

TERMS OF REFERENCE FOR A SOLICITED WRC RESEARCH PROJECT

KEY STRATEGIC AREA	DST Innovation Partnership for Rural Development Programme
THRUST	N/A
PROGRAMME	N/A
TITLE	The Implementation of the Integrated Algal Pond System at Barberton, Mbombela Municipality

Objectives

General

This research study is divided into two phases. Phase one aims to investigate the feasibility for biogas recovery, water and biomass reuse potential in support of community gardens post implementation of a demonstration Integrated Algal Pond Systems (IAPS). The feasibility study outcomes will inform any required skills transfer activities in support of operations and maintenance of IAPS within South African municipalities. The second phase focuses on the construction of an IAPS demonstration plant at the Barberton wastewater treatment works (WWTW) as part of the Department of Science and Technology (DST) funded Innovation Partnership for Rural Development Programme (IPRDP). The IAPS demonstration plant is designed to complement the existing Barberton WWTW in terms of the mandatory operational permits and licenses required by the Government Regulations and will be implemented using currently available approved designs.

The IPRDP is an initiative of the DST) which through the Water Research Commission (WRC) aims at supplying value addition to targeted municipalities in response to prioritized needs. The programme targets selected districts and provides technology demonstrators to address diverse and extensive needs for social and economic infrastructure within the targeted municipalities. In addition, technology selection and implementation complement a set of knowledge, learning, and communication interventions that support capacity building for technology and innovation management. It is against this background that Mbombela Local Municipality responded to the IPRDP call put out by the DST and expressed an interest to host the IAPS demonstration in support of improved wastewater effluent quality and downstream volarization. In this regard, a feasibility study for biogas recovery, water and biomass reuse potential (including mapping and documentation of the required skills transfer activities in support of operations and maintenance of IAPS) followed by an IAPS demonstration are proposed at the Mbombela Local Municipality's Barberton wastewater treatment works (WWTW).

The Barberton WWTW is a biological nutrient removal (BNR) system with a capacity in excess of 8 ML/day. The current WWTW consists of an inlet, two trains of BNR (anaerobic tank, 2x aerobic tanks, 2x clarifiers, final contact channel, and sludge dam) split 60:40 v/v. Chlorination and maturation ponds are present and used when treated effluent is discharged. Only the 40% capacity train is operational at present and 100% of wastewater is treated by this component. This coupled with the energy demand and technical intensity of the present WWTW along with a need to provide sanitation infrastructure to remote villages within the municipality prompted Mbombela Local Municipality to address these challenges through the IAPS demonstration approach.

Specific

The specific objectives are:

1. To conduct a feasibility study for biogas recovery, water and biomass reuse potential in support of community gardens post IAPS demonstration
2. To map and document the required skills transfer and capacity building for IAPS operation and maintenance
3. To construct and implement a 0.75 ML/d IAPS demonstration plant at Barberton wastewater treatment works using available approved designs that include the necessary Water Use License and Environmental Impact Assessment clearances
4. To undertake all the project management of different civil and construction work.
5. To optimize, commission and demonstrate IAPS operation in support of technology promotion
6. Technology transfer and capacity building of Municipality to operate and maintain the system.

The specific requirements are:

1. Registration with Engineering Council of South Africa and currently active
2. Knowledgeable about biological systems for wastewater management
3. Experience in biological effluent treatment systems with available examples of projects already implemented
4. Knowledge in designing of wastewater treatment and conveyance systems
5. Possession of relevant insurance and indemnity cover
6. Experience and demonstration in execution of similar type projects
7. Construction of demo plant complies with all codes and standards as per construction and building regulations.

Deliverables

The following deliverables will be expected:

1. Progress report on feasibility of biogas recovery, water and biomass reuse potential post IAPS demonstration
2. Progress report on mapped and documented required skills transfer and capacity building for IAPS operation and maintenance
3. Progress Report on constructed IAPS demonstration plant including biogas recovery systems
4. Progress report on the optimization, commissioning and demonstration of the implemented IAPS
5. Operation and Maintenance manual
6. All built drawings and transfer of assets documentation to Municipality
7. Final Print Ready Report incorporating progress reports 1 – 6

Impact Area:

Environmental, Social, Health and Economy

Time Frame:

Eighteen months (18) months

Budget estimate:

Phase one (R 2 500 000):

Feasibility study, skills transfer mapping and documentation - 6 months

Phase two (R 10 000 000)

0.75 ML/d IAPS plant construction, optimization, commissioning and demonstration - 12 months

NB:

- Design drawings can be acquired from Dr John Ngoni Zvimba; Tel 012 761 9300; email: johnz@wrc.org.za; or Mr. Bennie Mokgonyana; Tel: 012 761 9300; email: benniem@wrc.org.za; Charmaine Khanyile; Tel: 012 761 9300; email: charmained@wrc.org.za
- The WRC reserves the right to continue or terminate this initiative at any point.