current funding allocation and the new funding allocation will be advised when available.

Global Environment Facility (GEF)

The Global Environment Fund (GEF) is a global alternative asset manager dedicated to the energy, environmental, and natural resources sectors. GEF strives to be the premier alternative asset management firm in the domain of energy, environment, and natural resources by delivering favourable risk-adjusted investment returns to investors. GEF was founded on the principle that well-deployed capital can bring significant improvements to the environment and quality of life throughout the world.

The DBSA is an accredited National Project Agency for the Global Environment Facility (GEF). GEF is a partnership for international cooperation where 183 countries work together with stakeholders to address global environmental issues. To date the GEF has provided more than $12.5 billion in grants and leveraged over $58 billion in co-financing for thousands of projects in developing countries (DBSA, 2017). Climate Change (Adaptation and Mitigation) are one of the GEF's focal areas. Co-funding is a key requirement for any project funded by GEF.

Conditional Grants-Pledging/Bridging Finance Loans

In conjunction with National Treasury, DWS and DoE, DBSA was instrumental in the formulation of the regulatory framework to allow the use of conditional grants in municipalities to leverage the raising of bridging finance to fund the development of critical infrastructure in local government, especially in the water and energy sectors.

This led to the introduction of Circular 51 being promulgated, effectively allowing the pledging of MIG and INEP grants for water infrastructure and rural household electrification. Through this initiative DBSA could advance billions of rands into various district and local municipalities in South Africa, thus fast-tracking the implementation of projects.

The challenge with Circular 51, however, is the fact that the regulatory framework requires the prior approval of National Treasury before loans can be disbursed, thus leading to delays with implementation. Discussions are currently underway between DBSA, National Treasury and DWS (and DoE) to review the requirement for prior approval by National Treasury for the disbursement of funds.

Industrial Development Corporation

The Industrial Development Corporation (IDC) is a South African DFI that was established in 1940 to promote economic growth and industrial development. The IDC start-up and existing business in South Africa and across the rest of the African continent. The minimum funding requirement is R1 million and a maximum of R1 billion with the main aim to facilitate the creation of sustainable direct and indirect jobs.

The IDC introduced the Technology Venture Capital (TVC) Fund that aims to provide funding and support to small companies at the early stages of commercialisation of innovative products, processes and technologies. The fund does not focus on a specific sector but rather focusses on interventions that have a significant developmental impact on the South African economy. The TVC fund provides a minimum of R1 million and a maximum of R5 million per transaction. It should be noted that the fund is in the post investment phase with no new investments being considered.

The World Bank Group

The World Bank Group is an international organization that is owned by 189-member countries and was established in 1944 to end extreme poverty and promote shared prosperity in a sustainable manner. The largest shareholders of the Bank are the United States of America, Japan, China, Germany, United Kingdom and France. Details of each entity within the group are listed in the table below.

Table 20: Companies in the World Bank Group

Entity	Comment
International Bank for Reconstruction and Development (IBRD)	Lends to governments of middle-income and creditworthy low-income countries. Commonly referred to as the World Bank. Funds are only extended to sovereigns and for sovereign guaranteed projects.
International Development Association (IDA)	Provides interest-free loans and grants to governments of the poorest countries.
International Finance Corporation (IFC)	Promotes development by financing private sector enterprises in developing countries. Provided a loan of up to R2.6 billion to FirstRand in order to expand SME lending and strengthen support for small and medium enterprises by the formal banking sector (IFC, 2017).
Multilateral Investment Guarantee Agency (MIGA)	Promotes foreign direct investment into developing countries by offering risk insurance (guarantees) to investors and lenders.
International Centre for the Settlement of Investment Disputes (ICSID)	Provides international facilities for conciliation and arbitration of investment disputes.

APPENDIX J: INDUSTRY

There are several large industrial organisations in South Africa. These include mining, manufacturing, automotive and chemical companies. These organisations often utilise large volumes of water directly in their operations, and indirectly for consumption purposes. These institutions therefore have a vested interest in ensuring that South Africa is a water secure country. Thus, there is a possibility that these institutions will be interested in the Water RDI Roadmap. The potential funding hook for these institutions is Corporate Social Investment.

Corporate Social Investment

Corporate Social Investment (CSI) refers to a company's financial and non-cash contributions to disadvantaged communities and individuals for social upliftment and welfare. CSI is now a key component of corporate objectives by being introduced into the Broad Based Black Economic Empowerment (BBBEE) scorecard as a part of the socio-economic development component in 2007.

The BBBEE scorecard has established contribution of 1% of net profit after tax (NPAT) to be directed towards Socio-Economic Development. The qualifying criteria to achieve the target include that beneficiaries of the funding must be 75% or higher black and contributions must be geared towards income generating activities for beneficiaries.

All businesses that do business with government are required to comply with the BBBEE codes. Further to this, state-owned and public enterprises and large telecommunications operators are required to include a social component in order to comply with their license conditions. This thus represents an opportunity for the WRC to engage companies to access funding through their CSI initiatives to fund elements of the Water RDI Roadmap.

The next section of the report provides details of Eskom and Sasol as potential institutions that could fund elements of the Water RDI Roadmap implementation plan.

Sasol

Sasol is an integrated chemicals and energy company that employs 30 300 people in 33 countries. The company is listed on the Johannesburg Stock Exchange in South Africa, and the New York Stock Exchange in the United States. In 2013, Sasol formed strategic partnerships with WRC and DWS to promote water conservation and improve treatment technologies and the re-use of wastewater in South Africa. The partnership with the WRC also included the use of the Research and Development facilities in Sasolburg.

Sasol has also launched Water Sense that aims to align water stewardship practices throughout its various operations around the world. This platform is used to co-ordinate and respond to water security risks, regulatory risks and the increased societal awareness of water becoming a scarce and valued resource.

Sasol committed R5 million funding to the Water Stewardship programme in 2015/16 financial year (other partners committed R8 million of funds to the programme). This programme involved partnering with municipalities around interventions focussed on reducing water losses.

Sasol spent R655 million on corporate social investment in 2015/16. The spending was targeted at environmental compliance, job creation, SMME development and municipal service delivery. Sasol is also committed to delivering social value through investments by aiming to improve local communities' access to healthcare, education and clean water.

Eskom

Eskom is an electricity supplier that is responsible for the generation, transmission and distribution of electricity to consumers in South Africa and parts of the South African Development Community (SADC) region. Eskom generated revenue of R177.1 billion at a group level in the 2016/17 financial year and had a capital expenditure programme of R65.9 billion (Eskom, 2017).

Eskom is a strategic water user and has identified that concerns around water scarcity is a material risk to their business. The utility notes that the short-term water risk has improved due to increases in dam levels in certain areas but the 'deteriorating quality of raw water requires stakeholders, including Eskom, to protect water resources and deal with polluters'. The development of new power stations must take the availability and quality of water resources, climate change impacts and lead times for the development of water supply infrastructure (Eskom, 2017).

The utility has also identified that water usage and partnerships in this area have the potential to create a revenue generating business.

The utility consumed 307 269 Ml of water in the 2016/17 financial year with the board having approved a comprehensive water strategy for all coal fired power stations.

However, the utility was unable to meet their reduction target (1.38 l/kWh sent out) in the 2016/17 financial year rather achieving water usage of 1.42 l/kWh sent out. This was attributable to dry and hot weather conditions, as well as load factors and inefficiencies at some power stations (Eskom, 2017).

Eskom also remains committed to the training and development of 47 658 staff. This is exhibited by the group spending R150 million on direct training and development costs in the 2016/17 financial year. The utility spent R1.54 billion in total on training and development of staff (Eskom, 2017).

The Eskom Development Foundation NPC is a wholly owned subsidiary of Eskom Holdings and was formed in 1998. The Foundation is responsible for the execution and coordination of Eskom's CSI initiative. The strategy supports socio-economic development programmes that targeting primarily the communities where Eskom operates. Eskom has undertaken to absorb the function provided by the Development Foundation within the Group and have undertaken to deregister the foundation in 2017. However, there is not expected to be any impact on the roles and functions of the employees tasked with executing the CSI strategy (Eskom, 2017).

Eskom spent R225 million on Corporate Social Investment initiatives that impacted 841 845 beneficiaries during the 2016/17 financial year. Sustainability is a key elements of Eskom's CSI interventions with the strategy being separated into three areas:

- Provision of support to small and medium enterprises through skills development and marketing support to assist these businesses in growing and creating further employment opportunities
- Provision of support for education from the early childhood development phase onwards
- Support provided to technical vocational education and training colleges

The table below provides a summary of funding that was approved for the 2015/16 financial year.

Table 21: Summary of Eskom CSI spend

Project	Number of projects	R million
Grants for flagship and national programmes and economic and social sector projects	11	173.5
Donations to registered, non-profit philanthropic organisations	214	37.2
Rural development	3	14.6
Total	**228**	**225.3**

Source: (Eskom, 2017)