# Improving water quality in the Crocodile Catchment Area Mpumalanga, South Africa

**Optimising wastewater treatment and introducing sustainable sanitation systems**

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# Proposal

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**PARTNERS VOOR WATER III**

**Ameco Environmental Services BV**

**in cooperation with:**

**Waterschap Groot Salland**
**DHV**
**Wageningen UR / Lettinga Association Foundation (LeAF)**


**15 September 2010**

| Colophon | |
|---|---|
| **Title:** | **Improving water quality in the Crocodile Catchment Area Mpumalanga, South Africa**<br><br>**Optimising wastewater treatment and introducing sustainable sanitation systems**<br><br>**Full Proposal** |
| **Reference:** | Partners voor Water III |
| **Client:** | Agentschap NL<br>Programmabureau Partners voor Water<br>Juliana van Stolberglaan 148<br>2595 CL Den Haag |
| **Project partners:** | • Ameco Environmental Services BV (Ameco)<br>• Waterschap Groot Salland (WGS)<br>• DHV Group (DHV and SSI)<br>• Lettinga Association Foundation (LeAF) – in cooperation with Wageningen UR<br>• Neochem<br>• Independent experts |
| **Date:** | 15 September 2010 |
| **Photo on front page:** | View over the Crocodile River (source: LeAF) |
| **Note:** | *This proposal forms part of a comprehensive tender package; it is referred to as Annex 1. Other Annexes constituting the package are not mentioned in this proposal, unless relevant or deemed necessary.* |

# Contents

# 1 Description Project Partners

## 2.1 Description Dutch partners

Ameco has formed a consortium together with Waterschap Groot-Salland (WGS), DHV-Group, LeAF and local partners to collectively initiate a business approach towards improving water quality in South Africa. The approach supports integrated and innovative approaches to wastewater treatment and sanitation. The consortium structure is based on previous experiences in South Africa, successful cooperation initiatives, complementary expertise and motivation for either entering or further expanding the market in South Africa. A list with project references per partner is included in Annex 7.

### 2.1.1 Applicant – Ameco

**Ameco**, established in 1989, has executed over 150 projects worldwide. Ameco is active in the fields of waste, water, renewable energy and nature management (policy development and implementation, institutional strengthening, awareness-raising), environmental education and communication. Ameco's experts are experienced in working with governmental and non-governmental organisations. Specific skills include supporting cooperation between public and private parties, intercultural communication and a creative and flexible approach. In Southern Africa, Ameco has executed various projects in the environmental field. Ameco has established together with its partners "Umeme Jua", a profitable company aimed at the marketing and distribution of solar panels for rural use in Tanzania. Ameco is still one of the shareholders. Ameco was also involved in a study on drinking water in Kenya (Rift Valley) and the development of measures and in the production of biofuel from Jatorpha. In the field of (waste)water, Ameco has extensive experience in the development and implementation of policy related to integrated water management (Water Framework Directive) and wastewater (Urban Waste Water Directive) and in the sustainable embedding of innovative technology.

### 2.1.2 Project Partners

**WGS** in its current form was established in 1997. As a regional Water Authority, WGS is responsible for water management in the province of Overijssel, including dike control, water quantity control, water quality control and wastewater treatment (WWT).

WGS has entered into a number of international cooperation agreements as part of their mandate for good governance and capacity building through the exchange of knowledge and experience in water and sanitation. In one example, WGS entered into an agreement with the Inkomati Catchment Management Agency (ICMA) in Mpumalanga in 2005. This cooperation is supported by, amongst other, the Ministry of Water and Environment in South Africa. Since 2008 this cooperation has been extended to include local municipalities both in The Netherlands and South Africa. WGS is also involved in a number of research studies, including: study by STOWA, University for Applied Science in Windesheim and Municipality of Zwolle on the use of urine from UD toilets at Windesheim; student exchange programmes for Windesheim students; and the European research project INNERS with several Dutch and European partners (WGS in lead) into the recovery and reuse of thermal energy from urban wastewater, concentration of wastewater streams to increase energy production (e.g. biogas) and improved energy efficiency at WWTPs in terms of operation and maintenance.

**DHV** is a leading international consultancy and engineering firm, providing services and innovative solutions in amongst other, water and environment and sustainability. DHV, headquartered in the Netherlands, is part of the DHV Group which maintains a network of 75 offices worldwide. **Stewart Scott International (SSI)** represents the DHV Group in South Africa. In terms of (waste)water treatment, DHV offers innovative and high-quality services and technologies. DHV is experienced in the fields of wastewater collection and treatment, for new and existing WWTPs. In terms of sanitation, DHV is also actively involved in supporting the shift from conventional sanitation to reclaiming more sustainable systems that utilise raw materials and energy. DHV's focus lies in realizing sustainable sanitation infrastructure where people and economic development are prioritised. Examples of projects carried out in WWT and sanitation worldwide include modelling and software use; design and implementation of sanitation, drainage and sewer systems in many parts of the world; master plans for sewerage and drainage supported by feasibility studies and detailed project reporting; and strategic sanitation planning for the preparation of designs and tender documents for infrastructure rehabilitation and upgrading.

**LeAF** is an independent non-profit knowledge centre that actively promotes the implementation of sustainable environmental technologies. Through these technologies, environmental protection becomes a profitable part of industrial, domestic and agricultural activities. Having close ties with Wageningen University (WU), LeAF aims to bridge the gap between research and practical application. As a result LeAF cooperates with various governmental and non-governmental organisations find solutions to questions and issues from both industry and society. LeAF has substantial experience in the field of anaerobic technology (considered core technology for mineralizing organic matter in (waste)water streams, while producing energy, reusable water and nutrients).

LeAF is also actively involved in the development and implementation of robust, affordable and sustainable WWT technologies for sanitation purposes. Examples of related initiatives undertaken by LeAF include the construction and implementation of mobile sanitation units in a slum in South Africa; implementation of and capacity building on anaerobic domestic WWT in a municipality in Morocco; and recovery of nitrogen and phosphorous from source separated urine in The Netherlands.

## 2.2 Description South African partners

**Neochem cc Water Treatement Specialists (Neochem)** is based in South Africa, offering a range of services in WWT, including training, maintenance services, water quality testing, design and implementation of treatment packages. Ms. Susan van Heerden is a specialist at Neochem who has extensive working experience in the (waste)water sector in Mpumalanga, particularly training. Ms. van Heerden has also been involved in activities in the framework of cooperation between WGS and the ICMA both in The Netherlands and South Africa, including the realisation decentralised, sustainable sanitation systems at Sincobile Secondary School in Komatipoort, Mpumalanga.

**Mr. Anthony Overbeek** is an **independent expert** who provides consulting and advice to various private companies and government institutions on improved (waste)water treatment technologies and utilization. He has considerable business experience in the design, procurement and installation of hardware for potable and WWT in South Africa and neighbouring countries, including Swaziland. In addition to consulting services, Mr. Overbeek also provides training and assists in the development of programmes to improve operations and maintenance of wastewater and sanitation systems. Mr. Overbeek is qualified to undertake microbiological analysis testing, chemical evaluations (e.g. water quality and chemical testing by various analytical methods) and water treatment process development (e.g. to remove specific contaminants in effluent). He is responsible for the implementation of the sanitation systems at Sincobile Secondary School.

### 2.1.3 Strategic cooperation and motivation

*Role within the consortium* (**Ameco**): overall project management and coordination; expert input for provision of framework for working in different cultural and settlement contexts in developing countries; expert input in the implementation of water regulation at local and regional levels; expert input in the sustainable embedding of hardware in local context (i.e. ensuring that hardware complies with local needs, training is provided based on actual needs, and agreements are made on operation and maintenance); and expert input in environmental capacity building, awareness-raising and information dissemination.

*Motivation* (**Ameco**): ambition to provide tangible and quantifiable improvements in water quality and the environment through expert advice; to enhance environmental awareness in South Africa and further afield through demonstration activities and information dissemination; and to support the South African authorities with the practical implementation of (waste)water regulations such as the Green Drop Programme for WWTPs.

*Role within the consortium* (**WGS**): expert input for strengthening cooperative governance between various parties involved and/or responsible for (waste)water treatment, such as Water Service Authorities (WSA) and local and district municipalities; expert input in the organisation and management of (waste)water treatment within a catchment area and jurisdictional boundaries; expert input for supporting the exchange of knowledge and experience between governmental organisations; and expert in cooperative governance in IWRM with ICMA, Province of Mpumalanga and DWA; and expert input in capacity building (focus: organisation and management). *Motivation* (**WGS**): ambition on behalf of the consortium to strengthen water governance and decision-making in integrated water resource management (IWRM) in Mpumalanga and further afield with governmental organisations and research institutes, e.g. Water Institute for Southern Africa (WISA), Water Research Commission (WRC) and CSIR (Centre for Scientific and Industrial Research).

*Role within the consortium* (**DHV**): expert input in the identification, development and application of innovative solutions in WWT and sanitation solutions in local contexts through quick-scans and audits; expert in the development of (strategic) plans for optimising existing WWT and sanitation systems and supporting the implementation of new systems; expert in hardware procurement and installation; and expert input in capacity building (focus: technical; processes, operations and maintenance). *Motivation* (**DHV**): ambition on behalf of the consortium to secure additional market entry opportunities in South Africa in close cooperation with SSI; and to nurture relationships with local contractors as potential agents in service provision and hardware procurement for activities proposed by project partners.

*Role within the consortium* (**LeAF**): expert input in the development of sustainable solutions for WWT and sanitation, emphasising the (re)use of nutrients, energy and water; expert input for supporting the exchange of knowledge and experience gained in research between governmental and non-governmental organisations; and expert input in capacity building (focus: technical; practical implementation of sustainable sanitation concepts). *Motivation* (**LeAF**): ambition to support the implementation of sustainable environmental systems and technologies, based on sound research and theoretical concepts; to nurture relationships with other education institutions active in the (waste)water sector, such as Tshwane University of Technology, WISA, WRC and CSIR; and support curriculum development for young water professionals and assist them in entering the market.

# 2 Project Context

## 3.1 Project title and location

For a summary of the project, see '*Aanvraagformulier Tijdelijke subsidieregeling Wereldwijd Werken met Water*'.

Activities that support the realisation of the overall project goal in the project "Improving water quality in the Crocodile Catchment Area Mpumalanga, South Africa: optimising wastewater treatment and introducing sustainable sanitation systems" will take place in the Crocodile Catchment, a sub-catchment of the ICMA. In terms of jurisdictional boundaries, the Crocodile sub-catchment area falls within the Ehlanzeni District Municipality (EDM) of the province of Mpumalanga in South Africa. The EDM borders the Limpopo province to the north, Mozambique to the east and the Royal Kingdom of Swaziland to the south-east. The southern section of the Kruger National Park (KNP) falls within the EDM's area of jurisdiction. For the purposes of this project, the EDM is seen as the main beneficiary. Additional beneficiaries include the WSA in EDM responsible for WWT, SanParks for sanitation in KNP (and as downstream conservation area) and ICMA, for the catchment.


*District municipalities in Mpumalanga, source: EDM, 2008*

Settlements found in EDM are located in the following local municipalities (LMs): Nkomazi LM (323,721 ha), Mbombela LM (341,049 ha), Umjindi LM (174,550 ha), Thaba Chweu LM (471,928 ha) and Bushbuckridge LM (260,000 ha). The types of settlements in EDM include large urban centres and smaller towns. A large proportion of the district consists of rural areas, including scattered villages, formal and informal townships and productive farmland. These settlements border the KNP, a world-renowned nature conservation area. The EDM is therefore considered to be of national and international importance, given its high potential for agriculture and associated industry, tourism and conservation. The district has a relatively low population density although positive growth scenarios and associated migratory work patterns are being witnessed due to increased development and tourism in the region.

## 3.2 Choice of themes

The following themes apply to the choice of activities and anticipated results within the proposed project, for reasons of which will become clear in subsequent sections: drinking water and sanitation (incl. wastewater); and governance.

## 3.3 Description of current situation

The quality of water in Mpumalanga, whether for drinking, agriculture or recreational purposes, is under threat. The EDM and Crocodile sub-catchment area is no exception. Water sources are regularly contaminated by municipal effluent from rural and urban sources. Decreasing water quality due to poorly treated effluent not only has a negative impact on surface water bodies and groundwater in the sub-catchment area but also in neighbouring catchments, including those located outside South Africa's boundaries.

## 3.4 Description of water and sanitation related problems

The underlying causes of water contamination in EDM can largely be attributed to the ongoing failure of LMs to recover maintenance backlogs, run effective preventive maintenance programmes and deliver reliable and appropriate (waste)water services. Inadequate budgets (mostly due to insufficient reserves for maintenance) and shortages in skills and experience have been identified as critical factors undermining the sustainability of effluent treatment in EDM, whether rural or urban in origin. In addition, legislation (and its implementation) is not seen to incentivise LMs and WSA to manage their infrastructure as they should. Information on good practice, norms and standards in the form of guidelines are also largely absent or if present, outdated.

The key players responsible for (waste)water management in EDM and therefore also for addressing problems associated with ineffective effluent treatment are the WSA. In the EDM, the five LMs are also the WSA. The EDM fulfils a supporting role to the LMs (WSAs) if and when required. The EDM is, however, the authorized WSA of the District Management Area comprising Southern KNP, Sabi Sands, Timbavati, Klaserie and Umbabat private reserves. In all cases, the EDM has the authority to take over service delivery should a WSA fail its duties or be unable to provide a service.

### 3.3.1 Basic services

According to the outcomes of the Community Survey of 2007 (Statistics South Africa) as reported in Table 19 of the 2009/2010 EDM Integrated Development Plan (IDP), approximately 62.1% of the households in EDM receive inadequate basic sanitation services. Bushbuckridge LM has the lowest score in service provision (86,5%). Pit toilets or latrines (with or without ventilation), the most basic form of sanitation, are the most commonly encountered sanitation system in EDM for dealing with household effluent (60,5%). In some cases (12,7%) no sanitation services are provided.

**Table 19 Sanitation Services in Ehlanzeni**

| Municipality | Number of Households | BASIC SERVICE | | FULL SERVICE | | BELOW BASIC | |
|---|---|---|---|---|---|---|---|
| | | Households | % | Households | % | Households | % |
| Thaba Chweu | 28,258 | 1,334 | 4.7 | 17,719 | 62.7 | 9,205 | 32.6 |
| Mbombela | 137,353 | 25,164 | 18.3 | 41,445 | 30.2 | 70,744 | 51.5 |
| Umjindi | 18,768 | 682 | 3.6 | 11,828 | 63.0 | 6,258 | 33.3 |
| Nkomazi | 78,254 | 29,295 | 37.4 | 6,081 | 7.8 | 42,878 | 54.8 |
| Bushbuckridge | 124,595 | 10,408 | 8.4 | 6,417 | 5.2 | 107,770 | 86.5 |
| DMA 32 | 90 | 6 | 6.7 | 84 | 93.3 | 0 | 0 |
| **Ehlanzeni** | **387,318** | **66,889** | | **83,574** | | **236,855** | |

*Source: Ehlanzeni District Municipality Blue Print on Water and Sanitation*

*Source: EDM Integrated Development Plan 2009/2010*

In the EDM Water Services Development Plan (SWDP) for 2010/2011, the EDM identified the following targets with regards to improving WWT and sanitation (and therefore water quality) in the district: 1) appropriate on-site sanitation systems; 2) maintenance of high level of services provision of WWTPs and existing infrastructure; and 3) ensure that operations and maintenance management plans are in place.

"*The operational debt of some municipalities is so severe that, even if no further infrastructure were acquired, it could well still be impossible for them, without* ***innovative external assistance*** *to catch up with existing maintenance backlogs and restore sustainable operations*" (EDM WSDP 2010/1011).

### 3.3.2 Rural context

Pit toilets/latrines are characteristic for rural areas. EDM is largely rural, which means that a high percentage of households depend on surface water bodies and groundwater for drinking water and utilise pit toilets/latrines. Large sanitation backlogs and prevalence of pit toilets/latrines without ventilation have and continue to lend themselves to health and safety issues, such as waterborne diseases and environmental degradation (surface water bodies and groundwater) through water contamination. A national audit carried out in 2009 identified Mpumalanga as one of the highest risk provinces in South Africa in terms of the negative impacts on health from poor water and sanitation systems. For example, contaminated water entering the KNP due to inappropriate sanitation management measures upstream became a concern in 2009 following an outbreak of cholera in which a number of deaths were reported. Similar outbreaks were reported in Limpopo Province and in Zimbabwe.

Pit toilets/latrines without ventilation are not considered effective in terms of treatment or resource (re)use. Nor are they easy to maintain. Pit/latrine emptying and sludge disposal seldom occur. A recently-released Water Research Commission (WRC) study on sanitation in South Africa recommended that easily-maintainable sanitation options in rural areas, such as single or double pit/latrine urine diversion toilets, could be chosen over difficult to maintain solutions if the current backlog in sanitation services is to be addressed and the negative impact of current practices reduced. According to Jay Bhagwan from WRC (2010): "*The practice of building sanitation infrastructure while not allowing for adequate maintenance in the future, whether it is basic VIP sanitation or full water-borne sanitation, is short-sighted and will result in South Africa facing a sanitation crisis in the medium term*".

### 3.3.3 Urban context

The most important indicator of WWT performance is the quality of the effluent discharged from the wastewater treatment plants (WWTPs). The majority of WWTPs in EDM fail to meet effluent discharge standards established by the Department of Water Affairs (DWA) of the Ministry of Water and Environmental Affairs. In many cases, the processes employed at WWTPs are no longer sufficient to deliver the required final water quality, nor are they effective in maximising the (re)use of resources. In 2009 the DWA launched its Green Drop Programme certification process, an incentive-based regulatory approach to evaluate the performance of municipal wastewater services. The majority of WWTPs in EDM were described as 'poor to non-functional'. In many cases, information was not available or provided to the DWA to assess the status of the plants. Attempts at process control and effluent compliance are often null and void, as no measured means are in place to verify the status of compliance of the WWTPs.

As a result, EDM was given a Green Drop Score rating of just 6%. The province did not fair much better, with a score of 30%. The regulatory impression stated: "*According to the assessment results, the WWQ management performance of the District Municipality, as a whole, is relatively poor, with substantial improvement effort required in all areas*" (http://www.ewisa.co.za). The WWTPs could not comply with DWA standards and the following criteria as stipulated by the Green Drop Programme: classification operational staff; wastewater quality monitoring; wastewater sample analysis; submission of wastewater quality results; wastewater quality compliance; management of wastewater quality failures; storm water management; bylaws; WWTP capacity; and publication of quality performance.

There is one case of good practice within the EDM, where higher scores have been obtained. The Mbombela LM scored 72% in the Green Drop Programme certification process in 2009, with the Kanyamazane and Matsulu WWTPs being awarded actual Green Drop status. Risks were nevertheless identified, including inadequate process controlling skills, which could lead to ineffective treatment and ultimately, loss of the Green Drop status. Other constraints typically experienced include a general lack of understanding of the technicalities of WWT amongst management and administration, resulting in the needs of the WWTPs and their operators not being prioritised. The funding requirements for WWTW operations are also not widely understood and communicated, with resulting negative repercussions for budgets for operations and maintenance. The existing infrastructure at WWTPs is also in need of replacement/refurbishment and expansion.

## 3.5 Added value of the project

The justification for the project intervention is summarised below:

Focus on sustainable sanitation solutions

- Provision of safe hygiene and socially acceptable sanitation solutions that are financially viable and sustainable and support the reuse of nutrients, energy and water given decreasing resource availability.
- Promotion of sustainable sanitation concept and systems in demonstrations, workshops and seminars that emphasises the (re)use of resources (water, nutrients and energy) their conservation and recovery; significant exposure (international, regional, national and local); showcase potential but still representative of rural context; platform for dissemination of information.

Focus on optimised WWT

- The project team will assist with the practical implementation of the Green Drop Programme certification process, particularly in the areas of monitoring, analysis and reporting.

- Support the practical translation of Green Drop programme criteria through Dutch approaches to processes, technology and management Training and coaching of process controlling and supervisors.

General

- The consortium represents the interests of the Dutch private sector (Business to Business, B2B), Government (Government to Government, G2G) and Knowledge Institutes (Knowledge to Knowledge, K2K). The structure is based on previous experiences, successful cooperation initiatives, complementary expertise and motivation for either entering or further expanding the market in South Africa.
- The challenges currently facing LMs as WSA in EDM are not inherent to EDM; they are representative of other districts and catchment areas in Mpumalanga and further afield. As such, proposed activities to improve water quality by addressing problems in rural and urban contexts should be viewed for their potential to be applied elsewhere (i.e. spin-offs).
- Effective effluent treatment will safeguard human health and reduce environmental degradation whilst creating opportunities for local economic development (LED).
- The proposed approach is based on extensive experience and knowledge. The potential for spin-offs is enhanced given the integrated way in which water quality needs to be addressed if solutions are to be sustainable and long-lasting, particularly in cases where these is more than pollution source of (rural and urban effluent).
- The cross-boundary potential of surface and groundwater contamination from municipal effluent requires innovative approaches and cooperation. The Inkomati Catchment is a priority water catchment for Water Mondiaal. The results of the project will be shared with Arasul in Mozambique and the Swazi RBO through the transboundary cooperation activities of ICMA and WGS.
- The proposed activities address global water-related problems, through reductions in water ‘misused’, increased reuse and reduced negative impacts in the environment (e.g. surface water bodies, groundwater, etc.) and increased awareness and understanding of the need to 1) reduce water use and negative impacts on the environment, and 2) increase water re-use, efficiency, delivery and compliance.
- The proposed activities will contribute positively to achieving the Millennium Development Goals 7 and 8 through improvements in and regarding access to basic sanitation and reductions in disparities in urban and rural WWT and sanitation coverage. Activities will also assist the EDM and LMs to meet their development goals, which support the MDGs, as described in their IDPs.

## 3.6 Background information and preparation phase

The information contained in, and used during the development of, this proposal was sourced in close cooperation with South African stakeholders active in the (waste)water sector. The proposed activities are therefore demand-driven and reflect the needs of the local situation. They also reflect the need for environmentally friendly, socially acceptable and financially sustainable solutions in the context of decreasing or limited resouce availability (human and financial). The results of and lessons learned from related initiatives were taken into account during the development of the project. These will continue to be assed to define the way forward during project implementation in order to maximise synergies and avoid unnecessary overlap.

# 3 Project Goal, Results and Activities

## 4.1 Project goal

The overall goal of the project is to improve the water quality in the Crocodile Catchment Area in Mpumalanga Province, South Africa in an integrated way by optimising WWT in urban areas and introducing sustainable sanitation systems, based on (re)use of nutrients, energy and water) in rural areas. The following sub-objectives have been identified:

- Improve the capacity of relevant stakeholders for IWRM, WWT and sanitation.
- Demonstrate Dutch technology, policy and management practices for the optimisation of WWTPs in urban areas to key stakeholders in the framework of the Green Drop Programme.
- Demonstrate Dutch sanitation concepts and systems for rural areas in KNP (i.e. sanitation solutions).
- Develop a Business Model ("Making Business from Sanitation") for the introduction of sustainable sanitation concepts and systems that is based on the reuse of nutrients, energy and water in rural areas and supports local franchising.

## 4.2 Project results

| **Result 1** | **Title of the result:**<br>**Project kick-off, cooperation between project partners confirmed and Working Group established** |
|---|---|
| Description | During the inception phase of the project, a kick-off meeting will be held with all stakeholders involved to agree on tasks and responsibilities. Agreements will be confirmed in writing. A multi-stakeholder Working Group will be established. The Working Group will be involved in specific tasks to make sure the offered services comply with local needs and requirements. This supports the sustainability of the projects results. |
| **Sub-results** | **Deliverables/means of verification** |
| 1. Kick-off meeting held | 1.1. Agenda kick-off meeting, list of participants |
| 2. Cooperation between project partners confirmed in written | 2.1. Contracts |
| 3. Establishment of multi-stakeholder Working Group and tasks for Working Group specified | 3.1. List of Working Group members<br>3.2. Terms of Reference Working Group |

| **Result 2** | **Title of the result:**<br>**Strengthened capacity in integrated water management: wastewater treatment and sanitation** |
|---|---|
| Description | Local, regional and national authorities and other relevant stakeholders (education and research institutes, NGOs, private sector) will be trained on-the-job during the demonstration of the optimisation of a WWTP (Result 3) and during the demonstration of sustainable sanitation concepts for systems. The Working Group will be closely involved in project implementation. |

| **Sub-results** | **Deliverables/means of verification** |
|---|---|
| 1. Training needs assessed, training programme developed and participants identified (local, regional, national authorities, education and research, NGOs) | 1.1. Training programme developed on integrated water management, WWT and rural sanitation systems |
| 2. Training programme on integrated water management, WWT during demonstration project (see result 3) and on sanitation for rural areas during demonstration project (see result 4) implemented | 2.1. Training implemented: workshop programme, workshop materials, list of participants, evaluation forms |
| 3. Study-tour to the Netherlands | 3.1. Study-tour programme, minutes, list of participants, evaluation forms |

| **Result 3** | **Title of the result:**<br>**Dutch technology and management practices for the optimisation of WWT demonstrated** |
|---|---|
| Description | Together with the local stakeholders, three target municipalities will be selected for the demonstration of technology and management approaches for the optimisation of a WWTP according to the Green Drop programme. The practices will be compiled in a document for dissemination purposes for other municipalities, to optimise their operations. Potential differences in configuration will be taken into account. This document will be incorporated in the Green Drop certification process. The team aims at certification of the plant as part of the Green Drop programme. The Dutch technology and management approaches will be promoted during a seminar, press conference and via written promotion material. |

| **Sub-results** | **Deliverables/means of verification** |
|---|---|
| 1. Municipality selected for demonstration of WWT technology and management and required revision/improvement with respect to WWT assessed, according to Green Drop programme | 1.1. Working Group meeting minutes, including selection criteria<br>1.2. Assessment report |
| 2. WWT Optimised | 2.1. Recommendations for optimising process, management and technology<br>2.2. Procurement of hardware/equipment/materials for extension / retrofit at pilot plant<br>2.3. Pictures of installed hardware/equipment/materials<br>2.4. Certification according to Green Drop Programme |
| 3. Dutch technology and management practices demonstrated to a wide audience | 3.1. Seminar programme, list of participants<br>3.2. Press releases<br>3.3. Leaflet disseminated<br>3.4. Project presented during WISA biannual conference in 2012 in Cape Town |

| | |
|---|---|
| 4. Road Map of steps followed for improvement of the WWT process and advice for implementation of the Green Drop Programme developed (based on experience gained during demonstration) and incorporated into Green Drop certification process | 4.1. Road Map of the steps followed for improvement of the WWT process and advice for implementation of the Green Drop Programme. The Road Map will include an inventory of other national / local programs which can support it |

| **Result 4** | **Title of the result:**<br>**Dutch sanitation solutions for rural areas demonstrated in KNP and Business Model developed** |
|---|---|
| Description | To support the introduction of decentralised sanitation solutions based on the concept of reuse of nutrients, energy and water in rural areas, a Dutch model of this concept will be developed and demonstrated in KNP. The concept will be detailed with local stakeholders to make sure local needs and standards are considered. It will be promoted during a seminar, press conference, and written material (leaflet). After the demonstration and evaluation of its appropriateness, a business model will be developed by a selection of Working Group members. The Business Model will contain a distribution, marketing and financing plan. |
| **Sub-results** | **Deliverables/means of verification** |
| 1. Location determined for the demonstration of the sanitation solutions and assessment of local needs and constraints | 1.1. Working Group meeting minutes |
| 2. Sanitation solutions designed and installed | 2.1. Design<br>2.2. Procurement of hardware<br>2.3. Hardware delivered<br>2.4. Pictures of installed hardware |
| 3. Dutch sanitation solutions demonstrated to a wide audience, supported by visibility actions | 3.1. Seminar programme, list of participants<br>3.2. Press releases<br>3.3. Leaflet disseminated<br>3.4. Permanent publicity stand in the visitor centre at the Skukuza camp of KNP<br>3.5. Project presented during WISA biannual conference in 2012 in Cape Town |
| 4. Business Model developed by selected Working Group members and Dutch private sector for the marketing and distribution of sanitation solutions in rural areas | 4.1. Business Model for the marketing and distribution of sanitation solutions in rural areas (“Making Business from Sanitation”) |

## 4.3 Project activities

**Result 1: Activities**

1.1 *Organisation of a kick-off meeting with all involved stakeholders.* A meeting will be organised with South African stakeholders active in the (waste)water sector, including local, regional and national (water) authorities, national ministries (Ministry of Water and Ministry of Health) private sector, KNP, WISA, WRC, CSIR, Southern African Netherlands Chamber of Commerce (SANEC), NGOs, research and education institutes. The purpose of the kick-off meeting is to present the project, confirm the way forward and assess the potential to maximise synergies and avoid unnecessary overlap with related initiatives. In addition, the tasks and responsibilities of the project partners and beneficiaries will be determined.

1.2 *Drafting of contracts to confirm tasks and responsibilities of all project partners*. This will be coordinated by Ameco with contributions from all project partners.

1.3 *To establish a multi-stakeholder Working Group and specify activities to be carried out by the Working Group in a Terms of Reference.* The Working Group will comprise approximately 10 representatives of South African stakeholders active in the (waste)water sector. By default, a representative from the EDM and KNP (represented by SanParks) will be part of the Working Group as they are also the beneficiaries of the project. Members of the Action Group established as part of the cooperation agreement between WGS and the ICMA will be included in Working Group to support continuity and sustainability. Additional members will be identified during the kick-off meeting (Activity 1.1). The Working Group will be involved in the following activities: identification of training needs, development of training programme and identification of participants for training programme (Activity 2.1); participation in training programme (Activity 2.2); selection and confirmation of pilot municipalities for WWT demonstration (Activity 3.1); development of Guideline for improvement of WWT (Activity 3.5); selection and confirmation of demonstration location in KNP (Activity 4.1); and development of Business Model (Activity 4.4).

**Result 2: Activities**

2.1 *Identification of training needs, development of training programme and identification of participants for the training programme.* A Working Group meeting will be organised to identify training needs and participants for the training programme. Based on the needs and participants, a training programme will be developed. Training will be carried out for the major part during the realisation of Result 3 and 4 (i.e. demonstrations). In addition, a study-tour to the Netherlands will be organised.

2.2 *Implementation of training programme on integrated water management; WWT and on sanitation for rural areas*. The content of the training programme is presented in the table below.

| Training subject | Target group / nr. of participants | Training methodology |
|---|---|---|
| Integrated water management | Working Group members (10) | 3 x Working Group meetings<br>1 x Study tour to the Netherlands |
| Waste water treatment management and technology practices according to Green Drop Programme | Local, regional and national water authorities; engineers/operators of WWTPs; NGOs; and education and research institutes. Number of participants: 10 per pilot municipality (30 in total). In addition, Working Group members will participate (future disseminators of knowledge and information) | 3 x 3 days on-the-job training during demonstration (3x3 days)<br>1 x Study tour to the Netherlands |
| Sanitation in rural areas | Local, regional and national water authorities; engineers/operators of WWTPs; NGOs; and education and research institutes; and private sector. Number of participants: 30. In addition, Working Group members will participate (future disseminators of knowledge and information) | 3 x 3 days on-the-job training during demonstration (3x3 days)<br>1 x Study tour to the Netherlands |

2.3 *Study-tour to the Netherlands.* A study-tour to the Netherlands will be organised to exchange knowledge about waste water treatment, sanitation and integrated water management; present and promote Dutch technology, policy and management; support Dutch-South African cooperation; and identify new business opportunities. The tour is planned for November 2011, to coincide with the Aquatec Water Fair. Participants will be the Working Group members.

**Result 3: Activities**

3.1 *Selection of municipalities for demonstration of Dutch WWT technology and management approaches and assessment of required revision/improvement with respect to WWT, according to Green Drop programme.* The following criteria are to be considered with respect to WWT according to the Green Drop programme: classification operational staff; **wastewater quality monitoring; wastewater sample analysis; submission of wastewater quality results; wastewater quality compliance**; management of wastewater quality failures; storm water management; Bylaws; WWTP capacity; and **publication of wastewater quality performance**. A provisional needs assessment was carried out by the project team in close cooperation with South African stakeholders of the WWTPs in LMs in EDM to identify suitable pilot locations. The following WWTPs have been short-listed: Barberton, Komatipoort, Malelane and White

River. The results of the needs assessment confirm shortages in skills and capacity for the collection and analyses of water quality data and for operation and maintenance at these WWTPs. These related directly to the Green Drop programme criteria in bold. In addition, infrastructure is in a state of disrepair.

3.2 *Optimisation of WWT, provision of management advice and delivery and installation of hardware/equipment/materials.* In the pilot municipalities, management advice will be provided on how to improve the process of WWT and how to obtain Green Drop status. In a number of cases the performance of the WWTPs is hindered by the inadequate functioning of the major mechanical equipment (e.g. without influent pumps or aeration equipment the wastewater cannot flow through the WWTP and cannot be treated biologically). The project team will first confirm whether all major equipment is functioning. Major equipment is defined as equipment that enables wastewater to flow (e.q. pumps, screens) and supports the main processes (e.g. surface aerators, trickling filter sprayers, bridges in clarifiers). The team will then confirm the status of the equipment in terms of maintenance levels. For example, fine screens that allow too much debris through might cause clogging of the sprayers of the biofilters. Once the status of the equipment has been confirmed the project team will investigate opportunities for optimising the process. It is necessary to obtain relevant process data for this. This implies that at some locations samples should be taken with proper functioning equipment and analyses will be carried out (in accordance with the standards). Based on the process data and the information on working hours and capacities of mechanical equipment it will be possible to review the processes and optimize the conditions. Local stakeholders will be involved throughout these stages as part of capacity building and training (see Section 2.2). Equipment/material/hardware will be purchased to optimise the WWTPs in the pilot municipalities. These will be prioritised and reflect budgetary provisions. Based on experiences in South Africa and information obtained during the preparation phase of the project, the project team envisages that the following equipment/material/hardware will have to be installed: online measuring equipment; aeration pumps; inlet pumps; sludge pumps; and equipment for sampling.

3.3 *Demonstration of Dutch WWT technology and management practices to a wide audience.* A press conference will be organised during the installation of hardware to promote Dutch approaches to processes, technology and management. After finalising the demonstration, a seminar will be organised for approx. 50-100 participants to present the results of the demonstration. Media representatives will be invited and written materials developed for distribution purposes.

3.4 *Development of Road Map for the process of optimisation of the WWTP's to reach Green Drop status and incorporation of road map in Green Drop Programme.* A Road Map will be drafted for the process of optimising WWTPs to reach the Green Drop status based on the outcomes of activities and lessons learned.

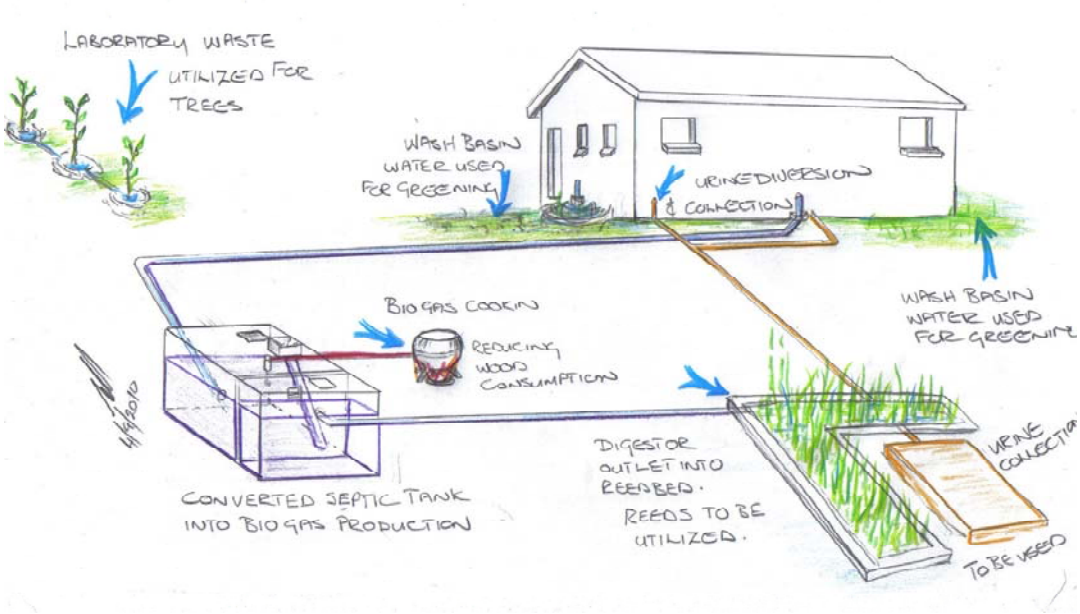
The purpose of the Road Map is to support the pilot municipalities and other WSA and LMs in South Africa to obtain and maintain Green Drop status. The Road Map will refer to Dutch approaches to processes, technology and management and as such, can also be seen as a means to strengthen market gains in South Africa by the consortium.

*Wastewater treatment plant in EDM*

**Result 4: Activities**

4.1 *Selection of location for the demonstration of the sanitation concept and assessment of local needs and constraints.* The most appropriate location in KNP will be selected to demonstrate the sustainable sanitation concept, as the demonstration in KNP needs to be representativeness of other rural areas.

*Illustration of a sustainable sanitation system:*




4.2 *Design and installation of sanitation system.* Based on the findings during Activity 4.1, an appropriate and effective sanitation system will be designed and installed at the selected location in KNP. During the design and installation of the sanitary system, the training programme will be carried out (see Activity 2.2). The following systems are envisaged:

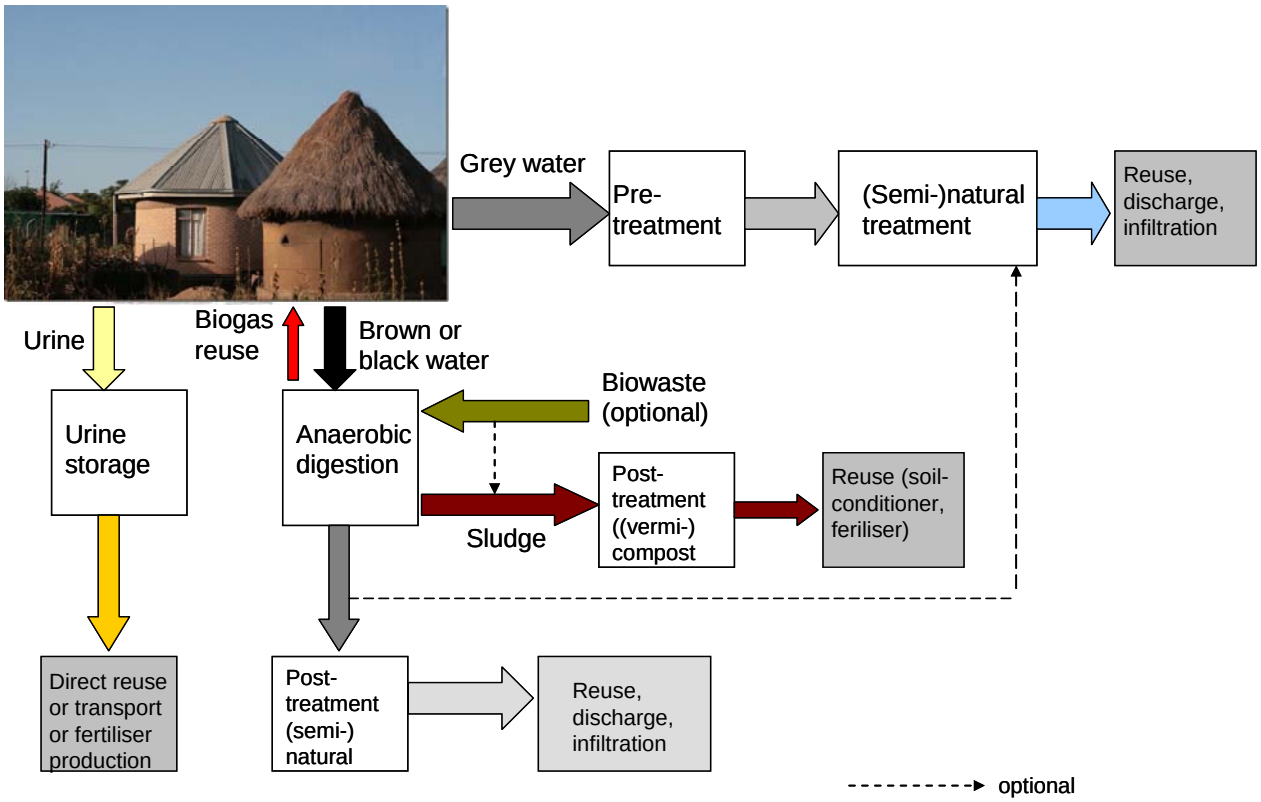
| Aspect | System components |
|---|---|
| Water conservation (minimisation of drinking water 'misuse' for flushing purposes) | • Urine diversion dry toilets (UDDT) and water free urinals where urine is collected water free, stored and reused, while faeces are dehydrated for further processing (composting) or direct reuse;<br>• Urine diversion water based toilet, where still a separation of both streams takes place but some water is used to guarantee the transport to treatment facilities. Urine is still collected with small amount of water, stored and reused or further processed. Faeces with low amount of flush water (brown water) are processed.<br>• Low flush toilet, where both waste streams are collected together with a minimal amount of water and further processed |
| Collection of organic, biodegradable waste | • As at visitors/rangers camps a significant volume of organic waste is expected to be generated, a separate collection is envisaged when the objective is the reuse of resources:<br>• A separate collection of organic waste (food leftovers from picnic space, restaurant, etc.) |

| | |
|---|---|
| Collection of grey water | • Grey water from hand wash basins, shower, kitchen will be collected separately from toilet waste and organic waste and separately treated |
| Collection of rain water | • Rain water could be infiltrated within/around the area of the camp. Rain water harvesting, treatment and reuse (flushing toilets, local irrigation) could be considered |
| Transport wastewater streams | • Various wastewater streams will be transported from the campsite to the treatment site. The distance will be short. Basically the visitors will be not directly confronted with the treatment system. On the other hand for the demonstration, tours, training an easy access and short distance should be ensured. This is also important for handling some streams, e.g. addition of organic waste to the treatment system and reuse options, to avoid long transport distances (safety as well). |
| Treatment of concentrated streams | • Urine after a sufficient storage time can be used as a safe fertiliser. The reuse opportunities should be recognized in the area. Depending on the location of the selected site (on the boarder of the park, close to a gate) transport and reuse in local agriculture (sugar cane) could be considered. Another option could be a local production of fertiliser (e.g. struvite) depending on the resources available. Too large storage on-site should be avoided as well as transport causing nuisances (smell) in the area).<br>• Dried feaces from UDDT are considered hygienic. They could be reused as a soil conditioner or further process with organic waste by composting or vermin-composting.<br>• Brown water from UDT or black water from low flush toilets due to its high organic matter content and concentration can be digested. Digestion treats the water to a high degree (around 80%) and leads to generation of biogas. To enhance biogas production organic waste (food, restaurant residues) can be co-digested if daily transport and feeding of this waste is well organized. Digested effluent (liquid form) does not have yet a satisfactory quality to be discharged to the environment; therefore it has to be post-treated. The semi-natural WWT systems (constructed wetlands, reed-beds can be considered as there is already a lot of experience with these systems in KNP). In anaerobic digester there is also sludge produced that has to be discharged, disposed of or reused. Drying of this well stabilised sludge or co-composting with organic waste are options. |
| Grey water | • Grey water is voluminous but relatively clean stream. After a simple pre-treatment to remove some larger particles and fat, it can be treated in semi-natural system such as above mentioned wetland system. Depending on the final destination of the effluent from the semi natural, co-treatment with the effluent from anaerobic digester can be included. As many camps in KNP are already equipped with these types of treatment systems, the existing infrastructure can be partially reused. |
| Potential reusable products | • Treated grey water: second quality water, irrigation water, infiltration (recharge aquifers);<br>• Urine: direct fertiliser or substrate to make fertiliser;<br>• Post-treated black water effluent: depending on quality infiltration, discharge;<br>• Anaerobic sludge, compost: soil conditioner, fertiliser;<br>• Biogas: cooking, lighting or electricity |

4.3 *Demonstration of Dutch sanitation solutions to a wide audience supported by visibility actions.*. A permanent publicity stand will be established in the visitor centre at the Skukuza camp of KNP. A press conference will be organised during the installation of the hardware to promote the Dutch sanitation concept to a wide audience. After finalising the demonstration project, a seminar will be organised for approx. 50-100 participants to present the results of the demonstration project. Media representatives will be invited and written materials developed for distribution purposes. The project will be presented during the WISA biannual conference in 2012 in Cape Town.

4.4 *Development of Business Model for marketing and distribution of sanitation solutions in rural areas.* The project team will, together with the relevant Working Group members skilled in business development, develop a Business Model for 'Making Business from Sanitation". The Business Model will be composed of: a description of the target group (households, municipalities, schools); a pricing strategy; a marketing plan; a distribution plan; and a financing plan, including a micro-finance component. The project team envisages the development of a **franchising concept**, in line with existing best practices in South Africa largely as a result of the work done by WISA, WRC and CSIR.

*Sustainable sanitation concept:*



# 4 Project Organisation and Finances

## 5.1 Description of project team members

**Corinne van Voorden (Ameco)**. Ms. van Voorden has over ten years of experience in sustainable development and international management. Ms. van Voorden holds a master degree in organisational sciences and an engineering degree in business management. She gained professional experience in both the business sector as with governmental organisations. In the private sector she held commercial key positions in non-food supplying and fair trade companies. As a consultant for an employers' association she advised a wide variety of companies on international trading. She has successfully implemented international projects on sustainable business development. Currently she is involved in the development and implementation of sustainable and environmental projects in emerging markets, especially in the field of water, renewable energy and environmental management. The projects are aimed at institutional strengthening of governmental and civil society organisations, the improvement of cooperation between the various stakeholders in the chain, and the embedding of environmental technological solutions in local societies. Her main assets concern intercultural managing and communication skills, supporting the successful implementation of international projects. Ms. van Voorden is a member of the Board of Umeme Jua, a company in Tanzania distributing solar panels for rural use.

**Nicky Bekker (Ameco)**. Mrs. Bekker BSc. (Honours) has a background in Environmental Management and Social Geography. Mrs. Bekker has gained project experience in southern African as well as a number of European and neighbouring countries through her work as advisor and technical assistant. She has over six years of working experience. In southern Africa (South Africa, Swaziland and Angola) her work focused mainly on integrated environmental management. She has undertaken environmental and social due diligences in The Netherlands, Belgium, Germany, Switzerland and Suriname. She is currently working on a number of international development-related projects, including improvements in wastewater management in small and medium-sized municipalities in Turkey, community involvement in local waste management in Georgia, sustainable introduction of hardware and technology for waste management in Georgia and cross-border cooperation between municipalities in Georgia and Armenia. Stakeholder participation, sustainable development and the implemention of pilot projects or local initiatives have been key elements in the above-mentioned projects.

**Keimpe Sinnema (WGS)**. Mr. Sinnema has over 30 years of working experience in the water sector. Mr. Sinnema holds a Master of Science in Environmental Science and Bachelor's degree in Land and Water Management. He also obtained a management degree for non-profit organizations and is a Certified Business Practitioner in the Art and Science of Neuro-Linguistic Programming. His key areas of expertise include water and sanitation, water management, institutional development and water governance and capacity building. In terms of work experience, Mr. Sinnema has operated as project leader in land and water projects for Rural Area Reconstruction projects, headed up technical department, acted as advisor for management and governing board, overseen the planning, design and maintenance of WWT, undertaken water quantity control, coordinated external affairs with local government, key institutions and organizations as part of foreign affairs and international projects. He has worked in Europe, Africa (including South Africa) and Asia.

**Barry Verduijn (DHV Group).** Mr. Verduijn holds a BSc. degree in Mechanical Engineering. Mr. Verduijn has over 13 years of work experience. At DHV, he is currently responsible for leading and coordinating a multi disciplinarian project team for the execution of primary Design-Built type projects in the drink-, waste- and industry water sector in The Netherlands and abroad. He has also coordinated the order process from technical specifications to contractual negotiations and supplier evaluation and been involved in studies to characterise and optimise WWT installations in terms of energy efficiency and operation management. He has worked in Europe, Africa (including South Africa) and Asia.

**Katarzyna Kujawa (LeAF)**. Mrs. Kujawa has a PhD based on her thesis: 'Estimation of denitrification potential using respiration based techniques'. Mrs. Kujawa also holds a Masters degree based on the 'Optimization of municipal wastewater treatment plant for nutrient removal, using the UCT activated sludge model'. She current lectures (part-time) at Wageningen University given her specialization in water, WWT and sanitation. The rest of her time is spent as project coordinator at LeAF, where she oversees projects on removal of micro-pollutants (pharmaceuticals) from concentrated wastewater streams and new sanitation concepts. She is an experienced researcher, having spent over 10 years examining 'new sanitation' and removal of micro-pollutants from concentrated wastewater streams. She has also worked as a wastewater engineer. Recent projects that she is involved in include New Sanitation in Westland (desk study); feasibility study for the implementation of new sanitation in Crimea, Ukraine; sanitation concept for Sincobile Secondary School, South Africa; feasibility study on the collection and treatment of human waste in informal settlements, Ghana; improvement of operation of pit/latrines in Africa and Asia (lab study); and course preparation on decentralized WWT and reuse in Accra, Ghana.

**Susan van Heerden (Neochem)**. Ms. van Heerden is a trained assessor (Unit Standard SAQA QAUL. ID7978 and Moderator SAQA QUAL. IDSOR204866) and accredited trainer in South Africa in the (waste)water sector. Ms. van Heerden has attended courses offered by the CSIR Microbiology Department, Centre for Continuing Education and Laboratory for Advanced Engineering of the University of Pretoria. Course material included the Water Act and water quality management in South Africa as well as WWTP Status Classification. She has been actively involved in the practical translation of the cooperation agreement between WGS and the ICMA. As a result, as gained considerable experience in liaising with Dutch and South African partners. Her key area of expertise is training and capacity building.

**Antonie Overbeek (Independent Expert)**. Mr. Overbeek is an independent expert who provides consulting and advice to various private companies and government institutions on improved (waste)water treatment technologies and utilization. He has a National Diploma in Water Care (Pretoria Technicon). He has considerable business experience in the design, procurement and installation of hardware for potable and WWT in South Africa and neighbouring countries, including Swaziland. In addition to consulting services, Mr. Overbeek also provides training and assists in the development of programmes to improve operations and maintenance of wastewater and sanitation systems. Mr. Overbeek is qualified to undertake microbiological analysis testing, chemical evaluations (e.g. water quality and chemical testing by various analytical methods) and water treatment process development (e.g. to remove specific contaminants in effluent).

**Rudi Louwrens (SSI of DHV Group)**. Mr. Louwrens holds a Masters Degree in Water Resources Management. He is a registered professional agricultural engineer. He is currently employed as a project manager in the Nelspruit office of SSI. He has extensive experience in working in the field and with various stakeholders, including national, district and local governments and private sector organisations in South Africa and further afield. His experience ranges from planning and management to research studies for water.

For Curricula Vitae of all project team members, see Annex 1(a).

### 5.1.1 Tasks and responsibilities

| Project team member | Tasks and responsibilities |
|---|---|
| Corinne van Voorden (Ameco) | • Project management and reporting<br>• Expert input in training on IWRM<br>• Development of Business Model for sanitation in rural areas<br>• Identification of spin-off activities and financing |
| Nicky Bekker (Ameco) | • Project co-ordination and assistance with reporting<br>• Development of training programme and material<br>• Expert input in training on management of WWT<br>• Organisation of promotion/demonstration activities during pilot activities<br>• Development of publication<br>• Organisation of study-tour to the Netherlands |
| Keimpe Sinnema (WGS) | • Chairing the Working Group<br>• Expert input in training on integrated water management, sanitation and WWT from the perspective of water board<br>• Expert input in development of Business Model for sanitation in rural areas from perspective of water board<br>• Networking with water authorities, compliance with activities of WISA etc.<br>• Identification of spin-off activities and financing |
| Barry Verduijn (DHV-Group) | • Procurement of equipment/material/hardware for WWT and sanitation<br>• Supervising installation works of WWT hardware and construction of sanitation system<br>• Expert input in training on WWT (technical/technological issues)<br>• Input in development of the Business Model for sanitation in rural areas<br>• Identification of spin-off activities and financing |
| Katarzyna Kujawa (LeAF) | • Expert input in training on sanitation in rural areas<br>• Input in development of the Business Model for sanitation in rural areas<br>• Enhancing cooperation with education and research institutes in South Africa<br>• Identification of spin-off activities and financing |
| Susan van Heerden (Neochem) | • Local project coordination<br>• Organisation/facilitation of trainings (logistics, translation)<br>• Expert input on improving WWT according to Green Drop Programme<br>• Coordination of installation of WWT hardware<br>• Assistance in development of Business Model for “Making Business from sanitation” for sanitation in rural areas<br>• Identification of spin-off activities and financing |
| Antonie Overbeek (Independent Expert) | • Construction of sanitation systems<br>• Assistance in development of Business Model for sanitation in rural areas<br>• Identification of spin-off activities and financing |
| Rudi Louwrens (SSI, DHV Group) | • Assistance in procurement of equipment/material/hardware for WWT and sanitation<br>• Installation of hardware/material for improved WWT<br>• Expert input in development of Business Model for sanitation in rural areas<br>• Representation of Dutch business interests<br>• Identification of spin-off activities and financing |

For specification of tasks, please refer to the staff deployment scheme in Annex 1(b).

## 5.2 Project budget

For the detailed project budget, see Annex 2. Please note that local personnel in EDM will put resources (human and equipment) at the disposal of the project team during the implementation of the project and particularly during the demonstrations.

## 5.3 Time frame and staff deployment

For an overview of activities in time and a staff deployment scheme, see Annex 1(b).

## 5.4 Assumptions, preconditions, sustainability

For the successful implementation of the project, the following two main assumptions and preconditions have been made: 1) governmental bodies are willing to cooperate and invest sufficient time and capacity; and 2) sufficient resources (human and equipment) are made available for improvements in WWTPs and sanitation systems.

In terms of the sustainability of the project, the project team will ensure that the following activities are undertaken during the implementation of the project:

- A Working Group will be established with representatives of all stakeholders for reasons of transparency and to encourage ownership and commitment towards improving water quality. The Working Group is representative of parties, governmental and non-governmental interested and/or affected by WWTP and sanitation. The Working Group will be involved in all activities and as a result, will become a centre of knowledge and expertise following project completion.
- A Road Map will be developed to assist WSA to optimise the operation and maintenance of WWTPs and obtain Green Drop certification; the Road Map will be incorporated in the Green Drop Programme. Criteria from the Green Drop Programme relate to the water regulation. Green Drop certification means compliance with the water regulation and as such sustainability.
- A Business Model for sanitation in rural areas will be developed, to make sure the sanitation concept can be disseminated to other target groups; the capacity of SSI will be enhanced for representation of the project team and for implementation of the Business Model.
- Technical training will be provided, in terms of formal training and on-the-job skills development, supported by practical material that meets the need of the target group
- Sufficient attention will be given to information dissemination to increase awareness and generate interest in opportunities (commercial and non-commercial) for improving water quality through WWT and sanitation. Various communication tools will be used

(on the job training, workshop, seminar, leaflet, press releases and PR activities) to ensure maximum exposure and support the transfer of knowledge and experiences.

- Regular feedback and evaluation following trainings, workshops, demonstrations and seminars to identify potential issues on time and respond timeously and in a responsible manner.
- The goals for improving sanitation are part of the Water Management Plan of the target region.

# 5 Spin-off

## 6.1 Expected spin-offs

The following spin-offs apply to the consortium, Dutch and South African private sector organisations, Dutch and South African governmental bodies and Dutch and South African education and research institutes. They refer primarily to short and middle term benefits.

### 6.1.1 Environmental and social spin-offs

The following environmental and social spin-offs are anticipated:

- Short and long-term ecological benefits, both in the immediate Crocodile sub-catchment area (e.g. KNP)and in neighbouring catchments, including improved water quality through reduced contamination from rural and urban sources.
- Improved resource (re)use in terms of nutrients, energy and water.
- Reduced health and safety risks from waterborne diseases, which support targets set by the EDM's WASH and awareness campaign to improve health practices.
- Local materials and labour will be used during the implementation of the project, which will reduce amongst other the environmental impact of transportation of materials and human resources from areas outside the project area.
- The proposed activities and anticipated results will be carried out within the framework of internationally good practice regarding IWRM, which supports broad stakeholder involvement and transparent decision making process.

### 6.1.2 Economic spin-offs

This project is needed to demonstrate the benefits (commercial and non-commercial) of integrated approaches to improving water quality through reduced contamination and improved resource (re)use in terms of nutrients, energy and water. The structure of the consortium and representation of Dutch interests in South Africa through partner organisations support the realisation of increased market opportunities. The Business Model for "Making Business from Sanitation" based on local franchising concepts will further support the marketing and distribution of sanitation solutions in rural areas. In the optimisation of WWT, the consortium anticipates a definite need for 'after-sales' support including ongoing training to maintain skills levels and Green Drop status. Market entry has been given a strategic role in the project.

The following (additional) economic spin-offs are anticipated:

- Following completion, it is expected that the EDM and WSA will invest in sustainable sanitation solutions to increase the level and quality of services in the region in the short to middle-term. It is also expected that WSA in close cooperation with WWTPs managers and operators will be in a better position to support the process of Green Drop certification, given the financial implications of non-compliance (i.e. penalties and fines).
- Access to national funds, such as the Municipal Infrastructure Grant (MIG), National Treasury and municipal infrastructure refurbishment for supporting (ongoing) improvements in WWT and sanitation
- Cooperation with WISA and "Water for All" Flagship Programme from Mpumalanga.
- International and national financing organisations have expressed an interest in supporting activities, particularly the Business Model based on franchising concepts.
- Business generated through three different service level technical options: 1) responding to new consumer units as a result of natural population increase or migration to the area (generic growth). The Level of Service (LoS) to be provided will depend on the ability of the consumers to pay for the LoS rendered as well as to the existence of adequate systems; 2) addressing current backlogs where infrastructure and service provision is inadequate; and 3) upgrading of existing infrastructure and services to consumers who are willing to pay for a higher LoS for upgrading.
- New 'customers' for adopting sustainable sanitation systems include: residential consumer units [urban, rural (dense), rural (village), rural (scattered) and rural (farmland)], public institutions and "Dry" industries such as hospitals, schools, mills, etc. and customers outside the project area and South Africa.
- Cooperating with Bushbuckridge LM (as a municipality and WSA) to increase its level and quality of WWT and sanitation services. Bushbuckridge LM has been classified as an Integrated Sustainable Rural Development Programme (ISRDP) Node, which means it has been prioritised for special development incentives and funding from National Government.
- Assisting WSA to optimise their WWTPs to achieve Green Drop status through responsible, well-planned and properly budgeted hardware procurement, installation, operation and maintenance. Obtaining funding from national government for capital expenditure is considered part of this process.
- Stimulating LED initiatives through the further-roll out of the Business model for "Making Business from Sanitation" based on local franchising concepts and maximising the advantages of the location of EDM and KNP in particular.
- The demand for local (raw) materials and labour is expected to increase in response to new customers. LED and social upliftment is expected to increase as a result.
- Project activities will contribute to creating a financial sound organization for urban WWT and rural sanitation.

# 6 Annexes

- Curricula vitae for all project team members — Annex 1(a)
- Time frame and staff deployment — Annex 1(b)
- Project budget — Annex 2
- Project references — Annex 7