The Republic of Uganda
Ministry of Water and Environment

Assessment of Groundwater Investigations and Borehole Drilling Capacity in Uganda

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Executive Summary

The objective of the study is to assess the groundwater investigation, drilling and supervision capacity in Uganda, both in term of available equipment as well as in technical staff capacity and to recommend measures to enhance this capacity both in terms of quality of works as well as in terms of cost efficiency. This was done through desk studies and key interviews with stakeholders, and also the preparation, distribution and analysis of questionnaires to all stakeholders in the sector, comprising of drilling companies, individual consultants and consultancy companies in geophysical siting, drilling supervision and contract management, including also follow up meetings to drilling companies. The collected information was discussed in a workshop with sector actors.

The report describes the legislative and institutional framework of the sector. DWRM regulates the water drilling in Uganda. The Directorate licenses the drilling contractors and issues permits for drilling and water abstraction, and collects data for the national groundwater database. Every year, between 1,000 and 1,500 boreholes are drilled in Uganda. Currently applied siting as well as drilling contract formats are mostly no-water-no-pay contracts rather than BoQ contracts, which ultimately leads to lesser quality boreholes. Borehole drilling contracts by District Local Governments, constituting the largest fraction are procured after prequalification, whereas other actors also apply selected bidding or open bidding. The Sector Investment Plan (SIP) has studied various targeted service levels (access to safe water) based on selected combinations of water supply options. Combining the SIP information, current borehole costs and combined GoU / NGO funding capacity, it follows that there will be an increasing funding gap for borehole drilling.

The questionnaires, interviews and workshop revealed the following:

1. The current implementation environment for borehole drilling in Uganda is not conducive for a cost efficient and cost effective implementation of borehole drilling projects nor for a sustainable development of the sector.
2. The prices for boreholes depend on the costs for boreholes made by the drillers. Lower prices can only be attained if drillers can drill more boreholes per rig and/or per year.
3. Quality of works can only be ensured by a regulated environment where qualified and professional consultants, drillers and implementing agency staff work hand in hand aiming at high quality end products.
4. The major problems in the sector are the decentralized and fragmented implementation of water projects with very narrow implementation windows, the unfavourable tax environment and the lack of regulation.
5. Government, NGO and private sector staff now commonly demand commissions from drilling contractors as well as consultants, which is a real danger for sustainable development of the water sector.
6. The technical capacity of drillers and consultants is sufficient to implement standard rural water supply projects. Larger projects, and more complicated town water supplies involving different siting approaches, larger size drilling and greater logistical challenges can only implemented by few contractors and consultants.

The government should regulate and support the sector more vigorously, as follows:

1. License consultancy companies and groundwater professionals
2. Design standard technical protocols for drilling projects and hydrogeological investigations
3. Set up a performance monitoring system for contractors and consultants including regular field audits of work done by drillers and consultants
4. Improve compliance and enforcement of water laws, permits and licensing conditions for the various stakeholders (drillers, groundwater professionals, districts, NGOs, etc) like:
    a. Closer monitoring of District tender awards and issued contract types
    b. Closer monitoring of NGOs and enforce implementation procedures according to standard documents

c. Link license extensions of drillers and groundwater professional to performance

5. Improve protocols for tender procedures including introduction of engineer's estimates, standard tender documents to be used by all actors in sector (NGOs, Districts, Central government, multi-lateral and bi-lateral funded projects)
6. Review the implementation framework for drilling projects considering multi-year projects and more favorable payment schedules
7. Review taxation framework for the sector
8. Facilitate access to credit for drillers and consultants
9. Set up training programmes for drillers and groundwater professionals to improve their capacities (collaborate with private sector) as well as setting up specialized technical schools and courses

The drillers and groundwater consultants should revitalize or start their association to enable a more vigorous lobbying for their interests when working on a professional development of the sector.

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List of Abbreviations *(S.I Units throughout, unless indicated otherwise)*

BH	Borehole
BoQ	bill of quantities
B.Sc.	Bachelor of Science
CBO	Community Based Organisation
DDMC	District Disaster Management Committee
DSM	Department of Surveys and Mapping
DLG	District Local Government
DTB	drilled depth to bedrock
DTH	Down-The-Hole
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
DWSCG	District Water and Sanitation Conditional Grant
GoU	Government of Uganda
IDM	Inter-District Meeting
IDP	Internally Displaced People
km	kilometre
LG	Local Government
LS	Lump Sum
m	metre
m^3	cubic metre
MIS	Management Information System
M.Sc.	Master of Science
MoH	Ministry of Health
MWE	Ministry of Water and Environment
NDP	National Development Plan
NGWDB	National Groundwater Database
NWSC	National Water and Sewerage Corporation
O&M	Operation and maintenance
OP-5	Rural Water and Sanitation Sector 5-year Operational Plan
OPM	Office of the Prime Minister
PRDP	Poverty Eradication Action Plan
Q	discharge (m^3/hr)
RDD	recommended drilling depth
RGC	Rural Growth Center
RWSN	Rural Water Supply Network
RW(SS)D	Rural Water (Supply and Sanitation) Department
SPR	Sector Performance Report
SIP	Sector Investment Plan
SWL	static water level

TC	Trading center
TSU	Technical Support Unit
UTM	Universal Transverse Mercator
TOR; ToR	Terms of Reference
UGX	Ugandan Shillings
URA	Uganda Revenue Authority
VES	Vertical Electrical Sounding
WE	Water, Environment and Geo Services
WSC	Water Source Committee
WSL	water strike level
WSDF	Water Supply Development Facility
WUC	Water User Committee
WUG	Water User Group

1 INTRODUCTION

1.1 Background information

Privatisation of water borehole drilling services in Uganda started in the mid 1990s, following Government of Uganda (GoU)'s adoption of a policy on private sector delivery of main public services. Private sector based borehole drilling thrived in the late 1990s under the different sector projects, and the capacity grew, peaking at more than 2,000 deep boreholes per year at the end of the millennium. Since the closure of projects and movement to the decentralized approach through districts starting 2001, the drilling capacity appears to have significantly reduced. Many drilling companies appear to have closed down or moved to other countries due to various factors.

During the annual sector reviews stakeholders increasingly mention the decreasing quality and increasing costs of borehole drilling projects in Uganda.

The question is whether this negative trend can be related to the technical and managerial capacity of the drillers, hydrogeologists, District Local Governments, and Central Government, and/or can whether it can be related to the various aspects of the currently used implementation processes (tenders processes, contract types and size, etc).

1.2 Objective and expected results

This study was initiated with the overall aim to investigate the reported reduction in drilling capacity, analyse the factors that may play a role, and come up with suggested mitigation measures.

The objective of the study is to assess the groundwater investigation, drilling and supervision capacity in Uganda, both in term of available equipment as well as in technical staff capacity and to recommend measures to enhance this capacity both in terms of quality of works as well as in terms of cost efficiency (number of boreholes drilled with the available budgets).

The specific tasks to be carried out to reach this objective are:

1. review available literature on borehole drilling in Uganda and in Africa
2. develop a data collection tool, collect and verify the obtained data through visits to drillers and consultants
3. consult key stakeholders in the sector (government departments at national and district level, NGOs, UNICEF) to obtain their opinions on the capacity, their inputs in the assessment and recommendations for the improvement
4. prepare a draft assessment report
5. disseminate the obtained findings in scheduled sector meetings or through a ½ day workshop
6. prepare a final assessment report.

During the project it was decided that the initial results would be discussed during a 1 day workshop for drillers and consultants. Information collected during this workshop would be incorporated in the draft final report. This report would be reviewed then by MWE after which a final report would be prepared and presented during a 0.5 day workshop.

1.3 Layout of the report

In Chapter 2 the assessment methodology will be discussed while in Chapter 3 a situation analysis is given of the water well drilling sector in Uganda describing stakeholders, legislation, implementation cycles, tendering processes, borehole siting, drillers and consultant organisation. Chapter 4 deals with the findings of the questionnaires, meetings and workshop, and Chapters 5 and 6 give the conclusions and recommendations based on the findings.

2 ASSESSMENT METHODOLOGY

2.1 Introduction

The ToR of the assessment study comprises the following phases (between brackets the allocated time input of the Sr. Consultant /Jr. Consultant)

1. inception meetings with DWD, WRMD and UNICEF (1 / 0 day)
2. desk study (4 / 0 days) week)
3. preparation of questionnaires (5 / 0 days)
4. stakeholder consultations, field visits and meetings (10 / 15 days)
5. analysis (5 / 5 days)
6. reporting (5 / 0 days)

During the meetings of the Steering Committee it was decided to change the project set up slightly. A detailed description of these activities is given below.

2.2 Inception meetings

Inception meetings were held with the relevant staff of the Directorate of Water Development (DWD) and Directorate of Water Resources Management (DWRM). During the joint meeting with the MoWE and UNICEF a steering committee was set up. The members would assist in reviewing the questionnaires before they were sent to the target audience as well as the draft report / presentation.

2.3 Desk study

During the desk study all available information on borehole drilling in Africa in general and Uganda in particular was studied. This information comprised studying databases (DWRM and drilling companies), internet sites and reports provided by DWD, WRMD, RWSN and UNICEF. The obtained information was analysed and used to describe the status of the water well drilling sector in Uganda (see Chapter 3).

2.4 Stakeholder consultations

During the inception phase, the Consultant in collaboration with the Client identified a number of stakeholders, and set up meetings with each of the stakeholders to obtain first hand information on their experiences in all aspects of the implementation of drilling and siting projects. Some of the stakeholders received a questionnaire in advance. These questionnaires were discussed or filled during the meetings. The following categories of stakeholders may be listed:

1. Ministry of Water and Environment – Directorate of Water Resources Management and Directorate of Water Development
2. District staff
3. TSU staff
4. NGOs
5. Consultants
6. Drillers
7. Communities (on implementation procedure, maintenance, etc.)

2.5 Development of questionnaires

Five different questionnaires were developed, each targeting a category of stakeholders. The Consultant sent out the questionnaires for drillers, consultants, consultancy companies and implementing agencies by email, whereas the community questionnaires were filled during interviews with them. The questionnaires can be found in Annex 1.

2.5.1 Questionnaire for capacity assessment drillers

The questionnaire design is such that information is collected on the capacity of the driller in terms of technical knowledge, financial management as well as operational management capacity. The questionnaire layout is according to Table 1 where the various sections of the questionnaire are indicated as well as the type of data collected and the purpose of the data collection.

The questionnaire covers 21 pages and it is estimated that the time to fill this questionnaire is about 1-1.5 man-day depending on the capacity of the person filling the form and the amount of information to be entered (depending on the size of the company and annual work load). Most of the information should be readily available by the drillers as it covers information that is also required in technical proposals that the companies have to submit for government tenders.

Table 1. Questionnaire for drillers

No.	Section	Information	Purpose
1	Company information – Establishment	Addresses, contacts, permits, directors profession and nationality	Contacts and years of existences, nationality of directors
2	Company information - Financial	Share capital, Turnover, access to credit	Financial capacity and performance, availability of financial resources
3	Operational aspects and type of projects	Turnover per country, client, activity turnover per client, turnover per ca	Area of operation, dependency on drilling work
4	Staff	Type and number of staff, education, salaries and allowances	What is human resources capacity, costs for human resources
5	Equipment	Summary of numbers of items and details of equipment	What is technical capacity in terms of equipment
6	From costs of materials and suppliers to selling rates	Cost of items for drilling and selling rates	Overview of the actual direct costs of materials
7	Contract type	Contracts being used and opinion of drillers	Overview of most commonly used contracts and opinion of drillers
8	Borehole siting	Ownerships of geophysical equipment	In house capacity for borehole siting
9	Data management and project analysis	Technical and financial data processing habits and details on difficult project areas	Capacity to process data (financial and technical) and difficult areas of operation
10	Projects and volume of work of the company	Volume of work done in last 10 years	Where is drilling company operating and how much work is achieved
11	Constraints, opportunities and the future	Constraints, suggestions for improvement , expansion plan	Get drillers opinion about the future of the drilling sector and their plans to invest in sector

2.5.2 Questionnaire for capacity assessment of consultancy companies

The questionnaire aimed at collecting information on the capacity of the consultancy company both from a technical, financial and managerial point of view. The questionnaire was designed according to Table 2 where the various sections of the questionnaire are indicated as well as the type of data collected and the purpose of the data collection. In view of the fact that MWE plans to initiate a consultants and consultancy company licensing system in the near future, the groundwater consultant in collaboration with the client decided to also collect information in the questionnaire that could be used in that project. Not all of the captured information will therefore be analysed as part of the current project.

The questionnaire covered 16 pages and it was estimated that the time to fill this questionnaire was about 0.5-1 man-day. Most of the information was expected to be readily available by the consultants because it covers information that is also normally required in technical proposals that the companies have to submit for government tenders.

Table 2. Questionnaire for consultancy companies

No.	Section	Information	Purpose
1	Company information – Establishment	Addresses, contacts, permits, directors profession and nationality	Contacts and years of existences, nationality of directors
2	Company information – Financial	Share capital, Turnover, access to credit	Financial capacity and performance, availability of financial resources
3	Operational aspects and type of projects	Turnover per country, client, activity turnover per client, turnover per ca	Area of operation, dependency on drilling work
4	Staff	Type and number of staff, education, salaries and allowances	What is human resources capacity, costs for human resources
5	Equipment	Summary of numbers of items and details of equipment	What is technical capacity in terms of equipment
6	From costs of services to selling rates	Cost of siting and drilling supervision and selling rates	Overview of the actual direct costs
7	Contract type	Contracts being used and opinion of drillers	Overview of most commonly used contracts and opinion of consultants
8	Hydrogeological Surveys	Ownership of geophysical equipment	In house capacity for borehole siting
9	Data management and project analysis	Technical and financial data processing habits and details on difficult project areas	Capacity to process data (financial and technical) and difficult areas of operation
10	Projects and volume of work of the company	Volume of work done in last 10 years	Where is consultancy company operating and how much is achieved
11	Constraints, opportunities and the future	Constraints, suggestions for improvement , expansion plan	Get consultant's opinion about the future of the drilling sector and their plans to invest in sector

2.5.3 Questionnaire for groundwater professionals

The questionnaire aimed at collecting information on the general data, educational capacity and experience of the groundwater professionals in Uganda. It also addressed the current employment status of the professionals and provides an idea on the number of groundwater professionals available for borehole siting and drilling supervision in Uganda.

Table 3. Questionnaire for groundwater professionals

No.	Section	Information	Purpose
1.	Consultant personal data	Address, contacts, education, employers	Contacts and educational level
2.	Equipment and methodology for siting	Equipment used, costs and methodology	Equipment and methodology commonly used in siting
3.	Financial information	Fees for siting services	General market rates
4.	Contract types	Contracts being used	General contracts being used and preferred contracts
5.	Detailed experience	Years worked for which company and how many boreholes sited and supervised	Assessment of experience
6.	Constraints, opportunities and the future	Constraints and solutions	Opinion of professional on constraints in sector

2.5.4 Questionnaire for implementing agencies

The questionnaire for the implementing agencies was designed according to the sections given in Table 4. The collected information enabled a proper assessment of the technical capacity of the implementing agency as well as yield some information on the performance of the various consultants and drillers during contracts executed for the implementing agencies.

Table 4. Questionnaire for implementing agencies

No.	Section	Information	Purpose
1.	Implementing agency information	Address and type of organisation	Contacts and type of organisation
2.	Village identification and contract types	Village identification procedures, contracts being used	Assessment of procedures for implementation
3.	Evaluation consultants	Scoring table for performance consultants	Assessment of performance of consultants
4.	Evaluation drillers	Scoring table for performance drillers	Assessment of performance drillers
5.	Capacity of implementing agency	Education coordinators, size of water budget, constraints for organisation	What is the capacity financial and technical of organisation to implement / supervise water projects
6.	Constraints, opportunities and the future	Constraints and solutions	Opinion of implementers on constraints in sector

2.5.5 Questionnaire for communities

A short questionnaire was developed to assess the role of communities in borehole site investigations and drilling supervision. The questionnaire for the communities implementing agencies was designed according to the sections given in Table 5.

Table 5. Questionnaire for communities

No.	Section
1.	Community information
2.	Person interviewed
3.	General assessment of knowledeg of community on source and opinion about consultant, driller and DWO
4.	Assessment of role community in siting and supervision
5.	Opinion of person on improvement in water source implementation process.

2.6 Analysis of information

The questionnaires were transferred by data entry and by data copying to an MS Excel database. A detailed analysis was subsequently made. The results of the stakeholder meetings were incorporated in the conclusions and recommendation of the report. A one day workshop was organised for consultants and drillers during which DWD and WRMD were able to present their ideas for planned activities in the sector. The Consultant presented the preliminary results of the study. These presentations led to constructive discussions between drillers/consultants and MWE. The additional information collected during the workshop has been incorporated in the final report.

2.7 Reporting and dissemination workshops

The final report has been prepared based on the outcome of the questionnaires and meetings of stakeholders, and discussions held during a pre-dissemination workshop and the dissemination workshopt

3 GENERAL OVERVIEW OF THE SITING AND DRILLING SECTOR IN UGANDA

3.1 Introduction

This Chapter provides a general overview of the water sector in Uganda and more specifically the water well drilling and siting sector. These overviews have been given in numerous documents and only a summary is given in this report. The legal, policy and institutional frameworks of the sector are described in the District Implementation Manual (MWE, 2007) and the Water Sector Guidelines 2009-2010 (MWE, 2009). Most of the text in Sections 3.2 to 3.4 has been taken from these documents.

3.2 Legal, Policy and institutional framework

The implementation of water and sanitation activities in Uganda takes place within a set legal, policy, and institutional framework.

The **legal framework** outlines the rights and responsibilities of different stakeholders and gives a legal basis for water resources management and regulation.

The **policies** provide the principles of action to be followed in the implementation. They provide the rules of practice and give direction to the activities in the sector.

The **institutional framework** details the roles and responsibilities of key sector players.

3.2.1 Legal Framework

3.2.1.1 Constitution

The Constitution of the Republic of Uganda (1995) sets down the State's objectives, provides the framework for decentralisation, and overall principles of State policy. The constitution states that the state shall promote sustainable for development and public awareness of the need to manage land, air and water in a balanced and sustainable matter for the present and future generations. It also states that every Ugandan has the right to a clean and healthy environment, while expecting citizens to play their part in creating this.

The Constitution of the Republic of Uganda (1995) and Land Act (1998) set out the various land tenure systems in Uganda. All land is vested in the citizens of Uganda to be owned in accordance with customary, freehold, mailo and leasehold tenure systems. This means that both Government and private owners of land can set up facilities on land they occupy and own. Land tenure issues are critical to the development of water infrastructure. Any location of a water supply project must respect the proprietary rights of the landowner or occupier as protected by the Constitution (1995) and the Land Act (1998).

3.2.1.2 Water Statute

The Water Act, 1997 provides the framework "...for the use, protection and management of water resources and supply; to provide for the constitution of water and sewerage authorities and to facilitate the devolution of water supply and sewerage undertakings". The main objectives set out in the statute are to:

1. promote the rational management and use of the waters of Uganda by:
    a. progressive introduction and application of appropriate standards and techniques for the investigation, use, control, protection, management and administration of water resources;
    b. co-ordination of all public and private activities which may influence the quality, quantity, distribution, use or management of water resources;

c. co-ordination, allocation and delegation of responsibilities among Ministers and public authorities for the investigation, use, control, protection, management or administration of water resources;

2. promote the provision of a clean, safe and sufficient supply of water for domestic purposes to all persons;
3. allow for the orderly development and use of water resources for purposes other than domestic use, such as the watering of stock, irrigation and agriculture, industrial, commercial and mining uses, energy, navigation, fishing, preservation of flora and fauna and recreation in ways which minimizes harmful effects to the environment;
4. control pollution and to promote the safe storage treatment, discharge and disposal of waste which may pollute water or otherwise harm the environment and human health.

3.2.1.3 The Local Governments Act

The Local Governments Act (1997) specifies functions and services for central government, district councils, urban councils and those to be devolved by the district council to lower government councils. This is in conformity with the constitution of the Republic of Uganda. It builds on the Decentralisation Act (1995).

3.2.1.4 National Environment Statute

The National Environment Statute (1995) builds on the National Environment Policy. The statute was formulated with the objective: "... *to provide for sustainable management of the environment; to establish an Authority as a coordinating, monitoring and supervisory body...".* As lead agency in the water sector, the Ministry of Water and Environment has a shared responsibility with the National Environmental Management Authority (NEMA) for: water quality standards, standards for discharge of effluent into water, limits on the uses of lakes and rivers, management of riverbanks and lake shores, restriction on the use of wetlands, management of wetlands.

3.2.1.5 Public Health Act

The Public Health Act (1964), Cap 269 aims to consolidate the law regarding the preservation of public health. It sets down out the framework for regulation of the pollution of the environment to detrimental limits which can be risky to the health of the population of Uganda.

3.2.1.6 Water Resources Regulations and Waste Water Discharge Regulation

The Water Resources Regulations (1998) and Waste Water Discharge Regulation (1998) prescribe the thresholds and procedures for applications to construct any works, use water or discharge waste under the Water Statute 1995.

3.2.1.7 Public Finance and Accountability Act

The Public Finance and Accountability Act (2003) provides for the development of an economic and fiscal policy framework for Uganda; to regulate the financial and management of the government; to prescribe the responsibility of persons entrusted with financial management in the government; to provide for the audit of government state enterprises and other authorities of the state; and to provide for other connected matters.

3.2.1.8 Public Procurement and Disposal of Public Assets Act and Regulations

The Public Procurement and Disposal of Public Assets Act (2003) provides the legal basis for procurement and disposal of public assets in Uganda. This Act led to the establishment of the Public Procurement and Disposal of Public Assets Authority (PPDA). The Act defines the procuring and disposing entities, which comprise: an accounting officer, contracts committees, a procurement and disposal unit, a User department and an evaluation committee. Procedures for disagreements between the different entities are set out in the Act. The Public Procurement and Disposal of Public Assets Regulations (2003) set outs the framework in which the Public Procurement and Disposal of Public Assets (PPDA) Authority operates. It focuses on central Government. The Local Governments (Public Procurement and Disposal of Public Assets) Regulations (2006) set out the rules and procedures to be followed by District local Governments (DLG) for procurement and contract

management. This includes details on procurement methods, operations of the contracts committee and contract management procedures.

3.2.2 Sector Policy Framework

3.2.2.1 Poverty Eradication Action Plan (PEAP)

Poverty eradication remains the central objective of the Government of Uganda. The Poverty Eradication Action Plan (PEAP) provides an over-arching framework to guide public action to eradicate poverty. The PEAP, first published in 1997 and revised in 2000 and 2004 has adopted a multi-sectoral approach and recognises the multi-dimensional nature of poverty. Water and sanitation sector programmes addresses the PEAP objectives. In the revised PEAP (2004) water and sanitation falls under two pillars:

- Pillar 2 – Enhancing production, competitiveness and incomes
- Pillar 5 – Human development

The PEAP will be replaced by the National Development Plan (NDP). This Plan, currently under review and not yet endorsed by GoU has a focus on wealth creation rather than poverty eradication.

3.2.2.2 National Development Plan (NDP)

In addition to the strategy for increased water for production the National Development Plan comes with the following objectives and strategies for the water sector:

1. Increase access to safe water supply in rural areas from 63% to 77% by 2015 and in urban areas from 60 to 100% by
    a. constructing, maintaining and operating more water supplies in rural areas and more piped water supply systems in urban areas
    b. improve functionality of water supply systems
    c. Reduce unaccounted for water in NWSC systems in Greater Kampala area from 40 to 18%
2. Improve efficiency and effectiveness in service delivery by:
    a. Improvement of policy, legal and regulatory framework
    b. Strengthening the institutional structures and systems and coordination of water and sanitation activities
    c. Enhancement of the involvement of private sector players in water infrastructure financing, development and provision of water services
    d. Enhancement of sector coordination and management

3.2.2.3 Overall Water and Sanitation Policy Objectives

The overall policy objectives of the Government for water resources management, (domestic) water supply and sanitation and water for production respectively are as follows:

1. *"To manage and develop the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs of the present and future generations with the full participation of all stakeholders" (The National Water Policy, 1999).*
2. *To provide "sustainable provision of safe water within easy reach and hygienic sanitation facilities, based on management responsibility and ownership by the users, to 77% of the population in rural areas and 100% of the urban population by the year 2015 with an 80%-90% effective use and functionality of facilities" (Medium Term Budget Paper, 2006). This is more ambitious than the Millennium Development Goal (MDG), which aims to halve the percentage of people without access to safe water by 2015 in Uganda.*
3. *"Promote development of water supply for agricultural production in order to modernize agriculture and mitigate effects of climatic variations on rain fed agriculture" (The National Water Policy, 1999).*

3.2.2.4 National Water Policy

The National Water Policy (1999) "promotes an integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people of Uganda". The approach is based on the continuing recognition of the social value of water, while at the same time giving much more attention to its economic value. The policy has been developed under the two categories of Water Resources Management and Water Development and Use. With respect to Water Resources, the Water Policy sets out the guiding principles, strategies (enabling environment, institutional development, planning and prioritization, data collection and dissemination), management functions and structure, roles of the private sector and NGOs, as well as data and information. The six guiding principles set out with respect to domestic water supply are:

1. Protection of the environment and safe-guarding of health through the integrated management of water resources and liquid and solid waste
2. Institutional reforms promoting an integrated approach, including changes in procedures, attitudes and behaviour and the full participation of women at all levels in sector institutions and in institution making.
3. Community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes.
4. Financial viability of public utilities should be assured through sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies.
5. Provision of services through demand driven approaches in which users are fully involved and contribute to the cost of facilities and services to promote ownership and sustainability.
6. Allocation of public funds for water supply development activities will take into account that priority is given to those segments of the population who are presently inadequately served or not served at all, and who are willing to participate in planning, implementation and maintenance of the facilities.

The Water Policy also sets out guiding principles for Water for Production.

3.2.2.5 National Health Policy

The National Health Policy (1999) addresses the main contributors to the burden of disease, which includes malaria, HIV/AIDS, TB and diarrheal diseases. Government of Uganda places greater emphasis on rural areas where the population has low access to safe water and low sanitation coverage. This is to be achieved through the promotion of personal, household, institutional, community sanitation and hygiene.

3.2.2.6 Environmental Health Policy

The Environmental Health Policy (2005) establishes the environmental health priorities of the Government of Uganda and provides a framework for the development of services and programmes at national and local government levels. The goal of the Policy is the attainment of a clean and healthy living environment for all citizens in both rural and urban areas. National environmental health strategy and local interventions sets out the following guiding principles:

1. Prevention is better than cure.
2. Every Ugandan has a right to a clean and healthy environment but there are responsibilities that need to be fulfilled at every level.
3. There is need to place considerable emphasis on community mobilisation and proactive assistance in order to accelerate change and bring about widespread improvements in sanitation and hygiene behaviour.
4. Inter-sectoral collaboration is a pre-requisite for progress in addressing national environmental health challenges.
5. Environmental health interventions should be planned and implemented on an equitable basis, with resource allocation based on the principle of 'some for all' rather than 'all for some'.

6. Environmental health strategies should strike a balance between promotion, facilitation and
7. law enforcement
8. Interventions should maximise community participation and empowerment, to encourage and enable people to take responsibility for environmental health matters under their direct control.
9. Interventions should respond to the differing needs of men, women and children, while recognising that women are the main users of water and sanitation facilities.
10. Efforts should be made to harness the human and technical resources of NGOs, CBOs and the private sector in the planning and implementation of local interventions.
11. Environmental health initiatives should exploit the potential of the new integrated approach to village-level health interventions. There may be scope for synergies between sanitation strategies and strategies for school health, malaria and HIV/AIDS.

3.2.2.7 National Gender Policy

The National Gender Policy (1999): The affirmative action by Government in support of gender equity in the national socio economic activities encourages women to play a major role in decision making. On the basis of this policy, the level, in terms of percentage of the total membership, of women participation in decision-making organs has been nationally agreed and is respected. With respect to water, the National Gender Policy recognizes women and children as the main carriers and users of water.

3.2.3 Institutional Framework

3.2.3.1 Sector-wide approach to planning (SWAP)

A Sector Wide Approach to Planning (SWAP) for the Water and Sanitation Sector was adopted in September 2002. SWAP is a mechanism whereby Government and development partners support a single policy and expenditure programme, which is under Government leadership and follows a common approach. The rural water and sanitation sub-sector in Uganda is the most advanced in terms of SWAP implementation.

3.2.3.2 Sub-Sectors

The water and sanitation sector consists of four sub-sectors namely:

1. **The Water Resources Management (WRM) sub-sector** is concerned with the integrated and sustainable management of the water resources of Uganda so as to secure and provide water of adequate quantity and quality for all social and economic needs for the present and future generation.
2. **The Rural Water Supply and Sanitation (RWSS)** sub-sector comprises the provision and maintenance of adequate supply of water for human consumption and domestic chores. Sanitation aspects include sanitation promotion and hygiene education in rural communities and schools. End users are responsible for the management, operation and maintenance of their improved water and sanitation facilities
3. **The Urban Water Supply and Sanitation (UWSS)** sub-sector comprises services for human consumption, industrial use, and other uses to gazetted towns and centres with population of more than 5,000 people. Urban WSS is sub-divided into 43 large and 106 small towns. Large towns are managed by NWSC under a performance contract arrangement with Government. Private operators accountable to the Local Government, through the water authorities manage the small town schemes.
4. **The Water for Production (WFP)** sub-sector refers to water for agricultural production, which includes water for irrigation, livestock, fish farming and rural based industry. Water for production is considered to be an area of increasing importance for Uganda's future development of the agricultural sector in line with the Plan for Modernization of Agriculture (PMA). DWD/MWLE and the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) are both responsible for WFP.

3.2.3.3 Institutional Roles and Responsibilities

Numerous stakeholders are involved in the sector. The Ministry of Water and Environment (MWE) is the lead agency and responsible for coordinating and liaising the other stakeholders involved.

1. ***Ministry of Water, and Environment (MWE***), through the Directorate of Water Development (DWD) and the Directorate of Water Resources Management (DWRM) is the lead agency responsible for managing water resources, as well as coordinating, regulating and monitoring all water and sanitation activities and providing support services to local Governments and other service provides. DWRM is responsible for the full range of Integrated Water Resources Management (IWRM) activities including: monitoring, assessing, planning, allocating and regulating water resources through the issuance of water abstraction and wastewater discharge permits. It is also advising and facilitating water resources management in the country through decentralised and catchment-based management, coordinating Uganda's participation in joint management of trans-boundary waters resources and peaceful cooperation with Nile Basin riparian countries, facilitating the work of the national Water Policy Committee, developing and maintaining national water laws, policies and regulations, and communicating and raising awareness of the benefits of IWRM to all DWD supports districts in implementing decentralised water supply and sanitation programmes and implements new construction and rehabilitation of schemes in small towns and rural growth centres (RGCs). DWD has established eight Technical Support Units (TSUs) to support Districts to build their capacity to implement their sector mandates. DWD is responsible for the development of water supplies for water for production.
2. ***National Water and Sewerage Corporation (NWSC)*** operates and provides water and sewerage services to 18 large urban centres. NWSC's activities are aimed at expanding service coverage, improving efficiency in service delivery and increasing labour productivity. Key among its objectives is to plough back generated surpluses towards infrastructure improvements and new investments. The implementation of urban reform aims to create an independent regulatory framework and an Asset Holding Authority (AHA), which will affect the future management of urban water and sanitation systems.
3. ***Ministry of Finance, Planning and Economic Development (MFPED)*** has the role of mobilising and allocating funds and co-ordination of donor inputs. MFPED reviews sector plans as a basis for releasing allocated funds, and reports on compliance with sector objectives. MFPED also coordinates the planning and reporting to donors.
4. ***Ministry of Local Government (MLG)*** has the mandate of establishing, developing and facilitating the management of self sustaining, efficient and effective decentralized government systems capable of delivering the required services to the people. It aims to foster good governance and integrated social and economic development.
5. ***Ministry of Health (MoH)*** is responsible for development of the policy on hygiene promotion and sanitation development and ensuring its implementation by concerned stakeholders. The Environmental Health Division (EHD) is the key section of MoH responsible for the provision of support on environmental health to the decentralised structures regarding environmental health.
6. ***Ministry of Education and Sports (MES)*** is responsible for hygiene promotion and sanitation in primary schools. It works to ensure that schools have the required sanitation facilities and provide hygiene education to the pupils. It also promotes harvesting of rainwater for hand washing after latrine use.
7. ***Ministry of Gender, Labour, and Social Development (MGLSD)*** is responsible for spear heading and co-coordinating gender responsive development and community development. It assists the different sectors in gender responsive policy development, and supports Districts to build staff capacity to implement sector programmes.
8. ***Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF)*** is responsible for the development of agriculture, animal husbandry and fisheries and is a major stakeholder in the utilisation of water for agriculture production.

9. ***Local Governments (Districts, Towns, and Sub-Counties)*** are charged with responsibilities for the provision and management of rural water services, in liaison with DWD/MWE. Local Governments undertake planning, budgeting, resource allocation, community mobilization. They ensure effective participation involvement of end users, follow up implementation by the private sector and support the operation and maintenance of water services. They undertake monitoring, provide accountability and report to DWD/MWE and MFPED. Local Governments, in consultation with DWD/MWE, also appoint and manage private operators for urban schemes outside the jurisdiction of NWSC. The roles and responsibilities of local Government offices and district level organisations is set out in section
10. **End users** are responsible for demanding and planning improved water and sanitation services. A group of individuals who collectively plan, manage and maintain a point water source is referred to as a Water User Group. WUGs contribute a cash contribution towards construction of water facilities and are responsible for operation and maintenance, including the collection of revenue. A Water and Sanitation Committee (WSC)/Water User Committee (WUC) is the executive organ of a water user group. A WSC/WUC is to be established at each improved water point. Community cash contribution towards capital costs should be part of the Investment Projection and one of the funding mechanisms of the SIP 15. Communities indicate their ability to maintain the facilities through their cash contribution. Without it there will be a funding gap in the sector, and the sustainability of the facilities will be jeopardized. The amount of funds to be contributed depends on the technology type as indicated in Table 6.

Table 6. Community contributions

Type of Technology	Community cash contribution per Source (UGX)
Springs.	
Small.	45,000
Medium.	45,000
Ex- Large	100,000
Deep borehole	200,000
Shallow well (motor drilled/ hand augured/ hand dug	100,000
Borehole rehabilitation	90,000
Gravity Flow Scheme	45,000 per tap
Valley Tanks and Dams	Not specified - Determined According to Situation.

The Water User Committee in association with the Local Leaders (LC1 and/or LC3) should collect the funds from the community members. Any in-kind contributions collected by the Water User Committee should be converted into cash e.g. sale of chicken, matooke, millet, or ghee. Communities are responsible for ensuring that the items sold raise the required funds. The Water User Committee submits the full community contribution to the District Water Office (DWO). All contributions given to the District should be in cash. The DWO will issue a receipt for the funds received For minor repairs and O&M, communities normally contribute to the Water and Sanitation Committees on a monthly or annual basis or when the need arises.

11. ***Private Sector:*** The Government of Uganda (GoU) is firmly committed to the privatization process. The private sector undertakes design, construction, operation, maintenance, training, capacity-building and other commercial services. The private sector is also being considered for mobilizing resources and financing for sub-sector development in the on-going sector reform studies.
12. ***Development Partners:*** The country has received considerable support from its Development Partners for funding the development budget including rural water and sanitation programmes..

13. ***Non-Government Organisations (NGOs) and Community Based Organisations (CBOs)*** are active in the provision of water and sanitation services (construction of facilities, community mobilisation, training of communities and local Governments, hygiene promotion as well as advocacy and lobbying. By the end of 2008, the Uganda Water and Sanitation NGO Network (UWASNET) had a membership of 165 NGOs/CBOs implementing projects in the sector.

3.2.3.4 District Roles and Responsibilities

The District Water Office is the lead office for water and sanitation sector activities at local Government level. However the implementation of sector activities requires full participation and cooperation between all major stakeholders.

The **District Water Office (DWO)** takes the lead in the implementation of all the water and sanitation activities at district level. The main activities comprise planning, initiation and follow up of procurements, initiation, and supervision of crosscutting and sustainability issues, drafting of contracts, supervision of contractors and consultants and contract management. The office is also responsible for initiation and following up of capacity building, as well as ensuring operation and maintenance (O&M) of water and sanitation facilities by WUGs. The DWO should initiate and carry out monitoring together with other stakeholders and ensure that reports are submitted to the appropriate authorities on time. In case of disasters and emergency situations, the DWO has to actively participate in disaster management with assistance from relevant departments.

The role of the **District Health Office (DHO)** is to endure coordination with the DWO in implementation of sanitation activities and hygiene education/promotion. The Health Assistants who are stationed at sub-county level undertake water and sanitation related activities, hygiene education and promote behaviour change. In some instances, staff from the District Health Inspectorate can be seconded to manage sanitation activities in the District Water Office (e.g. Assistant District Water Officer –Sanitation). Joint planning and implementation of activities between the DWO and DHI will assist in effective utilisation of resources in the water and sanitation sector.

The **District Directorate of Community Based Services (DDCBS)** must work jointly with the DWO in matters related to community sensitisation and mobilisation before construction and after construction (i.e. pre-and post-construction). These activities are intended to ensure sustainability of water and sanitation facilities. The DDCBS should second staff to work in the DWO (as Assistant District Water Officer – Mobilisation). At sub-county level, the District Water Office should work with sub-county Community Development Officers (CDO) and Community Development Assistants (CDA) to carry out mobilisation for water and sanitation activities. There is need for considerable coordination to maximise the efforts in carrying out the tasks.

The **District Education Officer** liaises with the DWO and District Directorate of Health Services in planning and implementation of sanitation and hygiene education in schools and institutions.

The Chief Administrative Officer (CAO) is responsible for the overall management and approval of the district water and sanitation programme. The CAO is the accounting officer for all District funds.

The **District Planner** participates in the planning of water and sanitation activities in the Local Governments.

The **District Finance Officer** is involved in approval and processing of payments for the water and sanitation activities.

The **District Engineer** is the head of the Engineering Section in the district. She/He is involved in the implementation of the district water and sanitation programme and is the immediate supervisor of the DWO.

The **Contracts Committee** is established by the accounting officer. The contracts committee is responsible for adjudication of recommendations from the Procurement and Disposal Unit and award of contracts; approving the Evaluation Committee; approving bidding and contract documents; and approving procurement and disposal procedures.

The **Procurement and Disposal Unit** is responsible for the management of all procurement and disposal activities except adjudication and the award of contracts. Functions include: supporting the

contracts committee; plan procurement activities; recommend procurement procedures activities; prepare and issue bid documents; advertise bid opportunities; and issue approved contract documents.

The **Evaluation Committee** undertakes evaluations and reports to the Procurement and Disposal Unit. The contracts committee approves evaluations. The number of members of the evaluation committee and level of seniority and experience depends on the value and complexity of the procurement. However, it must have a minimum of three members. The members are required to sign a code of ethics, provided under the Public Procurement and Disposal of Pubic Assets Act (2003), declaring that they do not have a conflict of interest in the procurement requirement.

The **private sector** is responsible for direct implementation of water and sanitation sector activities. This comprises construction of water sources and borehole drilling as well as the provision of consultancy activities. The engagement of the private sector is undertaken through competitive bidding and is based on the procurement guidelines. Supervision of the private sector is undertaken by DWO and/or appointed consultants. The DWO has to ensure value for money for all that is done in the sector at district level

Non-Government Organisations (NGOs) and **Community Based Organisations (CBOs)** are active in the provision of water and sanitation services (construction of facilities, community mobilisation, training of communities and local Governments, hygiene promotion as well as advocacy and lobbying. It is the responsibility of the DWO to ensure that efforts of NGOs are harmonized and rationalized in the district, and comply with government policy regarding water and sanitation. NGO and/or CBO representatives should be members of the District Water and Sanitation Coordination Committee (DWSCC) described below.

A **Water and Sanitation Committee (WSC)/Water User Committee (WUC)** is the executive organ of a water user group. A WSC/WUC is to be established at each improved water point.

3.2.4 Sector Coordination Committees and Groups

The **District Water and Sanitation Coordination Committee (DWSCC)** operates at District Level. It provides a platform for coordinating and overseeing the activities of the water and sanitation sector in the Local Governments and strengthens collaboration across sectors and between different players.

The DWSCC comprises all political leaders, relevant district departments (District Water Office, the Planning Office, the District Directorate of Community Based Services, the District Finance Office, the District Directorate of Health Services, the District Education Office), NGOs and development partners at the Local Government Level.

At national level, two committees have been established to provide policy and technical guidance for sector development.

1. The Water Policy Committee is the highest body that coordinates the sector. It advises the Minister responsible for water on water resources and development issues. Among other functions, its role is to coordinate the formulation of national policies relating to international water resources; to liaise with international regional water resources organizations; to coordinate the preparation and review of plans and projects which may affect international water resources; to initiate and coordinate, in consultation with the National Environment Management Authority, the preparation, implementation and revision of, national water resources policy and national priorities for the use of water and related land resources.
2. The Water and Sanitation Sector Working Group (WSSWG), is responsible for sector coordination and approval of agreed minutes from the Annual Joint GoU – Donor Sector Review. It is chaired by Permanent Secretary MWE and comprises representatives from MWE/DWD, NWSC, MoH, MES, MFPED, MAIIF, MGLSD, development partners and NGOs (represented by UWASNET). The WSSWG provides policy and technical guidance for sector development in the country and meets at least every quarter.

3.2.5 Key Coordination Activities

The **Annual Joint Government of Uganda – Donor Water and Sanitation Sector Review**, known as the Joint Sector Review (JSR) is a forum for performance assessment, budget and policy guidance and allows a broad spectrum of stakeholders to get insight into, discuss and influence sector developments. It draws conclusions and makes recommendations on the overall developments in the sector. It is not a decision making body. The Water and Sanitation Sector Working Group (WSSWG) take any binding decisions during the JSR, such as endorsing formal undertakings. The JSR is attended by representatives from local Governments, development partners, NGOs, government Ministries and other stakeholders.

Inter-District Meetings (IDMs) enable Districts to share implementation experiences and mechanisms of cooperation, usually at regional/multi-district level. They are facilitated by MWE/DWD personnel and held bi-annually. The IDMs bring together political and technical heads of the Local Government, Private Sector, and NGOs. They enable MWE/DWD to explain policy related issues and provide an interface between DWD and the Local Government where views that affect implementation are explained and shared.

The **Annual General Assembly** is intended for analyzing operational progress and constraints and defining the way forward for Local Governments. The objectives include review of operational and performance issues in the sector, identification and prioritization of areas to be addressed for improved sector performance, and providing recommendations for consideration at the Joint Sector Review (JSR). The General Assembly is held annually and participants include Local Government (Chairmen, CAO, DWO, and DHI, Town clerks, MWLE /DWD and line ministries, development partners and NGOs).

3.3 Strategies and plans

3.3.1 Strategies

The implementation of water and sanitation activities in Uganda must take into account sector strategies regarding the following:

1. **Operation and Maintenance (O&M**) : there has been significant progress in improving access to safe water in Uganda. However, these gains can only be built on if improvements to water supplies are well used and maintained. DWD/MWE published a 'National Framework for Operation and Maintenance of Rural Water Supplies' (MWE, 2004). The O&M Framework sets out the "rules of the game" for all sector players in provision of water facilities to rural communities. The O&M Framework is in line with the Community Based Maintenance System (CBMS) in Uganda. Under CBMS, community members are responsible for the operation and maintenance of their water supplies.
2. **Gender equity and equality**: "The strategy aims to develop empowering approaches that will enhance gender equity, participation and access & control to resources in the water sector leading to poverty alleviation" Water Sector Gender Strategy (2003).
3. **HIV/AIDS**, The fight against HIV/AIDS requires a multi-sectoral approach and has to be part of the each Sector's efforts in poverty eradication and development. MWE/DWD has developed an HIV/AIDS strategy (Water and Sanitation Sector Strategy for Mainstreaming HIV/AIDS, DWD, 2004).
4. **Pro-poor strategy:** in Uganda, the poor are defined according to a number of criteria. An often-used limit for poverty is expenditure of US$ 1 day or less. However, poverty is a multi-dimensional concept, and varies seasonally, and over time. Its acuteness (degree of poverty) and longevity varies from person to person. The Pro-poor Strategy (2006) points out, that with respect to rural areas, the compliance with policy is patchy (contributions by communities are not always made and operation and maintenance is [sometimes] subsidised. This can have negative consequences for the poor. It also states that there are some inefficiencies with respect to use of funds, and that the per capita costs of supply of water has varied significantly

over the years. The objective of the above-mentioned is to improve the effectiveness of the water and sanitation sector in providing services to the poor.

5. **Water quality strategy:** The National Water Quality Management Strategy (2006) has the following vision: “Reduced poverty through effective water quality management”. The mission statement is: “Improve water quality management to guarantee water of sustainable quality to meet social economic development and environmental needs”. The key operational purpose of the strategy is to make sure that water quality is recognised as a crosscutting issue, and that it is mainstreamed in all water, sanitation and environmental management activities.
6. **Rural Growth Centres (RGCs) strategy:** A RGC is generally made up of a core trading centre and a fringe and is defined as a centre with between 500 inhabitants (or 1,000 person equivalents, i.e. water demand of 20 litre/day) and 5,000 inhabitants. The core normally comprises a densely populated nuclear settlement around a commercial zone. Viable and growing RGCs are considered crucial for economic and social development for the RGC and rural hinterland. RGCs are in transition from villages to small towns. Inadequate water and sanitation services in RGCs will prevent economic development and cause health as well as environmental problems. There is a contention that with increased urbanisation, protected water point water sources are increasingly becoming prone to contamination. An inventory undertaken in 2003 found a total of 844 RGCs in Uganda. The Long Term Strategy for Investment, Planning and Operation & Maintenance of Water Supplies and Sanitation in Rural Growth Centres, MWE 2005 (referred to as the Rural Growth Centre (RGC) Strategy sets out the (i) service level and technical options; (ii) investment plan; (iii) implementation; and (iv) operation and maintenance.
7. **Emergencies:** The Operational Strategy for Water and Environmental Sanitation Emergency Response in Uganda (2004) sets out three key areas: Operational framework, Financing mechanisms; and Strategy action plan. Key roles and responsibilities for assessment, ratification, co-ordination, implementation, O&M and monitoring and evaluation and institutional capacity building are set out. It is proposed that line ministries take responsibility for respective sectoral responses to disasters under the coordination of the Office of the Prime Minister (OPM) at national level and District Disaster Management Committee (DDMC) at district level. The Cluster coordination mechanism under the Inter-Agency Standing Committee (IASC) for humanitarian response led by the UN, works closely with the government structures during major emergencies.

3.3.2 Sector Plans

Planning modalities and criteria, as well as information on technology choices is given in the Rural Water and Supply and Sanitation Sector Investment Plan (SIP-15) and the Rural Water and Sanitation Sector 5-year Operational Plan (OP5). The OP5 sets out how to implement the strategies regarding rural water supplies.

3.4 Regulation

The Directorate of Water Resources Management is the main actor as regulator. A permit system for groundwater and surface water abstraction, as well as waste water discharge was introduced in 1998 (The Water Resources Regulations and Waste Water Discharge Regulations, 1998). The licensing of drilling contractors and groundwater professionals is the responsibility of DWRM.

3.4.1 Groundwater abstraction permits

Groundwater abstraction permits are issued to individuals, companies, institutions and organisations that want to use a borehole that will be equipped with a motorised submersible pump. The application costs are UGX 450,000 and an annual renewal fee costs UGX 50,000.

3.4.2 Licensing of drilling contractors

The Directorate of Water Development has set up the licensing system for drilling contractors. Any government department or individual is obliged to engage only drilling contractors that have a valid license. A list with contractors with valid drilling permits is published in the national news papers twice a year. Currently, 42 organisations (39 drilling companies and 3 NGOs) have valid drilling permits . A list is given in Annex 2. Despite the licensing system, some of the Districts still award contracts to unlicensed companies.

3.4.3 Licensing of groundwater professionals

The Directorate of Water Resources Management has initiated the process of registering groundwater consultants in line with Water Act, Cap152. This project, to be implemented in 2010, aims to ensure that all groundwater consultants contracted to carry out groundwater investigations and borehole siting have the required qualifications and experience in that field.

3.5 Borehole data

DWRM is responsible for collecting all the information on boreholes drilled in the country. This is done through the drillers who are obliged to fill a borehole completion form for each borehole they have drilled. At the end of each quarter, drillers need to submit the forms for the boreholes drilled in that quarter. The information filled in the borehole completion records is then entered in the national groundwater database. Some quality control is carried out before and during the entering of the information. However, no proper procedures have been set for validating the information.

The drillers also need to request DWRM for national borehole numbers to be used for the boreholes they drill. These numbers are allocated to drillers in lots of 20-100 boreholes.

The borehole completion records submitted by the drillers are supposed to be checked against the numbers allocated to the drillers to see whether they have actually used all numbers. The renewal of the permits depends amongst others on the satisfactory submission of borehole information. The drillers are also supposed to allocate numbers and provide borehole completion forms for dry boreholes and technical failures.

The District Local Governments are supposed to collect the location and functionality information of newly constructed and existing water sources. This information needs to be submitted on an annual basis to DWD. The information is used to assess the safe water coverage and functionality status in each of the Districts.

The information collected by DWRM is available at a cost of UGX 1,000 per borehole record. The Districts have been provided, or will be provided, with hydrogeological maps and copies of the groundwater database for their district, as part of an ongoing national groundwater mapping project.

3.6 Number of boreholes drilled in Uganda

3.6.1 Borehole projects

Every year approximately 1,000-1,500 boreholes are drilled in Uganda. These boreholes are drilled for:

1. Rural Water Supply projects (hand pump boreholes supplying 300 people) implemented by Districts, NGOs and multilateral international organisations like UNICEF, UNHCR.
2. (Small) Town Water Supply Projects (production wells for distribution networks and hand pump point sources outside the core areas of the towns), implemented by DWD.
3. Rural Growth Center projects (production wells for distribution networks and hand pump point sources outside the core areas of the towns) implemented by DWD and the Districts.
4. Industrial water supplies (production boreholes drilled for factories)
5. Individual domestic water supplies (boreholes for households in areas without piped water supplies)

6. Emergency water supply projects (rural water supply boreholes; contracts issued by central government as projects or as framework contracts). During the insurgency in the North many production wells were being drilled for the IDP camps. Now most former IDPs have returned to their villages, and the IDP camps are either empty or have developed into RGCs.

3.6.2 Borehole numbers issued by DWD/DWRM

Since 2002, borehole numbers are issued by DWRM; before that time DWD issued borehole numbers. Borehole numbers are a sequential number following a prefix that has changed over the years. Prefix examples are: CD, GS, WDD and DWD.

The borehole numbering system has been transferred to an excel database. In principle, drillers were supposed to give a borehole number to each borehole deeper than 30 m whether it yields water or not. Even technical failures should be given a number. This will allow a proper calculation of regional success rates that again allow for better budgeting of borehole drilling projects. Figure 1 shows the number of borehole numbers issued since 1991.

Dug wells, hand augured wells and boreholes drilled with a depth of less than 30 m do not get a DWD number but usually a District based number. Some of the shallow boreholes may get a DWD number. The NGWDB only contains information for a small percentage of the total number of sources constructed.

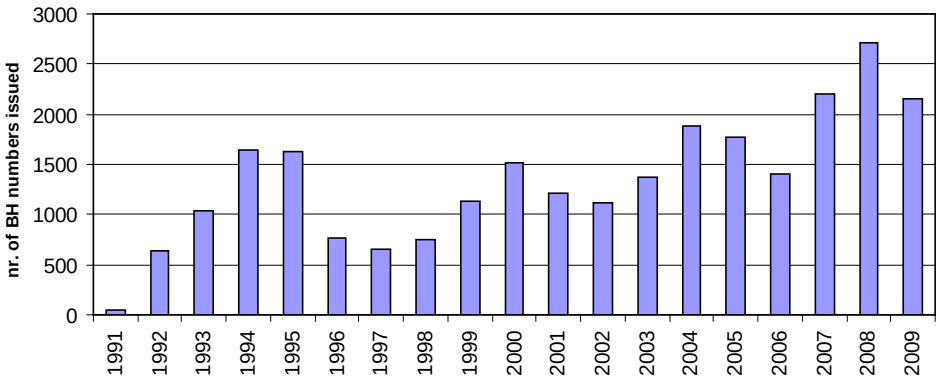


Figure 1. Number of borehole numbers issued per year

The issued borehole numbers do not give the exact number of boreholes installed because:

1. Dry boreholes and technical failures also get borehole numbers
2. Some borehole numbers are issued at the end of the year, not all of them are drilled in the specific year
3. Not all numbers issued are actually used in the end.

Figure 2 shows the total number of borehole numbers issued to the drilling contractors and NGOs that are operational in 2009.

3.6.3 Borehole records entered in NGWDB

The drillers are supposed to fill the borehole completion forms and submit these to DWRM. These forms are then entered in the NGWDB. Figure 3 shows the number of records of boreholes drilled in the particular years. To get an idea of the gap between the numbers issued and numbers entered in

the database, the number of borehole numbers issued has also been included for the particular years[1].

For the period 2000 to 2009, the NGWDB only contains records for 43% of the total number of borehole numbers issued. The percentage of returned and entered borehole completion forms compared to numbers issued reached 67% in 2008.

3.6.1 Boreholes reported by districts

The Districts, through submission of their annual status reports, report to DWD how many boreholes have been implemented in each financial year (running from July to June). The numbers of government funded boreholes are normally used for the Sector Performance Report, which is issued annually in September or October by MWE. The numbers are shown in Table 7.

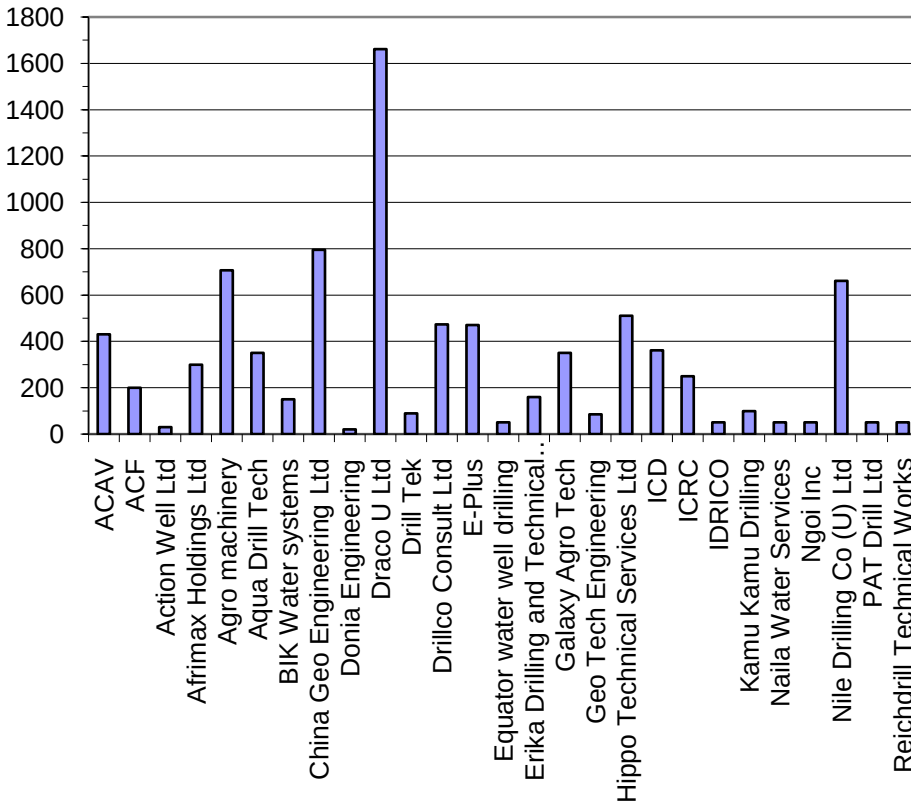


Figure 2. Number of borehole numbers issued per contractor

[1] *Please note that numbers issued does not mean that the borehole with that numbers is also drilled in that particular year*

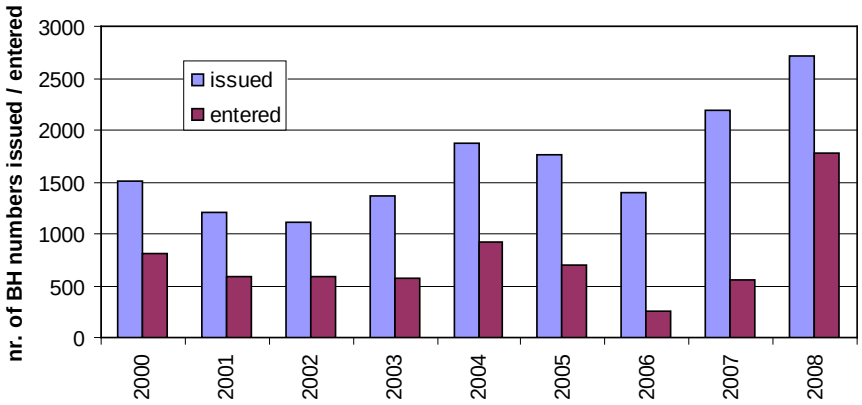


Figure 3. Number of borehole records issued and entered

Table 7. Number of boreholes drilled by government

SPR	2004/2006	2005/2006	2006/2007	2007/2008	2008/2009
DWSSCG	514	432	572	647	779
Other funds	49	77		34	81
Total	563	509	572	681	860

The total number of improved sources (functional and non functional) in a District is used for safe water calculations. These are also presented in the Water and Sanitation Sector Performance Reports (SPRs).

3.6.2 Boreholes reported by NGOs

The umbrella organisation of over 200 NGOs, working in the water supply and sanitation sector in Uganda is the Uganda Water and Sanitation NGO Network (UWASNET). The organisation was established in 2000, with the aim of strengthening the contribution of NGOs/CBOs in achieving the Water and Sanitation Sector goals. Currently it has a membership of 165 NGO and CBO members. The number of boreholes drilled by NGOs is reported per calendar year rather than financial year and the numbers reported are given in Table 8. Only 62 reported to UWASNET for the 2008/09 financial year. The numbers given below are therefore an underestimate of the actual number of boreholes drilled by NGOs and CBOs.

Table 8. Number of boreholes drilled by NGOs

Borehole drilled by NGOs	2005	2006	2007	2008
UWASNET report	38	40	147	353

3.7 Community mobilisation

Community mobilisation is based on a demand responsive approach whereby community members, once aware of the benefits of improved water supplies and good sanitation can demand service improvements with the support of the District Local Government or NGO/CBOs. The sensitisation and

mobilisation process should follow the guidelines as set out in the District Implementation Manual and documents mentioned in the Manual.

3.8 Borehole site investigations

3.8.1 Type of surveys

In general two types of borehole site investigations / hydrogeological surveys are being carried out in Uganda. These are surveys for:

1. rural water supplies aimed at supplying rural communities with enough water to be pumped with a hand pump. The threshold values for equipping rural boreholes with hand pumps, as set in the contracts varies between 300 and 1,000 l/hr.
2. rural growth centers and small town water supplies whereby production wells need to be drilled. The boreholes need to yield enough water for the installation of a pump of at least a 3,000 litre per hour capacity.

The government does not use detailed standardised Terms of References (ToR) for these types of surveys and it is therefore mostly up to the consultant to design his survey. Although some of the activities are specified in the ToR, the implementing agency hardly checks whether the survey was carried out accordingly. Required profile lengths or number of Vertical Electrical Soundings are hardly mentioned in ToRs issued by GoU.

3.8.2 Current siting contracts and their limitations

The borehole siting contracts issued by the government used to be Bills of Quantity (BoQ) based, which means that siting consultants were paid for works done independent of the drilling results. The low success rates of certain drilling projects were attributed to consultants not doing a professional job either purposely or just because they were not well trained in siting.

During the RUWASA project[2], project hydrogeologists were trained and consultancy companies were obliged to do a “professional job”, not by specifying the type of surveys but by insisting on obtaining a success rate that was thought to be realistic by the project after analysis of all borehole data for the various areas. If the success rate was not reached, the Consultant had to do an additional survey at his own expense. The driller was still paid for all his activities independent of the results. After the RUWASA project ended, this type of contract (minimum success rate to be obtained) was continued by the government. The driller is still paid but the consultant sometimes has to go back to do another geophysical survey, independent of the possible low overall groundwater potential.

Groundwater investigations cannot ensure that a successful borehole is drilled, as the geophysical techniques that are used to identify potential drilling sites may be interpreted in various ways; for example, the presence of sand with water gives a similar electrical response as the presence of clay. The consultant will try anything in his power to properly interpret his measurements and differentiate between the two, but s/he can never guarantee the presence of water.

Many implementing agencies and other actors in the water sector involved in drilling project are not aware of this limitation and may think they are dealing with a bad groundwater professional when they drill a dry borehole. Unfortunately also groundwater consultants often carried out below standard jobs resulting in unnecessarily low success rates on many projects

This lack of professional understanding with the implementers and lack of professional and moral integrity with the groundwater consultants has led to a preference for no water no payment contracts for drillers and / or groundwater consultants. During the emergencies in Northern Uganda, many NGOs and multilateral organisations came to the country and adapted the no water no payment contracts for drillers because of the above-mentioned reason. The drillers were made responsible for the final product and suddenly became financially dependent on the results of the hydrogeological surveys. They had to employ siting consultants on the same no-water-no-payment terms. Slowly by

[2] *a large rural water and sanitation project of the late 1990s implemented in Eastern Uganda, funded by Danida*

slowly, local governments took over this type of contract apparently because it seems the way to go to avoid losing resources during borehole implementation. This type of contract, often associated with lack of continuous supervision, may jeopardize the quality of works may be less advantageous to the client as often thought (see also Box 1 and 2).

Often, the siting Consultant is supposed to be responsible for the preparation of the tender documents for the drilling contract. The specifications for the drilling contract should be based on the findings of the siting consultant. In practice, however, the drilling contractor is procured at the same time as the Consultant and therefore the driller is often confronted with an unrealistic BoQ.

No-water-no-pay, no risks for implementer ?

An African Development Bank Project in Mozambique was set up in such a way that there was no risk for the implementing agency. The community mobiliser, the supervisor (also called the "representative of the implementing agency") and the driller (also responsible for siting) would not be paid for dry boreholes. No water in the borehole then no cost for the Client, that seems to be fair. Unfortunately, the driller had accepted the job not knowing the poor potential of the area, the community mobiliser was also not aware of the risk, the supervisor accepted the contract conditions reluctantly, because he wanted to get his company established. All well for the implementer, since there would be no risk for his organisation one would think. However, on many of the Project's contracts the drillers ran away after having drilled too many dry boreholes without compensation. In the end, the Project drilled considerably less boreholes per year than anticipated. It is sad that some NGOs in Uganda also think they do not bear any risk with their no-water-no-payment contracts. There is a task for the government to step in and regulate and insist on contract types that are most appropriate for the prevailing implementation framework considering interests for all parties involved in the project.

Box 1 No water - no costs… is it really true?

No-water-no-pay, less hassle for the implementer but also lower unit rates?

During the aftermath of the insurgency in Northern Uganda the no-water-no-payment unit rates for boreholes was between 17 and 18 m UGX. MSF Holland, however accepted a BoQ based project with BoQ based payments for contractor and consultant with one of the more professional drilling companies and consultancy companies. The success rate for the 22 borehole project was 83% with an average borehole unit cost of approximately UGX 14.7 m including siting and supervision. The result of the project indicates that professional execution of drilling projects may result in lower unit rates. For this particular project a saving of approximately 15% or UGX 2.3 m to 3.3 m per borehole was made compared to a lump sum no-water-no-payment contract. These results can be obtained if all parties are professionals who are good result oriented!

Box 2 No-water-no-payments not the cheapest contract option?

3.9 Borehole drilling

3.9.1 Drilling techniques

The drilling techniques commonly used in the Basement Rocks of Uganda are air rotary, mud rotary and down-the-hole (DTH) drilling. During the RUWASA project, some drilling companies used the combined cable tool and rotary drilling technique whereby the overburden was drilled with a cable tool machine and the boreholes were later deepened by the DTH technique.

The additives that are being used are air, foam and biodegradable polymers. Most items are readily available in the East African market. Bentonite is hardly used in drilling.

Drilling in the Rift Valley Sediments has to be done through mud drilling. Only few companies really are capable of doing a professional job here. For many years, the Rift Valley Sediments were thought to have a low potential because many dry boreholes were drilled. In fact most of the boreholes were technical failures, as DLGs employed drilling companies with the wrong equipment.

3.9.2 Borehole design, hand pump boreholes and production wells

During the RUWASA project two standard borehole designs were adapted in Uganda:

1. shallow borehole design – this actually means that the boreholes are cased down to the bottom of the hole with a 5" internal diameter casing. The design is straightforward with minimum risks of technical failure. The screens are covered by gravelpack, and the bottom is sealed with a bottom plug.

2. deep borehole design – this means that the boreholes are only cased down to the hard rock, whereas the hole in the hard rock is not cased and left open. The design is also called 'open hole design'. The major challenge is the contact between the casing and the hard rock. If this contact is not properly closed soil or gravel pack material can enter the borehole. Many drillers take chances here and if and cause siltation that will render the borehole useless in the short or long run depending on the rate of siltation. The proper “sitting” of the casing on the hardrock (no space between casing and the hardrock) needs to be accurately calculated by the driller and supervisor.

The internal diameter of the casings for rural hand pump boreholes is 5” being large enough to allow the installation of a U3 hand pump. A U2 hand pump can be installed in a 4” casing.

The internal diameter of the casings for a production borehole is set at 6” to allow enough space to install a submersible pump. There are however many submersible pumps capable of pumping up to 15 m^3/hr on the market that fit in a 5” casing.

The drilling diameters are usually specified as being 2-4” more than the outer diameter of the casing allowing enough space for gravel pack.

The original RUWASA design included a cement seal at the bottom of the casing. The seal was installed and had to dry for 12 hours. This design was later adapted by many drilling companies (not in the contract documents) who actually saw this delay as an unnecessary loss. Their boreholes without seals had a 5” casing hanging in a 6” hole by putting a packer at the bottom of the casing. Another alternative is to push the 140 mm casing in a 2-3 m 143 mm without grouting The drillers argue that the design is as good as the earlier RUWASA design. Some government departments have been complaining that these boreholes are silting (filling up with silt) at a faster rate. Both arguments have not been proven.

No shallow boreholes in a deep well contract?

During a borehole drilling project for a District Local Government in Eastern Uganda the driller reports sufficient water (3,000 liter per hour) at a depth of 21 meters after drilling through clay layer of at least 10 m. At 21 m boulders are found which make drilling deeper very difficult. Although the driller will also earn less on this BoQ paid borehole he suggests to stop drilling and install a shallow well design. The meters and money saved on this borehole and the other boreholes in this area with similar hydrogeological conditions could then be used for the drilling of a borehole in additional villages in area. This solution to the “problem” would make everybody happy, the people (more sources), the driller (wants to drill all his meters in his contract) and the District staff (more water sources) and the supervisor (more boreholes to supervise). Unfortunately the people involved in this project forced the driller to continue drilling) to at least 40 m because the client, the villagers and the population expect deeper boreholes. The government should regulate the sector in such a way that tax payers money is used more efficiently and effectively. The groundwater mapping project produces technology option maps that give this type of information. It should be noted that this local information is often already known with the DWO. Why drill deep boreholes in areas where it is not necessary? The groundwater professionals and DWO should be sensitised on these issues and react in a more flexible way in such cases.

Box 3 Deep boreholes or shallow boreholes?

The average required depth of a borehole in Uganda depends on the area of operation but varies between 45 and 90 m. It should be noted that many boreholes are unnecessarily deep because there are no clear instructions / specifications on when to stop drilling. Many boreholes with sufficient water at 50 m are drilled down to 70 m because the BoQ based contracts are not based on existing borehole statistics and include unnecessarily deep boreholes. Drillers will also persuade supervisors to continue drilling because they have not properly priced their BoQs items according to actual costs made on the BoQ item, and can therefore make more money by drilling more meters. See also Box 3.

3.9.2.1 Current drilling contracts and their limitations

The drilling contracts for most government departments are BoQ based whereby the driller gets paid for what he delivers. The consultant is responsible for the success rate of the project. The driller is supervised by the consultant who also certifies the payment. However, as discussed above, the implementing agencies have introduced the so called lump sum no-water-no-payment contracts to make sure they do not have any costs in case the drilled boreholes are dry. The two types of contracts are discussed below.

3.9.2.1.1 BoQ based contracts

The BoQ based contracts pay consultants and contractors for the work they have done against the BoQ unit rates for the various BoQ items.

This type of contract, which is the most commonly used contract in Europe and North America seems to be the preferred contract option assuming that the consultant, the driller and the implementing agencies are high level professionals. The risk for dry boreholes is with the implementing agency, which is well aware of the risks involved because it has been informed by the Consultant of the anticipated groundwater potential condition in his area of operation. The implemented agency has budgeted the cost of a borehole in that area based on the anticipated success rate and depths as stipulated in the consultant's report. Finally, the driller has calculated a realistic unit rate for the drilling activities incorporating his costs, overhead, depreciation and profit; all components are known, s/he just drills the borehole.

In Uganda, however, not all activities of all actors are well specified in the contracts. The geophysical surveys are designed by professionals who are not always integer and may do fewer measurements than actually required. The driller will drill but he has not priced his BoQ correctly and may want to drill as deep as the average depth otherwise he makes too little money (he has spread his overhead costs over the meters to be drilled and not over mobilisation or other items). The BoQ was prepared by the implementer who did not consult his consultant, or by a consultant who forgot to analyse the average borehole depth. In short: many mistakes are made and the project is bound to fail. This is what the implementing agencies found out, and the NGOs adapted to this by quickly introducing the no-water-no-payment option. This option at the first instance seems to work in an environment where people are not acting in a professional manner; the question is however whether it is also the most cost effective contract option.

3.9.2.1.2 Lump sum no-cure-no-pay contracts

The Lump Sum no-water-no-payment contract is a contract signed with the drilling contractor, whereby the contractor is responsible for the success-rate of the borehole. This type of contract has gained popularity because in many areas of Uganda, low success rates made the implementing agencies doubt the quality of the consultants and contractors they deployed. In addition, there is a lot of pressure from politicians and funding agencies for outputs and value for money. However, the introduction of these contracts has made drilling companies now also become consultancy companies. They have to carry out borehole site investigations as part of the drilling contract, as they will not get paid for dry boreholes. In this way, the two completely different professions get merged into one, which commonly is not a good development.

3.10 Drilling supervision, theory and actual practice

Drilling supervision is carried out by a hydrogeological consultant, who has to make sure that drilling contractors construct the borehole according to the contract specifications. In many contracts the siting consultant is also responsible for the drilling supervision. The drilling supervisor represents the Client and will certify the payment requests of the drilling contractor.

A drilling supervisor should be full time on site and be able to understand all the drilling contractor is doing. The drilling supervisor instructs the driller when to stop drilling and also advises on the design of the borehole; as such, the drilling supervisor may influence the final price of a borehole. The supervisor also has to make sure the borehole is constructed in a professional way. S/he will record all events during drilling on a minute-by-minute basis, and notes the depth at which the events occur. The more s/he records, the more the Client will know about what is happening in the underground. Failure to do so will make any future problem more difficult to solve.

For no-water-no-payment contracts, the NGOs and DLGs supervise the drilling activities themselves, though hardly on a full time basis, and only rarely have they employed a groundwater professional. Hence, there is no proper check of the quality of works being carried out. A borehole that tends to give good water during the pumping test may be silting slowly and depending on the size of the openings in the hole, the borehole may be out of operation after a few months. If it falls within the liability period the driller will need to correct the defects; this may not be an easy exercise and it would have been better to avoid the situation through professional full time supervision. If it occurs beyond the liability period, the borehole will become out of order.

Many contracts that are supposed to be full time supervised are in reality not supervised, whereas some companies deploy people with no relevant qualifications.

During the RUWASA project detailed guidelines were prepared for drilling supervisors and these are often included in the contracts for drilling supervisors. The Client however does not always insist on reports prepared according to these guidelines.

Drilling supervision for government funded contracts is always part of the siting contract. NGOs sometimes also use the same project approach as the government but may also opt to supervise the drilling themselves.

3.11 Operation and maintenance and rehabilitation

Table 9 gives an overview of the activities involved in operation and maintenance (O&M) and rehabilitation of water facilities. According to the sector guidelines, the responsibility for O&M of a borehole lies with the end-users, and they will be able to arrange for its maintenance and minor repair. The District is expected to step in when there are major repairs needed. Boreholes that are not operational because they are low yielding should not be rehabilitated. Rehabilitating a borehole will not increase the initial yield. These low yielding boreholes should not have been installed in the first place. For low yielding boreholes hydro-fracturing[3] could have been considered. In the RUWASA project, the success rate of hydro-fracturing was approximately 55%.

Table 9. O&M activities for borehole and shallow well with hand pump

Maintenance	Minor Repair	Major Repair
1. Clearing drains and surroundings, 2. Maintaining the fence Periodical replacement of fast wearing parts such as buckets and valves. 3. Periodical checking and service of the pump	1. Repair of damaged parts 2. outside routine maintenance 3. Replacement of damaged slow wearing parts (handle, chain, few pipes/rods, cylinder). 4. Repair of cracks in the platform or drain.	1. Re-drilling / hydro-fracturing 2. Fishing of dropped pipes and rods 3. De-silting of borehole 4. Repairs to borehole casing and screens 5. Replacement of platform and drain 6. Replacement of rising main

Under the sector guidelines, Local Governments may use up to 8% of the development budget for O&M and rehabilitation of boreholes and piped water supply systems that cannot be fully financed by communities. Rehabilitation works above this percentage should be carried out with the approval of DWD. The District should then provide DWD with a summary of the assessment of the required repairs. The required repairs should be verified by the DWD staff before implementation is carried out (GOU/MWE, 2008).

3.12 Tender processes

Borehole drilling projects are mostly implemented by District Local Government through the DWSCG. Other implementers are Central Government, NGOs, bilateral organisations and multilateral organisations (UNICEF, UNHCR) as well as specific multi-lateral funded programmes including drilling, e.g. NUREP and NUSAF.

There are three types of procurement methods being used in the sector:

1. Prequalification method is commonly used by Local Governments. The interested bidders are first subjected to prequalification on technical and financial requirements before bidding for the actual services to be provided. It is a cost-effective method and helps to ensure quality from the onset.

[3] *Hydrofracturing is a technology whereby a fractured aquifer tapped by a borehole that has clogged up or is not interconnected with nearby fractures is opened up.*

2. Open bidding method is where the bids are openly advertised and whoever is interested has the right to bid. The major problem with this method is that even non-qualified companies tend to bid. This makes the evaluation process harder because more tender documents are issued than in the prequalification method. However, its main advantage is that it skips the first step and can be implemented quickly.
3. Selective bidding method is where few companies are invited to bid for the specific services. The advantage is that it is a fast method, but it can easily be abused. In case it concerns a government project, it is important to know the financial and technical capabilities of the firms invited and to obtain approval to use the method by the Contracts Committee.

3.12.1 National level

The DWD issues borehole siting and drilling contracts for specific emergency programmes. These contracts are usually tendered out under selective bidding and/or open national bidding, and include the drilling of up to 30 boreholes.

Some of the contracts are framework contracts and have a size of up to 100 boreholes for drilling and up to 150 boreholes for geophysical site investigations.

3.12.2 Districts

The District Local Governments follow the standard tendering process as described in the District Implementation Manual. Consultancy companies first have to pre-qualify and then will be invited to submit proposals. Drilling contractors do not need to prequalify since their contracts usually exceed UGX 50m the limit above which there must be open national tendering according to the guidelines.

The procurement process for a particular year starts in March of the previous financial year. According to the implementation work the execution of the works starts in September of the particular year. In practice however most of the siting and drilling work is limited only to the second half of the financial year with most work even concentrated in the last quarter of the financial year. There is no siting and drilling activity in the District in the first half of the financial year (July-December).

The PPDA has issued standardised tender documents for the administrative sections. The local governments will need to customise the administrative and the technical sections of the documents and include specifications and details of the services to be rendered. The technical specifications for drilling are more or less standardised but for siting detailed specifications are never included.

3.12.3 NGOs and bi/multi-lateral organisations

NGOs procure contractors either through the open bidding method by publishing advertisements in the news papers, or they make use of the selective bidding option. The tender documents are either provided by their own organisations or they make use of documents provided by MWE or by the DLG of the district they operate in.

3.13 Prices for borehole drilling and siting

The cost for siting and drilling a borehole refers to what the consultant and the contractor actually spend on carrying out the job, whereas the price refers to what the contractor or consultant charges the client. The price includes the profit, the costs does not include the profit. The cost however should include overhead and depreciation. The client therefore has to make budgets based on the anticipated prices for the services of the driller and the consultants.

Borehole were initially drilled at a rate of UGX 20,000,000 (US$ 10,000), and this rate was incorporated in the government budgets when the government was still in charge of drilling in the country. These rates were adapted when the privatisation started. Soon after, the justification for privatising the drilling sector was given when unit rates for borehole drilling started to drop.

The budgets that Central Government allocates to districts are variable. The DWO requests for the funds and s/he will base his unit rates on the experiences during earlier tenders. The range of unit costs as reported for government funded projects is listed in **Table 10**.

Table 10. Prices for GoU funded boreholes

Source	Unit rates UGX from	Unit rates UGX to
Sector Performance Report 2009	5,403,000 (Adjumani D.)	47,636,000 (Kotido D.)

The prices do not include borehole siting and the consultant assumes siting is part of the BoQ based drilling contract.

The prices for borehole site investigations are in the range of UGX 600,000 to 1,000,000. Prices that drilling companies have pay to consultancy companies and individual consultants, are between UGX 300,000 and UGX 800,000.

3.14 Planned drilling activities in Uganda

The Sector Investment Plan analyses a few scenarios for the investments required for the construction of boreholes depending on the desired service coverage levels. **Table 11** shows the number of boreholes that need to be drilled to attain the planned service coverage levels. The table also gives the number of boreholes for which the funding still needs to be found and the related funding gap. The following assumptions have been made:

1. Government can finance 900 boreholes per year
2. NGOs will finance 300 borehole per year
3. Unit cost per borehole is UGX 17.4m, 1 US$ = UGX 2,000
4. Borehole share in the technology mix[4] is 37%
5. Safe coverage of 70% in 2015

Table 11. Planned borehole drilling in Uganda and funding gap

Year	Nr. of boreholes still to be funded	Nr. of boreholes	Funding gap US $
2009-2010	191	1,391	$1,661,590
2010-2011	606	1,806	$5,276,490
2011-2012	964	2,164	$8,383,750
2012-2013	1,360	2,560	$11,831,410
2013-2014	1,559	2,759	$13,566,525
2014-2015	1,771	2,971	$15,403,945

3.15 Constraints in the rural water supply sub sector

The general constraints that have been identified for the rural water supply sub sector during the reform study are listed Table 12.

[4] *Technology mix refers to the mix of applied types of safe water sources in a district, e.g. 37% boreholes, 33% shallow wells and 30% protected springs. The technology mix is dependent on prevailing geological, topographical and climatological conditions, and also to what extent the cheaper options have yet been completely implemented.*

Table 12. Community contributions

Nr.	Constraint
1	Low technical and functional capacities at District level.
2	Planning and budgets for water and sanitation are being done in isolation.
3	Community mobilization and capacity building gender mainstreaming is weak.
4	Full private sector participation is yet to be realised especially for simple technologies. Spare parts distribution through the private sector is reported as problematic. Borehole drilling capacity, whilst limited, is growing.
5	District level tendering, contract management, financial management as well as reporting were found to be under developed, thus leading to very substantial sector programme implementation delays and under-utilisation of allocated funds.
6	O&M structures were found to be weak or non-existent and most Districts lacked back-up support for community based Operation and Maintenance especially for boreholes and Gravity Flow Schemes (GFS).

4 RESULTS OF SURVEYS, MEETINGS AND WORKSHOPS

4.1 Introduction

In this Chapter, a summary of the results of the questionnaire survey, the field visits and the meetings and workshop will be given. The first section will elaborate on the response of the questionnaires, the number of meetings held and the attendance of the workshops, while in the subsequent sections the combined results of the data collection activities are given in sections describing the working environment and/or capacity of the drillers, consultancy companies, groundwater professionals, implementing agencies and role of communities in drilling projects.

It should be noted that the results are based on the reported information by a large number of the drillers but not all the drillers. Some information has been reviewed with care but the consultants cannot be held responsible for the reliability of the information provided by the drillers.

4.1.1 Questionnaires returns

All questionnaires apart from the community questionnaire were sent by email to the respective stakeholders. The Consultant prepared the mailing lists based on attendance lists of workshops and through information obtained from DWD. The mailing lists are given in Annex 3.

The Consultant ensured follow up on the returning of the questionnaires through phone calls and visits. The time allocated for this study allowed for a limited number of visits. Because of the apparent complexity of the driller's questionnaire, the Consultant decided to concentrate on visiting the drillers.

4.1.1.1 Drillers

All drillers with a valid drilling permit received a questionnaire by email. Only one driller did not have an email address and his questionnaire was delivered by hand. The contacts for the drillers were obtained from the Permit database, tender documents and data submission reports. During the course of the project, some additional drilling companies were identified that did not have an updated license or were not recorded in the drillers' database. Out of the 43 questionnaires, 32 were returned including 3 NGOs and 29 Limited companies.

4.1.1.2 Consultancy companies

All consultancy companies were identified through workshop attendance lists, discussions with other stakeholders and tender documents of implementing agencies. All individuals received the company questionnaire as well and they were asked to fill the company questionnaire if they had registered a company and/or were using the company to tender for borehole siting and drilling supervision work. Only seven company questionnaires were returned.

4.1.1.3 Consultants

More than 100 groundwater professionals received the questionnaire. This group included professionals working in various departments and levels of the government, in NGOs, international organisations, in consultancy companies and in drilling companies. Twenty eight questionnaires were received. Mainly government officials have not returned a filled questionnaire.

4.1.1.4 Implementing agencies

Eighty District water officers received the implementers questionnaire as well as 18 NGOs, 4 international organisations and 9 other government institutions involved in the implementation of water projects. The questionnaires of 13 Districts, 8 NGOs, 1 TSU and 1 international organisation were received.

4.1.2 Meetings

The Consultant held interviews were held with various stakeholders in the sector during meetings meant for introduction or collection of the questionnaires or through separate meetings.

4.1.3 Workshop

The Consultant and Client jointly organised a workshop to present the preliminary results of the survey in Radar Hotel, Seeta on 18/12/2009. A large cross-section of water sector stakeholders attended the workshop (see attendance list in Annex 4) and were able to give their opinion on the report and add additional comments on issues not yet included in the report.

4.2 Assessment of hydrogeological consultants and companies

4.2.1 Introduction

An initial list of approximately 100 groundwater professionals in Uganda was prepared and used to collect information. At a later stage more people were added to the list. The professionals are working in the following organisations:

1. Consultancy companies
2. Individual consultants
3. Central government departments
4. District Local Government
5. Non Governmental Organisations
6. International organisations

Figure 4 shows the number of groundwater professionals working for the various types of organisations as obtained through this original list. A full list of the professionals is given in Annex 3.

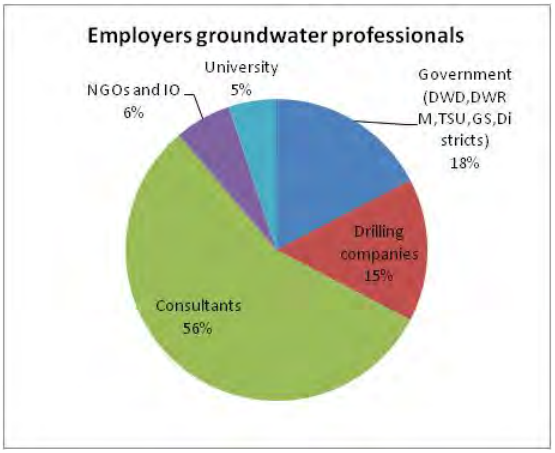


Figure 4. Employers groundwater professionals in Uganda

There are approximately 25 (consultancy) companies involved in groundwater assessment and development advisory activities.

The general role of the groundwater professionals is the assurance of a professional implementation procedure in groundwater resources assessment and development projects. Their specific role depends on the organisation they are working for.

The groundwater professionals are not organised in an association and one does not need a license for carrying out the profession.

The groundwater professionals have been trained in Uganda and abroad. There are no specific groundwater related courses at the universities and technical colleges in Uganda. Groundwater resources development subjects are included in courses for civil engineering at the technical colleges and in courses for chemistry and geology at Makerere University.

Table 13. Size of consultancy companies (turnover and number of staff)

Size of companies	Turnover in UGX	No. of companies
1 person	20,000,000 – 50,000,000	9
2-5 persons	50,000,000 – 500,000.000	8
> 5 persons	500,000,000 – 800,000,000	3

4.2.1 Consultants, companies and projects

Most of the groundwater professionals are involved in project and contract management, hydrogeological / geophysical surveys and supervision of drilling activities. The most important clients for the consultancy companies are local governments, NGOs, Central government, drillers and private clients. Individual consultants may not work for government projects because GoU only allows companies to tender. As a result, half of the companies are 1-person companies, to enable them to tender for GoU contracts. The size of the companies based on people employed is given in **Table 13**.

4.2.2 Assessment of technical and logistical capacity

4.2.2.1 Educational level staff

The technical capacity of groundwater consultants is highly variable. The educational level of the official groundwater professionals operating as consultant in the sector ranges between Diploma and M.Sc. level. However people with levels as low as S4 are sometimes employed by companies or individuals who cannot afford to deploy a groundwater professional.

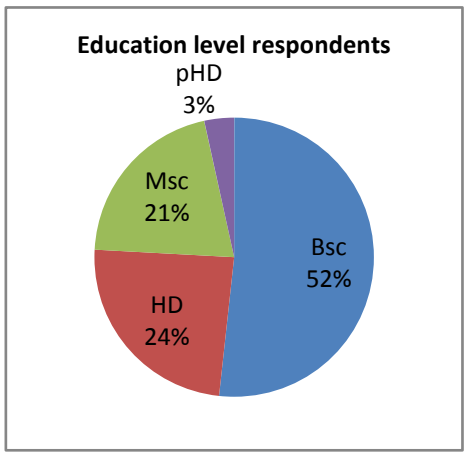


Figure 5. Educational level respondents consultants

Out of the 29 people who submitted the questionnaire more than 50% has a B.Sc. (see Figure 5).

Table 14 Table 1 also indicates that drilling companies prefer employing BSc. and Diploma Holders while most M.Sc. professionals are working in consultancy companies besides B.Sc. professionals. University lecturers sometimes work as free lance consultants. However, more information on individual consultants is required to get more conclusive results.

Most professionals only have practical experience in geophysical surveys for rural water supplies for which resistivity equipment is used. The level of theoretical knowledge has not been assessed. Only few individuals and companies have been involved in large scale groundwater assessment studies for town water supplies. Most consultants only have limited theoretical and practical knowledge because they did not have the opportunity to work fulltime in a professional consultancy company or were able to follow training courses abroad.

Table 14. Educational level and organisation

Organisation/ Educational level	B.Sc.	HD	M.Sc.	PhD	Total
Consultancy companies	9	3	4		16
Drilling companies	4	4			8
Free Lance	1				1
Government			1		1
NGO	1				1
University			1	1	2
Total	**15**	**7**	**6**	**1**	**29**

4.2.2.2 Approach and methodology of geophysical surveys

Most consultancy companies carry out basic geophysical investigations without detailed desk studies. Aerial photographs are hardly consulted (while they only cost UGX 10,000 at the department of Surveys and Lands) and only one company has stereoscopes available. Borehole data are not always consulted while they can be obtained at UGX1,000 per record from the NGWDB of WRMD, Entebbe.

The data is not always of high quality and some records are listed double for which the Consultant then has to pay, so few companies still buy these records. Few companies maintain a database and/or library of the project data and reports they have compiled. The following activities summarize the generally applied siting methodology in Uganda:

- Few professionals use aerial photographs
- Few companies use GIS tools
- All use resistivity profiling; parallel profiling only in difficult areas or when budget allows
  - » Rural Boreholes
    - Profile length minimum 50 -500 m
    - Profile length maximum 100-1500 m (unlimited)
    - Station interval minimum 2-10 m
    - Station interval maximum 5 – 20 m
    - VES minimum : 1-4
    - VES maximum: 4-14
  - » Production Boreholes
    - Profile length minimum 100 -1500 m
    - Profile length maximum 300 - 3000m (unlimited)

4.2.2.3 Approach and methodology of drilling supervision

Supervisors are supposed to be full-time on site, whereby the supervisor either uses his/her own transport, or travels with the drilling team. The supervisor records all activities and materials used, in order to be able to prepare completion reports and sign completion certificates. The supervisor also discusses the borehole design, and decides when to stop drilling.

Most professionals have practical experience in the supervision of air rotary drilling and mud rotary drilling. Only few have experience with other techniques as they are hardly used in Uganda. No polytechnic or university course addresses in detail subjects on groundwater exploration and exploitation techniques.

4.2.2.4 Equipment

Table 15. shows the availability of geophysical equipment in the country. It shows that quite a number of Terrameters are available only not always with people who have been awarded the contracts. Not all proprietors of the equipment are willing to rent out the equipment. This has resulted in the impression that there is a shortage of geophysical equipment.

The Terrameters that are available are ABEM SAS300C and SAS1000 and some Sting R1 and R8. The VLF equipment are ABEM WADI and the EM equipment are Geonics EM34 and Geonics TEM47.

It may be concluded that there is no real constraint on the availability of equipment for geophysical surveys.

Table 15. Number of geophysical equipment

Organisation	Terrameter	VLF	EM
Companies	20	3	2
Individuals	2	0	0
WRMD / DWD	6	0	1
Drillers	18	1	0
Total	**46**	**4**	**3**

4.2.3 Financial capacity

Only few consultancy companies have submitted the questionnaire hence it is difficult to asses the financial capacity of the company. Most companies have a poor cash flow because of late payment problems and hence need advance payments to start the works. These advance payments can often only be obtained against bank securities. Generally this means that the companies need to hand over sureties (usually money or land titles) to the bank to obtain the guarantee. The sureties are not required by the insurance companies to issue guarantees. However, off recent, companies have submitted falsified insurance guarantees and clients are reluctant to accept these guarantees.

Generally the companies are not able to generate sufficient funds for further investment nor are they able to get large loans from banks. The non-availability of sufficient funds and/or the fact that the companies have not been willing to further invest (because of the difficulty of finding sufficient work to justify new investments) has resulted in a very slow growth of the size of consultancy companies in the groundwater sector in Uganda, if growing at all.

4.2.4 Costs and income for siting and supervision

Part of the questionnaire was aimed at assessing the costs involved in borehole siting and drilling supervision and the awareness of the stakeholders of these costs. Table 16, Table 17 and Table 18 give an overview of the actual costs involved provided one works with qualified people and will spend on average one day per village for geophysical investigations.

Table 16. Estimated costs involved in borehole siting exercise

Staff	Unit	Qty	Rate	Individual	Rate	Company	*Comments*
Hydrogeologist siting	day	1	50,000	50,000	93,750	93,750	*gross salary of UGX 1,500,000 per month, 80% billable*
Hydrogeologist reporting and desk study	day	1	50,000	50,000	93,750	93,750	*gross salary of UGX 1,500,000 per month, 80% billable*
Terrameter rent / depreciation	day	1	50,000	50,000	50,000	50,000	
Allowance hydrogeologist	day	1	40,000	40,000	40,000	40,000	
Transport in km per site	km	200	750	150,000	1,000	200,000	*individual rents car at 100,000 per day plus fuel*
Assistant technicians per day	day	2	40,000	80,000	40,000	80,000	*2 trained semi permanent assistant technicians*
Other casual per day	day	2	5,000	10,000	5,000	10,000	
Other costs	LS	1	100,000	100,000	100,000	100,000	
Commission	LS	1	100,000	100,000	100,000	100,000	
SUB TOTAL				**630,000**		**767,500**	
Overhead			0	0	15%	115,125	
Profit			0	0	20%	153,500	
TOTAL		**UGX**		**630,000**		**1,036,125**	

Table 17. Estimated costs involved in borehole drilling supervision

Staff	Unit	Qty	Rate	Individual	Rate	Company	*Comments*
Hydrogeologist drilling	day	3	50,000	150,000	93,750	281,250	*gross salary of UGX 1,500,000 per month, 80% billable*
Technician test pumping	day	1	25,000	25,000	46,875	46,875	*gross salary of UGX 750,000 per month, 80% billable*
Hydrogeologist reporting	day	1	50,000	50,000	93,750	93,750	*gross salary of UGX 1,500,000 per month, 80% billable*
Transport in km per site	km	200	750	150,000	1,000	200,000	*individual rents car at 100,000 per day plus fuel*
Allowance hydrogeologist / technician	day	4	40,000	160,000	40,000	160,000	
Other costs		1	75,000	75,000	100,000	100,000	
Commission	LS	1	150,000	150,000	150,000	150,000	
SUB TOTAL				**760,000**		**1,031,875**	
Overhead			0	0	15%	154,781	
Profit			0	0	20%	206,375	
TOTAL		**UGX**		**760,000**		**1,393,031**	

Table 18. Selling prices borehole siting and supervision

All rates in UGX	**individual consultant**				**consultancy company**			
Siting	**min**		**max**		**min**		**max**	
siting all inclusive					650,000	1,000,000	850,000	2,500,000
siting	200,000	800,000	250,000	1,000,000				
reporting	25,000		200,000					
equipment	100,000		150,000					
casuals	20,000		100,000					
transport	200,000		300,000					
Supervision	**min**		**max**		**min**		**max**	
supervision all inclusive					200,000	800,000	500,000	1,000,000
professional fees per day	100,000	400,000	200,000	1,000,000				

4.2.5 Assessment of management capacity

The few larger companies are managed by at least one senior hydrogeologist. These persons are also involved in the training or guidance of new staff. They are more focused on quality control and acquisition and are hardly involved in technical work. In the smaller companies the directors are still for the larger part involved in technical work including field work. Only the larger companies employ financial / logistic officers.

4.2.6 Assessment of reporting and data processing capacity

The survey did not include a proper analysis of the reports being submitted to the various clients by the groundwater consultants. Most companies are reporting to their Clients according to the standards set by the government.

Few companies maintain a database and/or library of the project data and reports they have compiled.

The software packages being used for interpretation of VES and resistivity profiles are Excel, Resix, Earth Imager and WINSEV. Only few people have bought licenses. For test pumping most companies use Excel spreadsheets.

4.2.7 Reported challenges and issues

The questionnaires were also intended to identify the major problems of the consultants in carrying out their work. A summary of the results is given in Table 19

Table 19. Constraints

Constraint	Individual	Company
Regulatory (no quality control, guidelines for siting, licenses for professionals)	31	9
Financial (low rates, high input costs, competition)	25	7
General (political influence, commissions)	13	7
Tax (VAT, corporate, import duty)	6	6
Community (not well sensitised)	3	0
Hydrogeological (poor potential)	2	0
Management	2	2

The most frequently mentioned challenges by the individual consultants are the following:

1. Not enough regulation
2. Districts more interested in commissions than in quality of works
3. No quality control
1. Unqualified people carrying out profession, licensing needed
2. No minimum rates for site investigations

The most frequently mentioned constraints by the consultancy companies are:

1. Poor regulation
2. Low budgets
3. Tough competition
4. Commissions
5. Late payments
6. No VAT on sales but VAT on inputs has to be paid and cannot be claimed
7. No long term relationships based on merit with clients can be established (see Box 4).

Building a long term relationship with clients

After 3 years of poor results, local politicians forced the technocrats in one of the Districts in Northern Uganda to employ another consultancy company and drilling company for the siting and drilling of boreholes. In many instances they were allocated villages where other companies had failed. A success rate of 100% was obtained and it seemed the basis for a long term relationship to ensure efficient use of funds for groundwater development in the District. Unfortunately the following year, other companies were contracted and many dry boreholes were drilled again. Why are contractors and consultants not hired on merit by (local) governments?

Box 4 Failing to build a relationship with Clients based on merit

4.2.8 Reported suggested solutions

The consultants came up with a number of suggestions for improvements in the sector. These are given in Table 20.

Table 20. Solutions suggested by individual consultants and companies

Solution consultants	No.
Licensing of qualified staff (grading companies / individuals)	17
Better standards for consultants	11
Better standards for drillers	7
MoWE to monitor quality control of works / adherence to rules	7
Set up a consultants association	7
Free availability of data / knowledge sharing	6
Fixed or minimum unit rates / review siting rates	6
Abolish no water no payment contracts	5
Centralise / regionalise drilling projects	4
Fight / report corruption	3
More hydrogeological mapping	3
Adapt contracts to hydrogeological conditions	3
Districts NGOs better planning of communities	2
Setup training programs / schools	2
Separate drilling and siting / supervision contracts	1
No involvement of political figures	1
MoWE monitor award of contracts in Districts	1
Distribute contracts between companies	1
Revise contract set-up mobilisation siting drilling	1
Government should regulate NGOs	1

Solution companies	No.
Licensing of professional	5
Legal means against corruption (commissions, NGOs/Gvmt officials in tender)	4
Revise tax regime	4
Engineers estimates	2
Better standards / guidelines	2
Framework fixed fee contracts	2
No payments linked to success rates	1
More transparency in contract awards	1
Monitoring body for works	1
Better planning of implementers	1
Government to enforce guidelines / standards to NGOs / donors	1

4.3 Assessment of drilling contractors

4.3.1 Introduction

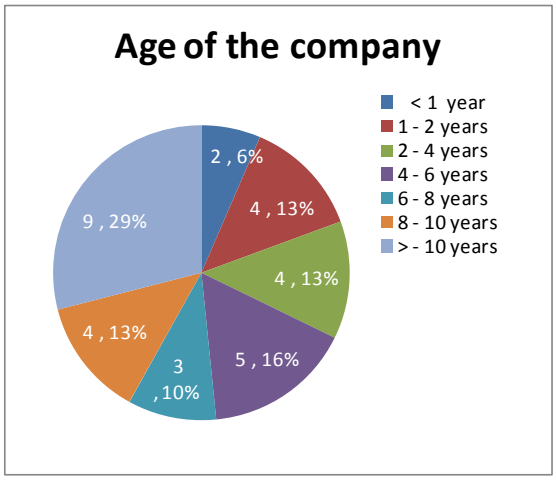


Figure 6. Age of the drilling companies

WRMD gives out licenses to drilling contractors. This database together with drilling completion reports was used to set up a list with all drilling contractors in Uganda. The list with operational drilling contractors is given in Annex 3. By December 2009 there were:

- 39 companies with permits
- 3 companies without permits
- 3 NGOs with drilling permits

4.3.2 Establishment of companies

All companies are registered with the Registrar of Companies and have a Certificate of Incorporation. These documents are also a requirement for companies to obtain any government contracts. The date of incorporation was used to calculate the age of the companies. In Figure 6 the age of the companies is depicted; it is remarkable that many of the companies (29%) are well established and older than 10 years. The

companies that have ceased operating in Uganda have either been adapting a new name, were in the country only during and just after the RUWASA project or they stopped activities because of the difficult business environment.

Only 85% of the companies are VAT registered. Some of the companies were forced to de-register from VAT by Uganda Revenue Authority (URA) because boreholes and all water related construction and consultancy services are not subject to VAT. It is not clear why other companies were not forced to de register.

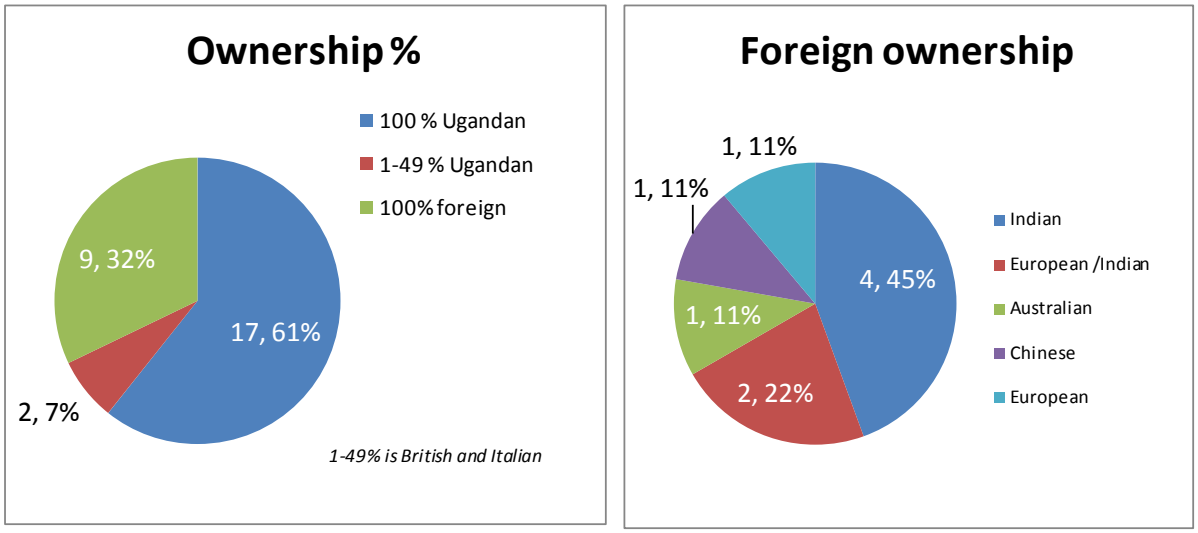


Figure 7. Ownership of the drilling companies

Most of the drilling companies are fully owned by Ugandans as can be seen in Figure 7. Most of the foreign owned companies are owned by Indians.

4.3.3 Activities drilling companies

Most drilling companies get the largest part of the turnover from Uganda. Some companies have ventured into drilling projects in Sudan, Rwanda, DRC and Burundi but the markets there are either small, or are dominated by local drilling companies. Operational and logistical challenges occur when drilling boreholes at large distances from the home base. Only few companies have set up a base in Sudan.

Apart from venturing outside Uganda some companies have started other activities in the Ugandan water sector like:

1. Sales of hand pumps and submersible pumps
2. Construction of piped water supplies
3. Hydrogeological consultancies
4. Spring protection
5. Building construction
6. Geotechnical drilling

4.3.4 Assessment of technical and logistical capacity of the drillers

4.3.4.1 Educational levels

Most of the companies are directed by engineers, hydrogeologists and geologists combined with financial and administration experts. Out of the 27 companies that submitted data, two companies have only directors with a business background, while four companies have no technical person in the board of directors.

4.3.4.2 Type and number of rigs and compressors

The information obtained through the questionnaire gave a good overview of the number of drilling rigs and other equipment in the country. Table 21 gives an overview of the number of rigs per company.

Table 21. Number of rigs and other equipment

No. of rigs	No. of company	No. compressor	No. of company	no. of mudpump	No. of company
0	2	0	0	0	2
1	8	1	11	1	13
2	16	2	11	2	12
3	6	3	7	3	3
4	3	4	4	4	0
5	0	5	1	5	1
6	0	6	0	6	0
7	1	7	1	7	0
Total		**Total**		**Total**	
77	**36**	**82**	**35**	**51**	**31**

Most of the companies have two drilling rigs. There is one company with 7 drilling rigs. Most companies have one or two compressors and one or two mud pumps.

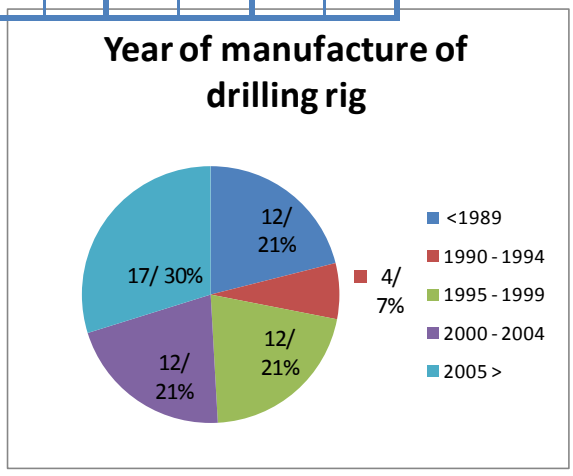
The age of the drilling rigs is given in Figure 8. Almost 50% of the drilling rigs is more than 10 years old. Quite a number of the 100% Ugandan companies have procured the old Ingersoll Rand and Hallco rigs that were used by DWD. The Indian-owned companies invested in Indian rigs, whereas one of the Indian drilling rig manufacturers also started a drilling company in Uganda. These rigs have been procured more recently.

There are three major types of compressors on the market, being Ingersoll Rand, Elgi and Atlas Copco.

The compressors are slightly less old (see Figure 8) as they are less easy to maintain and have a shorter lifespan. Most of the former DWD compressors are in a poor state.

In many cases, the drilling companies use large drilling rigs and compressors. The argument for the larger investments is that the drillers want to be able to drill boreholes in any hydrogeological environment[5] and be able to complete a borehole in a single day. In some cases drilling companies are drilling two boreholes in a day.

There are 10 small PAT rigs or equivalent.



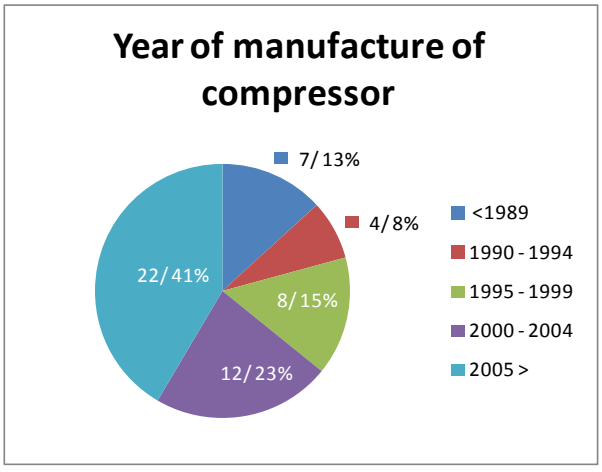


Figure 8. Age of the drilling rigs and compressors

[5] *The bigger rigs can operate all over the country, the smaller rigs cannot drill in large areas in Uganda where steel temporary casings are required. The pull back force of the small rigs is too small to handle the steel casings*.

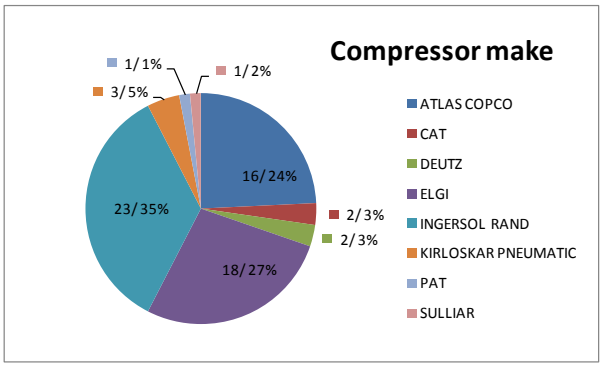


Figure 9. Compressors makes in Uganda

4.3.4.2.1 Drilling deep holes and large diameters

Most of the companies only drilling rural water supply boreholes for which depths hardly exceed 100 m. Some deep boreholes down to 300 m have been drilled for geothermal purposes. There is a tendency to start drilling deeper boreholes now water has been found at depths between 100 and 150 m. These depths can be easily attained with a large portion of the drilling rigs in Uganda. Some drilling rigs are able to drill up to 14" holes in the hard rock.

The rating of the compressors as indicated by the contractors in the questionnaires is given in Table 22, together with the reported number of these compressors available in Uganda. The largest compressors should be able to drill boreholes down to 200 m easily.

Table 22. Rating of compressors and number in Uganda

rating in bar	No. of compressors	rating in CFM	No of compressors
10 - 14	18	<300	1
15 - 19	6	300 – 500	9
20 – 24	22	500 – 750	6
25 >	18	750-1000	22
		1000-1250	17
		>1250	1
Total	**63**	**Total**	**56**

4.3.4.2.2 Mud pumps

There are at least 51 mud pumps in the country. These are mainly used in the collapsing formations in the overburden and in the Rift Valley sediments. For the sediments, the higher capacity mud pumps (> 15 bar) have to be used. There are 14 mud pumps with this capacity in Uganda owned by 8 companies.

4.3.4.2.3 Test pumping

Test pumping is part of the borehole drilling process. For rural water supplies, small submersible pumps with a maximum yield of 1 m^3/hr (against a head of 80 m) are sufficient. These 1-phase pumps can be operated with simple 1-phase generators, also because the test usually lasts less than 3 hours. For production wells with higher yields, longer tests need to be carried out. The bigger 3-phase submersible pumps require also 3-phase generators of 10 kVA and above.

There are at least 82 submersible pumps, most of them with a capacity of less than 10 m^3/hr as can be seen in Table 23. The highest capacity pump is 60 m^3/hr. The generators show a similar pattern with the highest number suitable for small pumps only.

Table 23. Pumps and Generators

Yield (m^3/hr)	Nr. of pumps	Capacity (kVA)	Nr. of generators
> 30	4	> 15	16
20-30	3	10-15	13
15-20	3	5 -10	21
10-15	2	<5	7
5-10	13		
2-5	35		
<2	10		

4.3.4.3 Number of boreholes drilled

There are a few sources that are used to assess the number of boreholes drilled by a drilling company. That is the database of the driller and the NGWDB.

4.3.4.3.1 Drillers databases

A small number of drillers keep their own database, usually in Excel format as a management tool. These databases are believed to be the most reliable databases for the number of boreholes drilled per year for the particular driller. .

4.3.4.3.2 National Groundwater Database

The NGWDB is kept by DWRM to monitor the borehole drilling activities, to sell the data to interested stakeholders and to prepare thematic groundwater maps. The information is entered from repoprts submitted by drilling contractors as part of the requirements of the drilling permits.

To get an idea of the number of boreholes drilled by the contractors the NGWDB was consulted. The numbers of boreholes drilled in 2007, 2008 and 2009 up to date are presented in Figure 10.

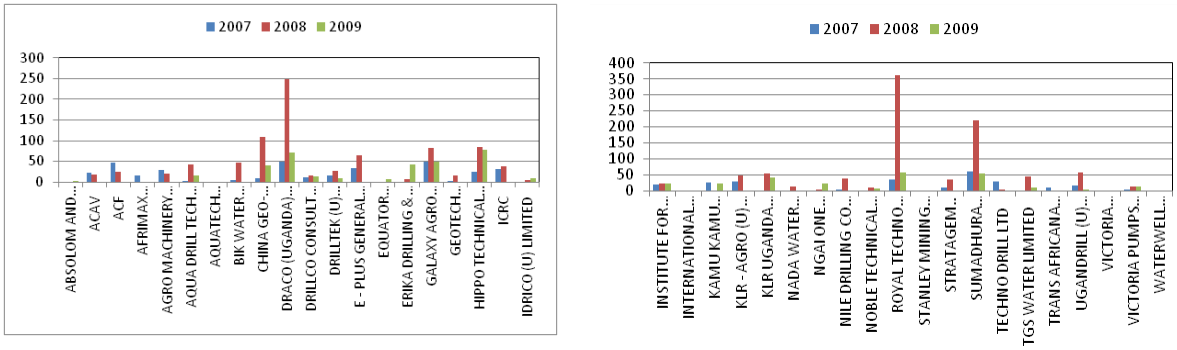
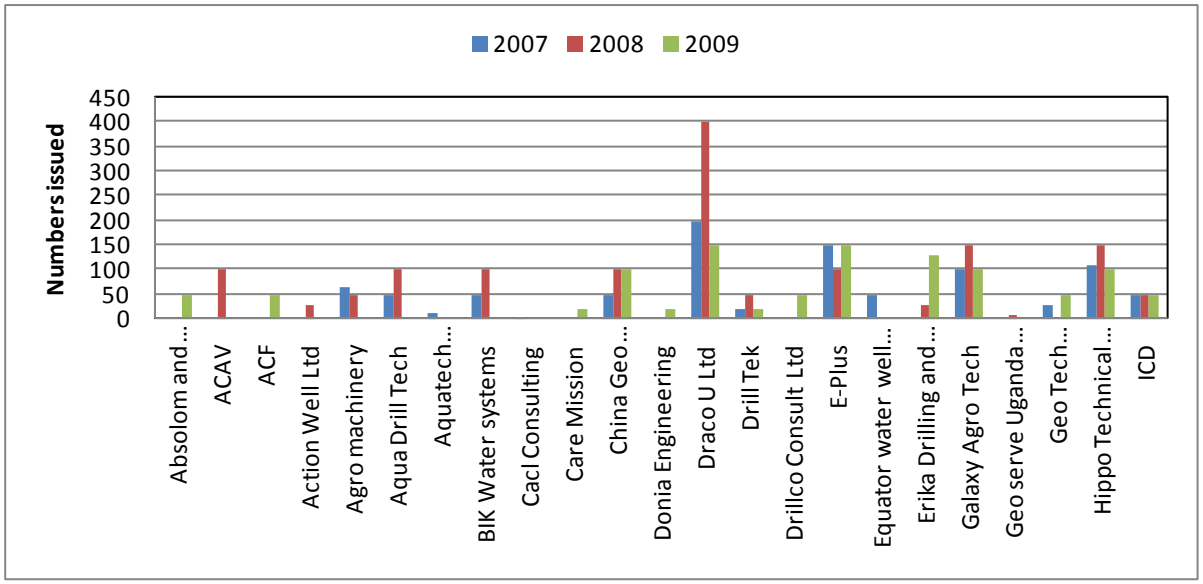


Figure 10. Borehole records in NGWDB per contractor

The graph clearly indicates the size of the different companies but the actually number of boreholes included in the database does not correspond to the numbers of the boreholes in the contractors' databases and also not to the number of borehole numbers issued (Figure 11).

4.3.1 Financial capacity drillers

The financial capacity of the drillers is highly variable and also depends on the time of the year. Delay in payments, poor payment schedules and poor contract conditions are a major challenge for the cash flow of all drillers. Only a few larger drillers have been able to get access to credit with banks and/or suppliers (7 companies only). The drillers who replied on the financial sections think that on average they need about 13% of their annual turnover as working capital (approximately UGX 165m). The 7 companies that have access to overdrafts have an average facility of approximately UGX 200 m. Only 7 companies can get bank securities for bonds.



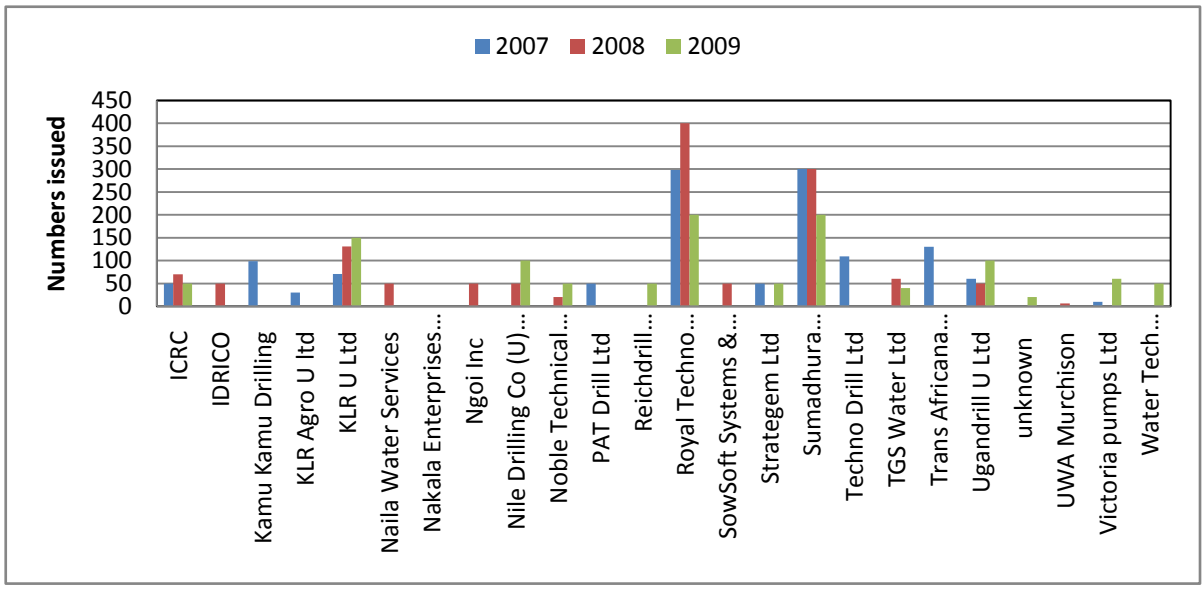


Figure 11. Borehole numbers issued per contractor

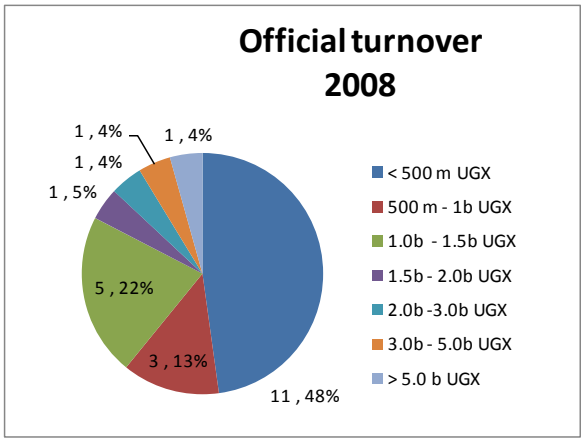


Figure 12. Official turnover 2008

The annual turnover for 2008 of the companies is depicted in Figure 12 and shows that almost 50% of the companies has a turnover of less than UGX 500,000,000. A third of the companies has a turnover between UGX 0.5 and 1.5 billion and approximately 20% of the companies has a turnover of 1.5 billion and above. It is remarkable that the lowest average annual turnover is found for the 100% Ugandan companies while the highest average annual turnover is found for the 100% Indian companies. This is illustrated in Table 24.

The drillers operate with targeted profit margins between 5 and 40% (see also Table 25). The actual profit margins for 2008 are between -20% and +52% as can be seen in Table 26.

Table 24. Average turnover 2008 per ownership nationality

Nationality	Average turnover 2008	Nr.	Max	Min
Australian	954,022,655	1	954,022,655	954,022,655
Chinese	484,381,000	1	484,381,000	484,381,000
European	635,019,168	1	635,019,168	635,019,168
European/Indian	797,847,727	2	1,176,917,823	418,777,630
European / Ugandan	2,973,241,141	1	2,973,241,141	2,973,241,141
Indian	3,369,962,512	3	6,908,012,000	1,240,124,058
Ugandan	532,858,787	13	1,449,372,725	40,000,000
Grand Total	**1,076,336,872**	**22**	**6,908,012,000**	**40,000,000**

Table 25. Sales price range for borehole drilling

Parameter for costs		minimum range UGX		maximum range UGX		Approx average
BoQ	*Borehole drilling cost ex siting*	7,000,000	16,000,000	10,000,000	25,000,000	14,540,000
BoQ	*Borehole drilling inclusive siting*	10,000,000	17,000,000	12,000,000	28,000,000	16,425,926
LS	*Borehole drilling*	3,000,000	18,000,000	5,000,000	25,000,000	13,259,091
Cost for dry borehole	*Direct cost*	1,000,000	12,000,000	3,000,000	14,000,000	5,833,333
profit margins		5%	30%	10%	40%	19%
Overhead in % and amount UGX		8%	30%	900,000	3,500,000	1,855,556
Depreciation in % and amount UGX		2 %	20%	200,000	2,000,000	910,000

Table 26. Official profit range 2008

Profit range in UGX		No.		Profit range in % of turnover		No.
<	0	1		<	0	1
0	50,000,000	8		0%	5%	8
50,000,000	100,000,000	7		5%	10%	4
100,000,000	200,000,000	3		10%	20%	3
200,000,000	300,000,000	1		20%	30%	1
300,000,000	500,000,000	1		30%	50%	4
>	500,000,000	1		>	50%	1
	TOTAL	**22**			**TOTAL**	**22**

4.3.2 Evaluation of general capacity of drillers

The questionnaires sent to the implementing agencies also catered for a brief evaluation of the performance of the drilling companies on their projects. The scoring is in the range of 1-5, with 1 being very poor, and 5 being very good. The drilling contractors were also assessed on their compliance with reporting requirements for DWRM (with a score of 1 up to 3). A summary of the results is given in Table 27.

Table 27. Evaluation of contractors

Evaluation by implementers			Reporting to DWRM	
point score range	**nr. of companies**		**score**	**nr. of companies**
1 - 2	-		1	1
2 - 3	1		2	5
3 - 3.5	3		3	9
3.5 - 4	7			
4 - 4.5	7			
4.5 - 5	-			

4.3.3 Costs and income for borehole drilling

Drillers often do not know the actual costs for drilling a borehole. The drillers just follow the market rates and quote accordingly. They fill the BoQs in the proposals in such a way that they will end up with the required amount, ignoring the actual cost for each of the BoQ items.

The cost of a borehole consists of the direct costs (all borehole items, drilling consumables, fuel, allowances, etc.) and indirect costs being depreciation and overheads. The depreciation is not a real cost that may appear on this project but it is a provision for the replacement of the rig and cars after a certain number of years. The overhead consists of salaries, office rent, operation and maintenance of the equipment, secretarial costs etc). The direct costs are clear and can easily be estimated for a borehole, whereas the indirect costs depend on many different factors like purchase price of the equipment, write-off period for the equipment, salaries of the staff, etc. There are various ways on how to deal with these indirect costs to

come up with a fee per borehole. The bottom line is one has to have a good idea of all the overhead costs per year and most importantly on the number of boreholes one expects to drill in a year. The anticipated annual depreciation and overhead costs need to be distributed over the number of boreholes drilled in a year. This concept is hardly used by the drillers in Uganda. Table 28 shows a scenario for drilling costs. The direct costs for a borehole in Uganda are between UGX 5.5m and UGX 8.0 m. The indirect costs may vary between UGX 6.55 m and 12.65 m and with profit margins between 10 and 20% will end up with a selling price between UGX 7.2m and UGX 15.2 m. In the scenario of UGX 7.2 m, the driller does not include depreciation nor a cost for dry boreholes. The above scenario corresponds reasonable well with the information from the returned questionnaires as can be seen in Table 25. It should be noted however that a selling rate of UGX 3 m per borehole may be erroneous.. The final price for a borehole depends more on what the contractors are charging for the indirect costs; the variation in direct costs does hardly exist although some contractors may use cheaper, lower quality products.

Table 28. Cost scenarios for borehole drilling

	Item	min	max
Direct costs	Casing, allowance, fuel rig, foam, etc	3,750,000	4,250,000
	Borehole siting	300,000	800,000
	Fuel for cars	500,000	1,500,000
	Commissions	1,000,000	1,500,000
	subtotal	**5,550,000**	**8,050,000**
Indirect costs	Dry borehole direct cost		
	ex GO, profit, depreciation, commission, and % for otherwise drilling successful borehole, amount depends on % success rate expected	not included	600,000
	Depreciation	not included	2,000,000
	Overhead	1,000,000	2,000,000
	subtotal	**1,000,000**	**4,600,000**
	TOTAL	**6,550,000**	**12,650,000**
	Profit *(min = 10%, max = 20%)*	655,000	2,530,000
	TOTAL SELLING RATE	**7,205,000**	**15,180,000**

4.3.4 Contracts

The drillers were also asked to express their opinion on the preferred contract type. The results as shown in Table **29** indicate that BoQ based contracts and lump sum (LS)- based contracts have an equal number of supporters. In addition, three companies would not mind working under LS conditions if they receive compensation when the success rate falls below a certain threshold value. Many companies complain about the risk they have to bear when signing a contract.

Table 29. Preferred contract types

Preferred Contract type	No. of companies
BOQ	9
Lump Sum (LS)	9
LS with compensation for dry boreholes	3
No preference	1
Grand Total	**22**

4.3.5 Non operational companies

Quite a number of drilling companies have ceased to exist in Uganda. The major reasons that are mentioned by the various people interviewed are:

1. Companies changed name after tax wrangles and actually continued with their drilling activities.
2. Corruption
3. End of the RUWASA project and more decentralised drilling tenders which are more difficult to win
4. Too few boreholes to be drilled on an annual basis

4.3.6 Reported challenges and issues

The drilling contractors were able to express their challenges in the questionnaire. Table 30 gives an overview of which challenges were reported most frequently. In their view the solving of the issues discussed below may all lead to significant reductions in drilling costs and prices, better quality boreholes and a more favourable environment for investment in the drilling sector hence an increase in the drilling capacity in the country.

The drillers through their drilling association also sent a letter to the Minister of Water explaining their challenges in more detail. This letter is given in Annex 5.

Table 30. Constraints mentioned by drillers

Constraints	1st	2nd	3rd	4th	5th	6th	7th	8th	Total
No quality control of works	0	2	3	1	0	1	11	1	19
Competition	3	2	2	3	1	2	0	0	13
Late payment	2	2	4	1	2	1	1	0	13
Commissions	5	2	3	0	1	0	1	0	12
Poor regulation	3	3	0	3	1	0	0	1	11
Low rates	1	3	1	2	4	0	0	0	11
Import duties	2	1	3	3	1	1	0	0	11
VAT	1	4	1	0	1	1	1	0	9
Corporate tax	2	1	0	1	0	0	0	0	4
High costs of procurement /unrealistic tender requirements	0	0	1	1	1	1	0	0	4
Foreign companies have links with foreign governments, manufacturers and NGOs	1	1	0	0	0	0	0	0	2
Political influence	0	1	0	0	0	0	0	0	1

4.3.1 Reported suggested solutions

Table 31 shows the categorised solutions to their challenges that the drillers mentioned in the questionnaires. These suggestions have been considered when preparing the final recommendations for this report

Table 31. Mentioned suggested solutions

Solutions	Times
Government to punish corrupt officials	7
Drillers to form association	7
Standard drilling rates	6
Taxes on drilling materials be abolished (VAT, import duties)	5
Amend current water laws	3
Centralise bidding and projects	3
Involve consultants to supervise works	3
Government to send funds to districts promptly	3
Central government to supervise districts	2
Government to increase boreholes	2
Government to set standards for borehole construction	2
Only genuine companies to get permits	1
Local contractors should be protected and supported by GoU	1

5 CONCLUSIONS

5.1 General

The current implementation environment for borehole drilling in Uganda is not conducive for an efficient and effective implementation of borehole drilling projects. The major problems are the decentralised fragmented implementation of water projects, the unfavourable tax environment and the lack of regulation.

The lack of regulation has had a negative impact on the development .

The amount of work provided by DLG is only concentrated in a few months per year because of rigid flow of annual funds from central government to districts. The competition is tough in the rest of the year and this competition has led to unrealistically low market rates throughout the year. These low rates endanger the quality of works delivered by the contractors whose activities are rarely fulltime supervised by professional supervisors because of a shortage of such professionals on the market.

The unfavourable environment has frustrated investors who may go bankrupt after a few years because the low rates never allowed them to create a buffer for paying for the replacement of their equipment. Others will be reluctant to further invest in the sector. Consultants are not willing to invest in a large core staff which limits their company growth and also the growth in number of professionals in a professional working environment.

The large rural water supply projects like RUWASA have had a very significant impact on the water sector in terms of training professionals and high quality outputs. These projects are now replaced by decentralised implementation of projects by district administrations. These districts generally have a low capacity to implement and manage borehole drilling projects. There are also less training opportunities for groundwater professionals with companies who can only operate with very small number of core staff, especially those for borehole siting and drilling supervision, because they have difficulties getting sufficient work to sustain the core staff in the current highly competitive, fragmented and unregulated implementation environment.

The common practice of demanding for commissions (by government staff, NGO staff and private sector staff) is a real danger for sustainable development of the water sector. The implementing staff has usually little understanding of the costs involved in drilling. They demand high commissions that force contractors and consultants to compromise some of the activities that are specified in their contracts thus furthermore endangering the quality of the services and works. Still, these works will be certified because the Client, the Contractor and the Consultant are on the same side. The government does not only lose the money related to the percentage commission (including the tax that needs to be paid by government for receiving the commission by its officers) but loses even more because it ends up with sub standard work.

The government has already undertaken some steps to better regulate the sector, of which the licensing of the drilling contractors is a good example. The installation of the TSUs was also a good intention but these TSUs are often not recognised as technical advisors by the DLGs.

It is expected that a better regulation and a reorganisation of project implementation activities together with the initiation of more training activities may lead to a more efficient and cost effective borehole drilling sector in Uganda.

The conclusions of the surveys and meeting are discussed in more detail in this Chapter while recommendations for improvements are given in Chapter 6.

5.2 Capacity of drilling contractors

5.2.1 General Capacity

Generally, the capacity of the drilling contractors is reasonable. Most companies score average on the various evaluation criteria. There are quite a few companies operating at higher standards and very

few companies operate below standards. These companies should be reprimanded by DWRM and suggestions should be given to them on how to improve.

5.2.2 Technical Capacity

5.2.2.1 Productivity

The productivity of the contractors varies greatly. This is due partly to the capacity and status of the equipment of the contractors but also due to the difference in skills and resources to get large contracts. For a contractor with a framework contract of 100 boreholes it is easier to complete 150 boreholes a year than a contractor who has to obtain district contracts of 5 boreholes each.

5.2.2.2 Quality and equipment

The capacity of the drillers to deliver good quality boreholes was difficult to assess because we received few questionnaires from implementing agencies.

5.2.2.3 Borehole siting

Only few drilling companies have employed their own hydrogeologists for borehole siting. Many of the drilling companies employ individual groundwater consultants or consultancy companies.

5.2.2.4 Large diameter

Few (5) companies are able to drill large diameter boreholes; most drilling companies have a maximum drilling capacity of 10".

5.2.2.5 Large yield test pumping

The capacity for test-pumping high yielding boreholes is low, there is only one company that is able to test-pump a borehole at 60 m^3/hr.

5.2.3 Management Capacity

5.2.3.1 Data management

Data management of drilling contractors is generally poor; only a small number of drillers keep their own database, usually in Excel format. The financial management capacity of most drillers is limited. Many companies suffer from cash flow challenges and only operate for a limited number of years. Most companies are not able to make budgets, and accept high risk project without evaluating the risks beforehand.

5.3 Overall and specific capacity of private sector consultants

5.3.1 General Capacity

The groundwater professionals in Uganda are not organised. The largest part work as individuals hired by companies on a project basis or they have set up small 1-2 person companies. Few people have ventured into larger consultancy companies with a larger number of core staff because an assurance of long term larger projects cannot be guaranteed. It is also difficult to build long term relationships with Districts or NGOs even if one has delivered good services.

Only 30% of the groundwater professionals actually submitted the questionnaire. A more detailed assessment should be made of the consultants in the near future if the government wants to introduce a licensing system.

The results of the survey indicate that the existing companies generally know what to do for the rural water supply hydrogeological surveys. The work is carried out in a standardised approach, whereby as soon as the hydrogeological environment is more difficult and/or the client needs high yielding boreholes, the professionals are unaware how to do more intensive desk studies and field work.

5.3.2 Technical Capacity

The number of professional consultants in the sector is limited, and their education and thus theoretical knowledge leaves to be desired. The available companies are able to implement small rural water supply projects in terms of personnel, equipment and transport, but only three of them are able to have various siting teams operating simultaneously. MWE urgently needs to increase the capacity of the drilling and siting professionals in terms of number of people available for the market as well as the quality of their knowledge.

The government should consider the fact that people will only choose to become a groundwater professional if the sector can more or less guarantee them a job. The current sector framework is not able to give this guarantee therefore students will be reluctant to follow the relevant courses. A more regulated environment may improve the situation.

5.3.3 Management Capacity

Data management of siting and drilling supervision consultants is overall, with most companies not keeping files and databases of earlier projects. The financial management capacity of most consultants is limited. Many companies suffer from cash flow challenges and only operate for a limited number of years. Most companies are not able to make budgets, and accept high risk project without evaluating the risks beforehand.

5.4 Overall and specific capacity of government and NGOs

5.4.1 Central government

DWD is able to implement framework contracts and emergency works contracts. The payment for the contracts however is very slow as a result of numerous internal procedures.

DWRM has made a commendable step by licensing contractors and soon also consultants, but is not taking enough appropriate measures yet for drillers and consultants who do not work according to professional standards or guidelines set out by DWRM.

MWE is not able to properly regulate the sector. Many districts do not adhere to the established procedures and manuals. The district staff do often not follow up the advice of the staff of the TSU units.

5.4.2 Districts

The overall capacity of the Districts to manage and supervise drilling contracts is low. Drilling companies without permits are awarded contracts, and most districts are not supervising their siting and drilling contracts appropriately.

With the increasing number of districts, it becomes more and more difficult to fill DWO posts with well trained and experienced staff. The Districts have become very small in size and the DWO staff has only few boreholes to implement per year.

Generally the major interest of the Districts staff is the arrangement of commissions to be obtained through the drilling and siting and supervision contracts. This activity is the major constraint of an efficient and cost effective implementation of the project.

Anybody can write tender documents?

A US funded project in Uganda wants to drill town water supply production boreholes. The driller can tender for a no-cure-no-pay contract and has to carry out the geophysical investigations. The boreholes have to yield 10m^3/hr and locations have to be determined based on 2 resistivity profiles and 2 VES. The borehole has to be cased with 6" casing and drilled 8" down to the bottom. Is it really an experienced groundwater professional who wrote these tender documents? The value of work is in tens of thousands of US dollars. Is it not worthwhile to hire an experienced consultant to prepare the tender documents? Can the MWE not insist on checking these documents or provide standard rules for the preparation of these documents?

Box 5 Anybody can write tender documents?

The DWO staff is not always consulted for the preparation of a tender document, hence the quality of the tender documents is highly variable.

5.4.3 NGOs

NGOs often do not follow the standard implementation procedures of the government, but are governed by conditions imposed by their donors. NGOs often have under-qualified staff, who only work for short periods in the organisations. As a result, there is no history on earlier projects and performance of consultants and contractors. NGOs often use unrealistic payment schedules (payment upon completion only, no advance payment), but upon sending the invoice they pay promptly.

5.5 Community mobilisation

Not all implementing agencies adhere to the guiding documents for community mobilisation as stipulated in the District Implementation Manual. The lack of sensitisation and mobilisation leads to delays in the implementation of the project which usually results in costs that have to be born by the consultants (siting at wrong locations and / or drilling of dry boreholes may mean that a re-siting has to be done for free by consultants) and contractors (communities insist on certain locations resulting in dry boreholes), while both parties already work with minimal margins.

5.6 Standardisation of works and contracts

There are quite a number of standard documents developed by MWE concerning the specifications of borehole drilling, borehole siting and drilling supervision. These documents need to be reviewed and upgraded by a groundwater consultant to avoid unrealistic tender documents, contract conditions etc. (see also Box 5). The following documents should be considered amongst others: Technical specifications for siting, Technical specification for borehole drilling, BoQs, Contract clauses, Technical specifications for supervision, Tender documents including guidelines and specifications for award.

5.7 Data management

The Districts prepare their annual water source status reports indicating the number of functioning and non-functioning water sources. However the distillation of the number of boreholes drilled every year by comparing the numbers of two subsequent years is rather ambiguous; in some cases the total number of boreholes reduces in subsequent years which is technically impossible.

Borehole numbers are issued and borehole completion records are entered in the database but less than 60% of the numbers issued are ending up in the database. Dry boreholes and technical failures are usually not recorded.

In short, it is not possible at the moment to accurately assess the number of boreholes drilled in Uganda on an annual basis. The flow of borehole data from the field to the NGWDB needs to be improved to allow for:

1. a better assessment of the total number of boreholes drilled in Uganda on an annual basis
2. a proper identification of areas with low groundwater potential or difficult drilling conditions that will lead to better planning and budgeting of drilling projects

5.8 Costs versus implementation modalities

The prices that are currently paid for borehole siting, drilling supervision and drilling are generally too low for the delivery of high quality services. Especially the smaller companies suffer under these rates; the bigger companies have lower overheads per borehole and can sustain these lower rates more easily. The continuation of the lowering of the unit rates will lead to reduced quality of the outputs and the collapse of the smaller companies that are fully relying on these market rates.

The same price range could however be considered as profitable rates by the drillers in case the implementation modalities would be adapted and the drillers could drill more boreholes annually; this would reduce the overhead to be charged to a single borehole.

Other savings on unit rates can be obtained when adapting reduced casing diameters in standard designs.

5.9 Tax regime in the water sector

In 2008, the Government decided to make all water related works and services VAT exempted in order to reduce the prices for boreholes and as such stimulate additional boreholes being drilled in the country. This measure created a lot of confusion in the sector, not in the least because URA staff were not well aware of how to implement the measure.

Some drilling companies were forced to deregister for VAT. These companies cannot charge VAT on their services but can also not claim VAT on their inputs (companies supplying casings, screens, pumps, cement, etc. still have to charge VAT) and imports of equipment (making the purchase of equipment 18% higher). Other companies were allowed to remain VAT registered and were not charging clients VAT on water related projects; others are charging VAT to the private sector only because the private sector can claim their VAT again anyway. Some drilling companies and consultancy companies also have other types of services that are liable for VAT. These companies only claim VAT on their inputs using the VAT liable and VAT exempted ratio. In short, the GoU measure created confusion and did yield the anticipated result of lower unit rates for boreholes.

Another issue is the abolishment of road tax resulting in higher rates for diesel (see Box 6).

Why drill boreholes with road tax diesel?

Uganda abolished road tax in FY 2007/2008 and the tax was included in the price of diesel and fuel and raised accordingly. The more you drive the more tax you pay, fair, but is it also fair if you drill boreholes with this high cost diesel. Still wondering why some people are complaining about high unit rates for boreholes? But are they really high? Drillers complain the rates are too low. Does the government have a good idea of how much a borehole should cost? All in all enough to think about and do something about!

Box 6 Road tax on boreholes?

5.10 Capacity versus demand in sector

As discussed in Section 3.14, the SIP mentions a few groundwater development scenarios. The number of planned boreholes as earlier discussed is repeated in Table 32 below.

Table 32. Planned number of boreholes

Financial Year	Nr. of BHs
2009-2010	1,391
2010-2011	1,806
2011-2012	2,164
2012-2013	2,560
2013-2014	2,759
2014-2015	2,971

The present number of professionals currently available for siting and supervision is depicted in Table 33. It follows that with the current number of professionals, 2,425 boreholes may be surveyed and the drilling supervised on a yearly basis. This is more than the number of boreholes drilled on a yearly basis in the first years to come. Therefore, the capacity to site and supervise seems to be sufficient for the coming years (up to 2013). It should be noted that the calculations are based on a 6-days working week and that the implementation of the projects is spread out over the year.

Table 33. Professionals available for siting and supervision

Groundwater professionals	Nr.	comment	Nr. available for siting and supervision
Individual consultants and 1-2 person companies	30	10% works abroad, 5% involved in management	27
Working for larger companies	15	20% involved in management	12
Working for drilling companies	15	20% involved in management	12
Working for government (DWD, DWRM, TSU, District)	15	Only 10% available for private sector	1.5
Working for NGOs	5	Only 10% available for private sector work	0.5
Total	80	**Available for market**	**53**

Table 34. Siting and supervision capacity

Activity	nr of days	working days per month	26
siting	1	Months	11
drilling	3	Productivity	80%
reporting	1	total workable days	229
total time	**5**	number of experts	53
		total expert days	12,126
		total boreholes (5 days per BH)	**2,425**

The capacity of the drilling companies is reflected in Table 35. The capacity is approximately 4,000 newly drilled boreholes per year but also in this case the estimate is idealised and assumes an equal distribution over the year.

Table 35. Production capacity rigs in Uganda

Average number of boreholes per rig per year now	51
Maximum number of boreholes per rig per year now	112
Minimum number of boreholes per rig per year now	15
Average number of BH under ideal circumstances	93
Max number of BH under ideal circumstances	200
Min number of BH under ideal circumstances	40
Number of rigs in Uganda	77
Take number of rigs in good condition at 75%	58
Take average number of BH per year at 75%	70
Total number of boreholes that can be drilled per year in Uganda	**4,060**

6 RECOMMENDATIONS

6.1 Introduction

If the government of Uganda wants to increase the number of boreholes being drilled on an annual basis at a lower cost it is highly recommended to significantly adapt the present framework of the borehole drilling sector. The recommendations to create a conducive environment for the government, the drillers and groundwater professionals to enable them to work efficiently and effectively to reach a higher safe water coverage in Uganda in a shorter period and at lower costs are described in the following sections.

6.2 General

The government should regulate and support the sector more vigorously, as follows:

- License consultancy companies (DWRM)
- Carry out regular audits of work done by drillers and consultants, and link extension of permits to performance (DWRM)
- Design better guidelines and schedules for borehole drilling project implementation (DWD)
- Include borehole siting specifications in standard contracts (DWRM)
- Closer monitoring of District tender awards and issued contract types (DWD)
- Closer monitoring of NGOs and enforce implementation procedures according to standard documents (DWD)
- Introduce engineer's estimates for drilling and siting (DWD)
- Review taxation framework for the sector (MWE and MFP)
- Facilitate a more healthy financial working environment for drillers and consultants (MWE)
- Set up training programmes (collaborate with private sector), schools and courses for drillers and groundwater professionals (MWE)
- Improve compliance and enforcement of water laws, permits and licensing conditions for drillers and consultants.

The borehole drilling framework should be reorganised in such a way that drillers are responsible for drilling only and not for siting and drilling.

Geophysical surveys should be carried out well before the drilling is done. Drilling contracts need to be prepared in concert with the consultants and should be based on the findings of the geophysical surveys.

The government should ensure that sufficient people are trained to become qualified supervisors. Relevant courses should be designed at polytechnic and university level. A training programme for District staff and private sector people should be set up and certificates for drilling supervisors should be issued. Only people with these certificates should be licensed and allowed to carry out supervision work. One district official should be trained and deployed as a full time drilling supervisor.

The government should investigate the possibility of coordinating all or part of the borehole implementation projects through the newly established regional Water Supply Development Facilities (WSDF). The boreholes will be drilled for Districts but the projects will be implemented and administered by the four Facilities. The TSU should play a more important role in the implementation of drilling projects by Districts and WSDF.

The government should explore the possibilities of working with framework contracts for consultants and drilling contractors. This type of contracts only has small delays and is more cost efficient for all parties hence prices may reduce.

The MWE should set engineer's estimates for siting and drilling in the various parts of the countries. These estimates are based on the requirements for both drilling and geophysical surveys (see also Section 6.3.3).

The MWE should consider classifying drillers and link contract size and awards to the various classes of drillers. Classification will be based on technical, logistic and financial performance. An assessment would need to be made on an annual basis when the drillers extend their permits.

Consultants and/or Consultancy companies should be licensed to do their work. A new licensing system needs to be developed.

6.3 Implementation procedures

There is a need for significant changes in the implementation procedures, if the government wants to professionalise the sector and increase the output of the borehole drilling sector. The main aim will be improved quality of the sources, lower prices (better value for money) and faster implementation.

The changes can be implemented at different stages since some of them just need mentality changes while others need to be enforced by law. The recommended changes are mentioned below.

MWE should review the implementation procedures of water and sanitation projects in Uganda. The improvements should be included in revised implementation manuals / protocols. MWE should also make sure that all implementing agencies adhere to the revised implementation procedures. The new manual should include the recommendations suggested below.

6.3.1 Community awareness

The Districts should better plan for the community mobilisation to avoid delays and problems during the actual siting and drilling of the water sources. Communities should be sensitised following the guidelines available. The RWD of DWD, in collaboration with the TSUs has to make sure that the guidelines are followed.

6.3.2 Project set-up and types

For rural water supply projects implemented by Districts:

1. the procurement cycle should be adapted for borehole drilling contracts to allow activities to take place whole year round and not only in short periods in the second half of the financial year. For that purpose the projects should be split into siting, drilling and supervision contracts. This will allow the local governments to carry out activities throughout the year, speed up implementation progress and hence achieve lower unit costs..

The low capacity at District level to implement and manage borehole drilling projects is one of the main causes for low efficiency, low quality and slow implementation progress. Alternative drilling project implementation modalities should be investigated . The government should consider implementation through:

1. WSDFs whereby the projects are managed by the Facility experts and whereby district lots can be lumped to avoid small drilling projects. The Facilities could also consider implementation of the work through framework contracts.
2. Framework Contracts implemented by DWD at central level
3. Regional projects like the RUWASA projects preferable with a large training component

6.3.3 Tendering and awarding

All borehole drilling tenders issued in Uganda should be checked by MWE or an appointed licensed consultant whether the documents are based on agreed procedures, designs and project set-ups.

All NGOs should be informed of the procedures and guidelines that are steering the water and sanitation sector in Uganda before they make proposals for funding. These documents could be made available through UWASNET. Signing a memorandum of understanding concerning the intention to

adhere to the stipulated implementation procedures should be a pre-requisite to operate in the water and sanitation sector in Uganda.

The MWE has to establish engineer's estimates for borehole drilling, borehole siting and drilling supervision for the various areas in Uganda. Evaluation committees should use the engineer estimate. Contractors / consultants deviating more than 15-20% from the engineer's estimate are either asking too much money, do not know what they are doing (hence less qualified) or think they can dodge some of the costs by not including certain BoQ items, not following the specifications or use cheaper sub-standard materials for their outputs.

Only 7 drilling companies reported to have access to bank guarantees, whereas consultancy companies find it even harder to get bank guarantees. Therefore it is recommended to also allow insurance guarantees for all contracts. A list with reputable insurance companies should be established by MWE for this purpose.

6.3.4 Drilling, siting and supervision contracts

It is recommended that MWE ensures that in Uganda only BoQ based contracts are used within a period of 1-3 years. The current implementation framework does not justify an immediate change to this type of contract. Until that time no water no payment contracts will still be allowed for NGOs but some additional guidelines will need to be set up to ensure a higher quality output and protect the consultants and contractors. MWE needs to specify the framework for these contracts as soon as possible and should emphasise the following aspects in the contract / contract preparation:

1. Contractors may only employ licensed hydrogeologists who will use the specifications as set by DWRM for that particular are.
2. NGOs agree to compensate contractors for dry boreholes (at actual cost only, a fixed fee can be set by the government for cases where casing can be retrieved and where they cannot be retrieved) below a certain success rate.
3. Drillers are supervised by consultants on a full time basis or at least during critical periods being the pumping test, the installation (let the community also be involved) and at the completion of the platform. If only supervised at critical moments, longer liability methods of at least 6 months but better 12 months are recommended.
4. Dry boreholes should be reported and given a number

The government should ensure that DLGs:

1. will only implement BoQ based contracts starting as soon as possible
2. do not split the contracts in many smaller contracts
3. when they split larger contracts they concentrate the villages per lot and do not spread villages over the whole district for the various lots

It is recommended to split the siting, drilling and supervision components by issuing separate contracts with consecutive implementation periods. This has the advantage that Districts can procure and allow consultants and drillers to work throughout the year. The separation will also allow the consultant to prepare the drilling contracts based on his borehole siting report. It is recommended that the hydrogeologist who sited the borehole will also get the supervision contract. S/he knows the exact location of the borehole and is well acquainted with the geology of the area, and can thus anticipate best when problems occur during drilling.

More costs efficient drilling contracts should be considered, for example a meter based contract as described in Box 7.

6.3.1 Technical specifications

6.3.1.1 Borehole siting

It is highly recommended that the increased knowledge of the regional groundwater potential as obtained through the groundwater mapping project should be used to set the standards for required

siting activities in the various geological formations and/or administrative units to avoid unnecessary detailed investigations or too shallow investigations and to ensure higher success rates

Meter based contracts as an alternative contract type to reduce unit costs?

If a District wants to drill 10 boreholes and the average depth of a borehole is set at 60m but in the end the boreholes appear to yield enough water at 40 m and the are drilled to an average of 45 m then the District will have made a saving of 10 x 15 m = 150 m, the equivalent of 3 boreholes. It is therefore recommended that the District prepares 15 villages and issues a 600 m contract. Then the district may use the remaining meters for an additional 3 villages in this case. If no meters are saved the villages automatically move to next year's programme. This type of contract will avoid unnecessary deep boreholes because drillers will refrain from insisting drilling deeper (they will drill their 600 m anyway).

Box 7 Meter contracts for drillers to reduce unit rates

6.3.1.2 Borehole type and design

The groundwater mapping project also has produced technology option maps. These maps should be more intensively used by Districts to avoid using techniques that are more expensive than necessary by giving more priority to dug wells and drilled shallow boreholes.

In addition costs savings can be made in the specified designs of the borehole. A 4" casing will still accommodate a hand pump.

The MWE should consider adapting the "shallow well design" for all boreholes, even in areas where hard rock needs to be penetrated. This may lead to higher costs (limited if diameter is reduced from 5" to 4") but the problem of silting boreholes, often found in "open hole" boreholes, is expected to reduce.

The MWE should review the recommended design of the boreholes and include the designs in standardised drilling project documents.

6.3.1.3 Drilling, testpumping, installation and platform construction supervision

Supervision of the drilling activity is very important but supervisors may not always be available in the market. The MWE should prepare guidelines for the supervision of borehole drilling projects that include alternatives for full time supervision.

6.3.2 Financial issues

The budgets for borehole siting and supervision that the MWE uses should be reviewed and be based on the area of operation. These budgets should be based on the engineer's estimates that need to be prepared by DWRM taking into account the information that can be obtained from the borehole database.

The MWE should also take into account the size of the contracts when establishing the engineer's estimates.

The MWE should ensure that Districts and NGOs use realistic payment schedules. Insurances for advance payments should not be against bank guarantees only because they are almost impossible for drillers to obtain. Payment schedules may include more payments relating to work done but still including a percentage retention; the risk for the client remains limited and advance payment (guarantees) are no longer required.

6.3.3 Data and data processing

DWRM should monitor more closely the submission of information on dry boreholes and technical failures. This information is required to make more realistic engineer's estimates leading to more realistic budgets for borehole drilling contracts.

DWRM should further investigate the possibilities for improving the data collection from consultants and contractors. The following activities are recommended;

1. Procurement of a better computer for the NGWDB, borehole allocation database and storage of hydrogeological reports in pdf formats.
2. Optimising the borehole allocation number database and number issuing procedures including a better monitoring of the submission of borehole data by companies.

3. Prepare procedures for the submission, storage and processing of borehole data
4. Review of the borehole data in the NGWDB by a consultant or insist on optimising the data during the groundwater mapping project. Make regular checks of this process by external consultants (other than the consultant on the groundwater mapping project)
5. Review of the structure of the NGWDB and include validation criteria in the database. The validation procedure will also enable the immediate validation of the data submitted by drillers in digital format.
6. Consultants have to submit siting reports in pdf format to DWRM.

In addition, it is recommended that all District LGs also insist on receiving copies of all siting and borehole completion reports from contractors, consultants and NGOs drilling in their District (this should be a contract requirement) and supply the borehole data of the newly drilled boreholes in their District to DWRM through DWD. The data sets should be reconciled with the information received from the drillers to avoid any discrepancies.

The drilling contractors should also be obliged to keep an excel database of the boreholes they have drilled. DWRM can develop such a template spreadsheet and include data validation routines. The spreadsheet should also be fit to be imported straight into the NGWDB. A 1-day training course could be organised for the drillers to explain the how to fill the spreadsheet.

In view of the above, the Consultant recommends strengthening of the groundwater database unit in terms of human resources and IT infrastructure.

6.4 Standardisation

DWRM should immediately prepare protocols for borehole siting, borehole drilling and drilling supervision. These protocols should be published and be made available to all trainees and groundwater professionals in the water sector. This will allow all stakeholders to get acquainted with government expectations in the short term.

DWRM/DWD should prepare/adapt the standard documents for borehole siting contracts, borehole drilling contracts and borehole drilling supervision contracts.

The above documents will also require an update of the district Implementation manual and other guidelines.

6.5 Improved capacities

6.5.1 General

Drillers, consultants and implementing agencies need to be trained and sensitised in the many challenges in water well drilling projects. Implementing agencies need to be provided with detailed explanatory implementation manuals with guidelines on tendering procedures, contract management etc.

6.5.2 Training

More details need to be collected on the capacity of the groundwater professionals to allow a better assessment of the specific capacities available and needed in the Sector.

To improve the capacity of the consultants and drillers in the sector MWE should further explore the possibilities for training activities and consider:

1. Setting up a course leading to a diploma for drilling engineer at one of the technical institutes (polytechnic level) in Uganda
2. Setting up a short course leading to a certificate in drilling supervision
3. Setting up a B.Sc. course in hydrogeology at university level
4. Facilitate foreign and local M.Sc. students to participate in local groundwater research studies. Local senior consultants could be facilitated to be involved in the guidance of the M.Sc.

students. Projects to be considered could be general water resources assessment studies or detailed investigations for town water supply projects.

In addition to the above, MWE should also consider the facilitation of consultancy companies to train students and Polytechnic and University graduates for periods of approximately 6 months. The facilitation could just be by guaranteeing firms framework contracts if these companies are willing to take up the trainees who will be paid agreed training allowances by the companies. This will speed up the capacity of the sector and should be considered as an immediate short term solution to filling the capacity gap while awaiting the implementation of the proposed more structural changes in the sector.

The MWE will furthermore need to organise training courses for drillers and consultants to get acquainted with the new protocols and standard documents.

6.6 Regulation

6.6.1 Division of tasks

It is recommended that within a time frame of 3-5 years the government will regulate the sector in such a way that consultants will be doing the consultancy work and drillers will be restricted to the drilling of boreholes. The independent roles of the two types of professionals is believed to lead to the best quality outputs. Drillers will still be allowed to do turnkey projects for private clients for which they can hire consultants and the other way around but government institutions and NGOs will only be allowed to issue contracts where there is a clear separation of tasks and whereby the Consultant can represent the Client (government or NGOs) independently, so that high quality outputs can be assured.

6.6.2 Licensing

DWRM should urgently finalise the licensing system for groundwater consultants. The licensing system should include clear protocols for the activities that consultants have to carry out concerning desk studies, geophysical surveys, reporting on surveys, preparation of tender documents, drilling supervision, borehole completion reports and data processing.

It is recommended to classify the consultants and attribute different types of licences accordingly. The type of license to be allocated to a company depends on number and educational level of staff, experience, equipment owned, etc. Larger contracts will awarded to companies with licenses indicating a large number of permanent staff, cars, and equipment. Production well contracts will be awarded to companies with licenses indicating that the company has highly skilled hydrogeologists.

DWRM should continue licensing the drilling contractors and also prepare clear protocols for drilling, reporting and data processing.

A classification of drillers should be made and each class may qualify for different types of contracts related to size of contract, depth of boreholes and drilling techniques required. As an example, drilling companies without proper mud pumps should not be allowed to drill in the Rift Valley sediments.

6.6.3 Monitoring of compliance with laws and guidelines

MWE should further explore the actions to be taken and corresponding investments to monitor the adherence to laws and guidelines implemented to regulate the sector. In particular DWD and DWRM should take the appropriate measures to monitor that implementing agencies adhere to:

1. Procuring consultants and contractors licensed by DWRM, who are obliged to follow the future drilling and siting specifications as set out by DWRM and DWD.
2. Implementation activities as set out in the standard documents and that should ensure an efficient implementation of borehole drilling projects.

In addition, DWRM and WRMD should make quality audits of works carried out by consultants and contractors and should put in place an evaluation system that assesses the consultants and contractors on a regular basis and also includes measures that eventually could lead to the suspension of the licenses if the consultants and contractors cannot deliver the required quality of works and services.

The TSU members should be given more authority and also assist the Districts in the review of the siting reports prepared by consultants to allow an immediate check of the works before drilling starts. At a later stage the consultants will be submitting their survey reports to WRMD as part of their obligations for a license and regular checks could be carried out at that level.

6.6.4 Self regulation

Drillers and Consultants should set up or revitalise their own professional organisation with or without facilitation of the government. The associations will have to play a lead role in defending the interest of their members in the sector in general but also in guaranteeing professional output of their members y setting up internal evaluation criteria in order to gain / increase the confidence of the stakeholders that have to hire their services.

6.7 Financial aspects

6.7.1 General

The drillers need a better financial environment to be able to operate efficiently. It should be noted that a better implementation environment (that can be realised if the above recommendations are implemented) will automatically lead to a better financial situation of the drillers and some of the recommendations may be not be needed.

6.7.2 Review of tax regimes

Independent of the realisation of other recommendations, it is highly recommended to streamline the tax regimes that are now creating confusion and inconsistencies in the water sector. The government through the URA should review the tax regime for the water sector. A meeting between the Ministry of Water and Environment and the Ministry of Finance Planning and Economic Development is therefore suggested. The following topics may be addressed during that meeting:

1. All drilling and consultancy companies should be allowed to be VAT registered
2. consultancy companies and drilling companies should be allowed to re-claim their VAT on inputs and imports even if they are not charging VAT on their services related to water development
3. Borehole drilling, water supply construction and water supply related consultancy services should therefore be a zero rated VAT item instead of a VAT exempted item
4. All drilling equipment and borehole materials as well as geophysical equipment for groundwater exploration should be exempted from import duty
5. Drillers should be allowed to purchase duty free diesel to a level that corresponds with the anticipated number of boreholes that the drilling company is drilling annually.

The implementation of the above recommendations will lead to lower unit rates for boreholes and lower fees for consultancy services in the sector whereby all stakeholders are operating under similar conditions hence assuring fair competition in the sector.

6.7.3 Financial support

MWE should investigate the possible actions that could support the drilling companies, and especially the local drilling companies who often have less external support or links, to invest and further develop. It may be quite difficult for MWE to act as guarantor for loans to drilling companies with banks. MWE could consider a support for example through enabling a healthier financial working environment for the drillers by considering framework contracts (assured income for the drillers) and more prompt payments (better cashflow status). The results of this support may also yield more confidence of the banks in the drilling companies and as such convince them in issuing loans to the companies.

Annex 1: Questionnaires

The Republic of Uganda
Ministry of Water and Environment

Questionnaire

Implementing agencies

Questionnaire number *(to be filled by Consultant):*

Please fill the questionnaire on the computer; it will save us some entry time. Then save it (please in filename replace "UNICEF" by your organisation name) and email it back. In case you cannot manage to fill it on the computer, print the file and fill it. Please give us a call to collect the hard copy. In case of any problems please give me a call for assistance at 0772-222049. *Your cooperation is highly appreciated!*

Capacity assessment of drilling companies and siting/supervision consultants in Uganda

Table of Content

Name person entering sheet:	Position:	Phone:	Date:

All amounts in this form should be Ugandan Shillings (UGX) Please use an exchange rate of 1 US$ = UGX 2,000 if your amounts are in US$

1. Implementing agency information

1) Name :		2) Organisation (District, Central Government – DWD, NGO, UNICEF):
3) P.O.Box :	4) City:	5) Email:
6) Phone 1:	7) Phone 2:	
8) Physical address office 1:		9) Physical address office2 :
Department responsible for borehole drilling projects:	10)	

2. Village identification and contract types

General village identification *(please give answers and comment)*

Who selects the villages that will receive a borehole?	11)
When selecting villages are earlier drilling attempts that resulted in dry boreholes considered? If yes how?	12)
Why do you think the attempts failed?	13)
How many attempts in a village would you consider justified before looking for alternative water	14)

development options or alternative villages?	
Do you inform the driller / consultant of the failed attempts?	15)
If not why not?	16)
What information do you use to select the best water development option in an area?	
Do you make use of the groundwater maps for the selection of water development options?	17)
Do you make use of groundwater data when you prepare a BoQ for a drilling contract?	18)
Are you taking into account that clustering boreholes in a small area will lead to lower costs?	19)
if not why not?	20)
What is the role of the community in the selection of the village? *how do they get selected?*	21)
Siting and supervision contracts	
Who prepares the siting contract? *Fill name if fixed, fill consultant if you employ a consultant for that or position of person within your organisation*	22)
Do you use a standard siting contract	23) Y/N:
What is the source of this document?	24)
Do you specify/adapt the details of the hydrogeological investigations?	25) Y/N:
if not why not?	26)
Do you specify the details of the geophysical measurements to be carried out?	27)
if not why not?	28)
Do you use No Water No Payment contracts or BoQ based contracts for the siting consultant?	29)
Do you prefer No Water No payment contracts or BoQ based contracts:	30)
Why ?	31)
Do you think the Consultant can always get water if he does a good job?	32)
Who prepares your supervision contract?	33)
Who supervises the drillers ?	34)
Is this full time or just spot checks?	35)
Are the spot checks well defined (during test pumping, installation etc.) or ad random?	36)
Does the community play a role in the siting?	37) Y/N:
Which role?	38)
Does the community play a role in the supervision?	39) Y/N:
Which role?	40)
Drilling contracts	

Are drilling contracts based on finding s of siting report?	41) Y/N:	
If not why not?	42)	
Who prepares the drilling tender documents and contract?	43) Name:	
Do you get advice from a hydrogeologist ? *Fill name if fixed, fill consultant if you employ a consultant for that or position of person within your organisation*	44) Y/N:	45) Name:
for the tender documents incl. BoQ?	46) Y/N:	47) Name:
for the evaluation of the tenders?	48) Y/N:	49) Name:
Do you use No Water No Payment contracts or BoQ based contracts for the drilling contractor?	50) Y/N:	
Do you prefer No Water No payment contracts or BoQ based contracts?	51)	
Why do you prefer these contracts?	52)	
In case of NWNP contracts would you consider payment in case of extremely low success rates?	53)	
In BoQ contracts often boreholes are drilled unnecessarily deep just because the drillers have filled their BoQ based on an average depth and they want to drill till these depths. Have you considered to give drillers a meter contract instead of a number of boreholes to avoid unnecessarily deep drilling and drilles that are only paid 60% of their contract sum?	54)	

The Republic of Uganda
Ministry of Water and Environment

Questionnaire

Implementing agencies

3. Evaluation Consultants and Drillers

Siting Consultants in period 2004-2009 *(SR= successrate, for capability scoring / assessment use : 1: very poor, 2: poor, 3: reasonable, 4; good, 5: very good), Contract type: BoQ based, LS (no water no payments), LS2 (compensation for dry boreholes), Comp% = % of LS rate per BH paid as compensation for dry borehole. PLEASE NOTE THAT CONSULTANT CAN BE MENTIONED MORE THAN ONCE*

No.	Name	Area	Contract type	Comp. % for dry BH	No. BH	SR %	Capabilities / skills / assessment score during contract							
							technical	financial	admin	communi-cative	report	timely delivery	overall	Comment
1	55)	56)	57)	58)	59)	60)	61)	62)	63)	64)	65)	66)	67)	68)
2	69)	70)	71)	72)	73)	74)	75)	76)	77)	78)	79)	80)	81)	82)
3	83)	84)	85)	86)	87)	88)	89)	90)	91)	92)	93)	94)	95)	96)
4	97)	98)	99)	100)	101)	102)	103)	104)	105)	106)	107)	108)	109)	110)
5	111)	112)	113)	114)	115)	116)	117)	118)	119)	120)	121)	122)	123)	124)
6	125)	126)	127)	128)	129)	130)	131)	132)	133)	134)	135)	136)	137)	138)
7	139)	140)	141)	142)	143)	144)	145)	146)	147)	148)	149)	150)	151)	152)
8	153)	154)	155)	156)	157)	158)	159)	160)	161)	162)	163)	164)	165)	166)
9	167)	168)	169)	170)	171)	172)	173)	174)	175)	176)	177)	178)	179)	180)
10	181)	182)	183)	184)	185)	186)	187)	188)	189)	190)	191)	192)	193)	194)
11	195)	196)	197)	198)	199)	200)	201)	202)	203)	204)	205)	206)	207)	208)
12	209)	210)	211)	212)	213)	214)	215)	216)	217)	218)	219)	220)	221)	222)
13	223)	224)	225)	226)	227)	228)	229)	230)	231)	232)	233)	234)	235)	236)
14	237)	238)	239)	240)	241)	242)	243)	244)	245)	246)	247)	248)	249)	250)

The Republic of Uganda
Ministry of Water and Environment

Questionnaire

Implementing agencies

Drillers used in period 2004-2009 *(SR= successrate, for capability scoring / assessment use : 1: very poor, 2: poor, 3: reasonable, 4; good, 5: very good), Contract type: BoQ based, LS (no water no payments), LS2 (compensation for dry boreholes), Comp% = % of LS rate per BH paid as compensation for dry borehole. PLEASE NOTE THAT DRILLERS CAN BE MENTIONED MORE THAN ONCE*

No.	Name	Area	Contract type	Comp. % for dry BH	No. BH	SR %	Capabilities / skills / assessment score during contract							
							technical	financial	admin	communi-cative	report	timely delivery	overall	Comment
1	251)	252)	253)	254)	255)	256)	257)	258)	259)	260)	261)	262)	263)	264)
2	265)	266)	267)	268)	269)	270)	271)	272)	273)	274)	275)	276)	277)	278)
3	279)	280)	281)	282)	283)	284)	285)	286)	287)	288)	289)	290)	291)	292)
4	293)	294)	295)	296)	297)	298)	299)	300)	301)	302)	303)	304)	305)	306)
5	307)	308)	309)	310)	311)	312)	313)	314)	315)	316)	317)	318)	319)	320)
6	321)	322)	323)	324)	325)	326)	327)	328)	329)	330)	331)	332)	333)	334)
7	335)	336)	337)	338)	339)	340)	341)	342)	343)	344)	345)	346)	347)	348)
8	349)	350)	351)	352)	353)	354)	355)	356)	357)	358)	359)	360)	361)	362)
9	363)	364)	365)	366)	367)	368)	369)	370)	371)	372)	373)	374)	375)	376)
10	377)	378)	379)	380)	381)	382)	383)	384)	385)	386)	387)	388)	389)	390)
11	391)	392)	393)	394)	395)	396)	397)	398)	399)	400)	401)	402)	403)	404)
12	405)	406)	407)	408)	409)	410)	411)	412)	413)	414)	415)	416)	417)	418)
13	419)	420)	421)	422)	423)	424)	425)	426)	427)	428)	429)	430)	431)	432)
14	433)	434)	435)	436)	437)	438)	439)	440)	441)	442)	443)	444)	445)	446)
15	447)	448)	449)	450)	451)	452)	453)	454)	455)	456)	457)	458)	459)	460)

unicef			Questionnaire
	The Republic of Uganda Ministry of Water and Environment		Implementing agencies

4. Capacity of the implementing agency

Assessment *(education level [PhD, Msc, Bsc, Diploma, certificate, none], Subject: [geology, water engineering, civil engineering])*					
Who is in charge for water project implementation (Title)			461)		
What are his qualification and experience?					
	Education level	462)	Subject	463)	Experience (yrs)	464)
How many boreholes do you implement per year on average?			465)		
actual number of borehole implemented : 2004		466)	467) Budget in UGX:		
2005		468)	469) Budget in UGX:		
2006		470)	471) Budget in UGX:		
2007		472)	473) Budget in UGX:		
2008		474)	475) Budget in UGX:		
2009		476)	477) Budget in UGX:		
Who provides the funding of you r water projects? *mention EU, own funds, government, etc.*					
478) Name:		479) Approx. fraction of total funding for BHs in period 2007-2008:		480) Clauses for dry BH included in agreement with your organisation Y/N?	
481) Name:		482) Approx. fraction of total funding for BHs in period 2007-2008:		483) Clauses for dry BH included in agreement with your organisation Y/N?	
484) Name:		485) Approx. fraction of total funding for BHs in period 2007-2008:		486) Clauses for dry BH included in agreement with your organisation Y/N?	
487) Name:		488) Approx. fraction of total funding for BHs in period 2007-2008:		489) Clauses for dry BH included in agreement with your organisation Y/N?	
490) Name:		491) Approx. fraction of total funding for BHs in period 2007-2008:		492) Clauses for dry BH included in agreement with your organisation Y/N?	
493) Name:		494) Approx. fraction of total funding for BHs in period 2007-2008:		495) Clauses for dry BH included in agreement with your organisation Y/N?	
Do you have enough staff to supervise the drilling			496) Y/N:		
Do you have enough budget for full time supervision of the works			497) Y/N:		
Do you have enough budget for part time supervision of the works			498) Y/N:		

Constraintsfor the implementing agency?	
What are the major constraints for your organisation in the implementation of borehole drilling projects?	
Number	Constraint
1	499)

2	500)
3	501)

5. Constraints and the future

What are in your opinion the major constraints in the siting and drilling sector in general

Number	Constraint
1	502)
2	503)
3	504)
4	505)

What are you suggestions for improving the working environment for the siting and drilling sector	
Borehole siting:	506)
	507)
Contract types:	508)
	509)
Regulation	510)
	511)
Others	512)
	513)

Please send the completed questionnaire back to ronsloots@gmail.com. For any information or clarifications please give me a call on 0772-222049.

The Republic of Uganda
Ministry of Water and Environment

Questionnaire

Drilling companies

Questionnaire number *(to be filled by Consultant):*

Please fill the questionnaire on the computer; it will save us some entry time. Then save it (please in filename replace "UNICEF" by your company name) and email it back. In case you cannot manage to fill it on the computer, print the file and fill it. Please give us a call to collect the hard copy. In case of any problems please give me a call for assistance at 0772-222049. *Your cooperation is highly appreciated!*

Capacity assessment of drilling companies and siting/supervision consultants in Uganda

Table of Content

Name person entering sheet:	Position:	Phone:	Date:

All amounts in this form should be Ugandan Shillings (UGX) Please use an exchange rate of 1 US$ = UGX 2,000 if your amounts are in US$

1. Company information – Establishment

1) Company name:		
2) P.O.Box :	3) City:	4) Email:
5) Phone 1:	6) Phone 2:	
7) Physical address office 1:	8) Physical address workshop :	
9) Physical address office 2:	10) Legal status (LTD, NGO, partnership):	
11) Certificate of incorporation Nr.:	12) Date of incorporation:	
13) Drilling permit Nr.:	14) Valid until:	
15) VAT registration nr. or not registered:		
16) Company auditors:	17) Company secretary:	
Directors		
18) Nationality Director 1:	19) Profession D1:	
20) Nationality Director 2:	21) Profession D2:	
22) Nationality Director 3:	23) Profession D3:	
24) Nationality Director 4:	25) Profession D4:	
Shareholders		
26) Share capital in UGX:		
27) Shareholder 1 nationality:	28) % of shares:	

29) Shareholder 2 nationality:	30) % of shares:
31) Shareholder 3 nationality:	32) % of shares:
33) Shareholder 4 nationality:	34) % of shares:
35) Shareholder 5 nationality:	36) % of shares:

2. Company information - Financial

Turnover and performance data *(to be obtained from audited accounts, all amounts in UGX)*

2004		
37) Turnover:	38) Net profit/ loss :	39) Depreciation:
40) Total costs:	41) Project direct costs / cost of sales :	42) Admin cost:
43) Total assets:	44) Current assets :	45) Current liabilities:
2005		
46) Turnover:	47) Net profit/ loss :	48) Depreciation:
49) Total costs:	50) Project direct costs / cost of sales :	51) Admin cost:
52) Total assets:	53) Current assets :	54) Current liabilities:
2006		
55) Turnover:	56) Net profit/ loss :	57) Depreciation:
58) Total costs:	59) Project direct costs / cost of sales :	60) Admin cost:
61) Total assets:	62) Current assets :	63) Current liabilities:
2007		
64) Turnover:	65) Net profit/ loss :	66) Depreciation:
67) Total costs:	68) Project direct costs / cost of sales :	69) Admin cost:
70) Total assets:	71) Current assets :	72) Current liabilities:
2008		
73) Turnover:	74) Net profit/ loss :	75) Depreciation:
76) Total costs:	77) Project direct costs / cost of sales :	78) Admin cost:
79) Total assets:	80) Current assets :	81) Current liabilities:
2009 estimate		
82) Turnover:	83) Net profit/ loss :	84) Depreciation:
85) Total costs:	86) Project direct costs / cost of sales :	87) Admin cost:
88) Total assets:	89) Current assets :	90) Current liabilities:

Bankers and access to credit

What amount of money is required as a buffer to allow a good cash flow ?		91) As % of annual turnover:		92) Absolute in UGX:
93) Bank 1	94) Overdraft Y/N:	95) Overdraft amount:	96) Bonds Y/N:	97) Interest % annual:
98) Bank 2	99) Overdraft Y/N:	100) Overdraft amount:	101) Bonds Y/N:	102) Interest % annual:
103) Bank 3	104) Overdraft Y/N:	105) Overdraft amount:	106) Bonds Y/N:	107) Interest % annual:
108) Comments:				

3. Operational aspects and type of projects

How much turnover came from neighbouring countries in % of turnover, 2009 and 2010 projections

2005	109) Uganda:	110) Sudan:	111) Rwanda/Burundi:	112) Congo:	113) Tanzania:
2006	114) Uganda:	115) Sudan:	116) Rwanda/Burundi:	117) Congo:	118) Tanzania:
2007	119) Uganda:	120) Sudan:	121) Rwanda/Burundi:	122) Congo:	123) Tanzania:
2008	124) Uganda:	125) Sudan:	126) Rwanda/Burundi:	127) Congo:	128) Tanzania:
2009	129) Uganda:	130) Sudan:	131) Rwanda/Burundi:	132) Congo:	133) Tanzania:
2010	134) Uganda:	135) Sudan:	136) Rwanda/Burundi:	137) Congo:	138) Tanzania:

How much turnover came from government, NGOs, private sector in % of turnover, 2009 and 2010 projections

2005	139) Government Central	140) Government District:	141) NGO:	142) Private Sector:
2006	143) Government Central	144) Government District:	145) NGO:	146) Private Sector:
2007	147) Government Central	148) Government District:	149) NGO:	150) Private Sector:
2008	151) Government Central	152) Government District:	153) NGO:	154) Private Sector:
2009	155) Government Central	156) Government District:	157) NGO:	158) Private Sector:

What services are being offered by your company *(select from rural boreholes, production wells, rehabilitation, test pumping, site surveying[consultancies], geotechnical drilling, piped water supply, … others)***. List in order of volume of work**

159) Activity 1:	160) Activity 2:	161) Activity 3:
162) Activity 4:	163) Activity 5:	164) Activity 6:
165) Activity 7:	166) Activity 8:	167) Activity 9:

What percentage of turnover is originating from what type of work, 2009 and 2010 projections. *Please make sure that borehole siting is included in boreholes/wells unless the drilling is done by others then it will be entered in others*

2004	168) Rural boreholes	169) Production wells:	170) Rehabilitation	171) Others:
2005	172) Rural boreholes	173) Production wells:	174) Rehabilitation	175) Others:
2006	176) Rural boreholes	177) Production wells:	178) Rehabilitation	179) Others:
2007	180) Rural boreholes	181) Production wells:	182) Rehabilitation	183) Others:
2008	184) Rural boreholes	185) Production wells:	186) Rehabilitation	187) Others:

2009	188) Rural boreholes	189) Production wells:	190) Rehabilitation	191) Others:

4. Staff

(position [MD, FM, Office Manager, Logistics Manager, Operation Manager, Workshop Manager, Store Manager, Hydrogeologist, Driller, Ass. Driller, Driver], education [Msc, Bsc, Diploma, certificate, none], nationality, experience in years,, remuneration [approximate in UGX for the position])

Position	Education level	Subject	YwC	Nationality	Experience (yrs)	Monthly salary:	Monthly allowance:
192)	193)	194)	195)	196)	197)	198)	199)
200)	201)	202)	203)	204)	205)	206)	207)
208)	209)	210)	211)	212)	213)	214)	215)
216)	217)	218)	219)	220)	221)	222)	223)
224)	225)	226)	227)	228)	229)	230)	231)
232)	233)	234)	235)	236)	237)	238)	239)
240)	241)	242)	243)	244)	245)	246)	247)
248)	249)	250)	251)	252)	253)	254)	255)
256)	257)	258)	259)	260)	261)	262)	263)
264)	265)	266)	267)	268)	269)	270)	271)
272)	273)	274)	275)	276)	277)	278)	279)
280)	281)	282)	283)	284)	285)	286)	287)
288)	289)	290)	291)	292)	293)	294)	295)
296)	297)	298)	299)	300)	301)	302)	303)
304)	305)	306)	307)	308)	309)	310)	311)
312)	313)	314)	315)	316)	317)	318)	319)
320)	321)	322)	323)	324)	325)	326)	327)
328)	329)	330)	331)	332)	333)	334)	335)

336)	337)	338)	339)	340)	341)	342)	343)

Position	No,	App. Monthly salary:	Monthly allowance:
Driver	344)	345)	346)
Technicians	347)	348)	349)
Secretary	350)	351)	352)

5. Equipment

(drilling rigs, compressor, mud pumps, hammers, pumps and generators, trucks, cars, steel casing, drilling rods)

General number of items (*list trucks carrying compressor or mudpump as truck separately, casing is in meter,)*

Item	Nr.	Item	Nr.	Item	Nr
Drilling rig	353)	Compressor	354)	Mud pumps	355)
4" hammer	356)	6" hammer	357)	8" hammer	358)
10" hammer	359)	12" hammer	360)	Trucks > 3000 CC	361)
Support cars < 3000	362)	Temp. casing, steel 8"	363)	Temp. casing steel 10"	364)
Welding equipment	365)	Temp. casing, PVC 8"	366)	Temp. casing PVC 10"	367)
Submer. pump (1-3m^3/hr)	368)	Submer. pump (> 3m^3/hr)	369)	Generator	370)
Verticality test equipment	371)	Geophysical BH log equip.	372)	Borehole camera	373)
Packers (for hydrofracturing)	374)	EC meter	375)	Casting mold	376)
Water level meter	377)	Terrameter	378)	VLF	379)
Grouting pump	380)	Computers	381)	Printers	382)
GPS receivers	383)	384)	385)	386)	387)

DRILLING RIG

Rig No.1:	388) Make:	389) Model:	390) Year of manufacture:
	391) Rated capacity *m/diameter*:	392) Truck / trailer mounted:	393) Yrs with company or leased:
	394) Mast length (m):	395) Mast capacity (kgs):	396) Draw works capacity (kgs):
	397) Drill pipe diameter (inch):	398) Drill pipe weight per meter (kg):	399) Number of drill pipes :
	400) Drill collar diameter (inch):	401) Drill collar weight per meter (kg):	402) Drill collar length (m):
	403) Foam water injection possible:	404) Rig equipped with air relief subs:	405) Stiff foam injection possible Y/N:
Rig No.2:	406) Make:	407) Model:	408) Year of manufacture:
	409) Rated capacity *m/diameter*:	410) Truck / trailer mounted:	411) Yrs with company or leased:
	412) Mast length (m):	413) Mast capacity (kgs):	414) Draw works capacity (kgs):
	415) Drill pipe diameter (inch):	416) Drill pipe weight per meter	417) Number of drill pipes

		(kg):	:
	418) Drill collar diameter (inch):	419) Drill collar weight per meter (kg):	420) Drill collar length (m):
	421) Foam water injection possible:	422) Rig equipped with air relief subs:	423) Stiff foam injection possible Y/N:
Rig No.3:	424) Make:	425) Model:	426) Year of manufacture:
	427) Rated capacity *m/diameter*:	428) Truck / trailer mounted:	429) Yrs with company or leased:
	430) Mast length (m):	431) Mast capacity (kgs):	432) Draw works capacity (kgs):
	433) Drill pipe diameter (inch):	434) Drill pipe weight per meter (kg):	435) Number of drill pipes :
	436) Drill collar diameter (inch):	437) Drill collar weight per meter (kg):	438) Drill collar length (m):
	439) Foam water injection possible:	440) Rig equipped with air relief subs:	441) Stiff foam injection possible Y/N:
Rig No.4:	442) Make:	443) Model:	444) Year of manufacture:
	445) Rated capacity *m/diameter*:	446) Truck / trailer mounted:	447) Yrs with company or leased:
	448) Mast length (m):	449) Mast capacity (kgs):	450) Draw works capacity (kgs):
	451) Drill pipe diameter (inch):	452) Drill pipe weight per meter (kg):	453) Number of drill pipes :
	454) Drill collar diameter (inch):	455) Drill collar weight per meter (kg):	456) Drill collar length (m):
	457) Foam water injection possible:	458) Rig equipped with air relief subs:	459) Stiff foam injection possible Y/N:
Rig No.5:	460) Make:	461) Model:	462) Year of manufacture:
	463) Rated capacity *m/diameter*:	464) Truck / trailer mounted:	465) Yrs with company or leased:
	466) Mast length (m):	467) Mast capacity (kgs):	468) Draw works capacity (kgs):
	469) Drill pipe diameter (inch):	470) Drill pipe weight per meter (kg):	471) Number of drill pipes :
	472) Drill collar diameter (inch):	473) Drill collar weight per meter (kg):	474) Drill collar length (m):
Rig No.6:	475) Make:	476) Model:	477) Year of manufacture:
	478) Rated capacity *m/diameter*:	479) Truck / trailer mounted:	480) Yrs with company or leased:
	481) Mast length (m):	482) Mast capacity (kgs):	483) Draw works capacity (kgs):
	484) Drill pipe diameter (inch):	485) Drill pipe weight per meter (kg):	486) Number of drill pipes :

	487) Drill collar diameter (inch):	488) Drill collar weight per meter (kg):	489) Drill collar length (m):
	490) Foam water injection possible:	491) Rig equipped with air relief subs:	492) Stiff foam injection possible Y/N:
Rig No.7:	493) Make:	494) Model:	495) Year of manufacture:
	496) Rated capacity *m/diameter*:	497) Truck / trailer mounted:	498) Yrs with company or leased:
	499) Mast length (m):	500) Mast capacity (kgs):	501) Draw works capacity (kgs):
	502) Drill pipe diameter (inch):	503) Drill pipe weight per meter (kg):	504) Number of drill pipes :
	505) Drill collar diameter (inch):	506) Drill collar weight per meter (kg):	507) Drill collar length (m):
	508) Foam water injection possible:	509) Rig equipped with air relief subs:	510) Stiff foam injection possible Y/N:

COMPRESSOR			
Compressor No.1:	511) Make:	512) Model:	513) Year of manufacture:
	514) Rated capacity CFM:	515) Rated capacity psi/bar:	516) Yrs with company:
	517) Engine hours since last overhaul:	518) Truck / trailer mounted:	519) Approx. diesel consump l/hr:
Compressor No.2:	520) Make:	521) Model:	522) Year of manufacture:
	523) Rated capacity CFM:	524) Rated capacity psi/bar:	525) Yrs with company:
	526) Engine hours since last overhaul:	527) Truck / trailer mounted:	528) Approx. diesel consump l/hr:
Compressor No.3:	529) Make:	530) Model:	531) Year of manufacture:
	532) Rated capacity CFM:	533) Rated capacity psi/bar:	534) Yrs with company:
	535) Engine hours since last overhaul:	536) Truck / trailer mounted:	537) Approx. diesel consump l/hr:
Compressor No.4:	538) Make:	539) Model:	540) Year of manufacture:
	541) Rated capacity CFM:	542) Rated capacity psi/bar:	543) Yrs with company:
	544) Engine hours since last overhaul:	545) Truck / trailer mounted:	546) Approx. diesel consump l/hr:
Compressor No.5:	547) Make:	548) Model:	549) Year of manufacture:
	550) Rated capacity CFM:	551) Rated capacity psi/bar:	552) Yrs with company:
	553) Engine hours since last	554) Truck / trailer mounted:	555) Approx. diesel

	overhaul:		consump l/hr:
Compressor No.6:	556) Make:	557) Model:	558) Year of manufacture:
	559) Rated capacity CFM:	560) Rated capacity psi/bar:	561) Yrs with company:
	562) Engine hours since last overhaul:	563) Truck / trailer mounted:	564) Approx. diesel consump l/hr:
Compressor No.7:	565) Make:	566) Model:	567) Year of manufacture:
	568) Rated capacity CFM:	569) Rated capacity psi/bar:	570) Yrs with company:
	571) Engine hours since last overhaul:	572) Truck / trailer mounted:	573) Approx. diesel consump l/hr:
MUDPUMP			
Mudpump No.1:	574) Make:	575) Model:	576) Year of manufacture:
	577) Rated capacity l/min:	578) Rated capacity psi/bar:	579) Stroke (inch):
	580) Power source (rig/other):	581) Truck / trailer mounted:	582) Yrs with company:
Mudpump No.2:	583) Make:	584) Model:	585) Year of manufacture:
	586) Rated capacity l/min:	587) Rated capacity psi/bar:	588) Stroke (inch):
	589) Power source (rig/other):	590) Truck / trailer mounted:	591) Yrs with company:
Mudpump No.3:	592) Make:	593) Model:	594) Year of manufacture:
	595) Rated capacity l/min:	596) Rated capacity psi/bar:	597) Stroke (inch):
	598) Power source (rig/other):	599) Truck / trailer mounted:	600) Yrs with company:
Mudpump No.4:	601) Make:	602) Model:	603) Year of manufacture:
	604) Rated capacity l/min:	605) Rated capacity psi/bar:	606) Stroke (inch):
	607) Power source (rig/other):	608) Truck / trailer mounted:	609) Yrs with company:
Mudpump No.5:	610) Make:	611) Model:	612) Year of manufacture:
	613) Rated capacity l/min:	614) Rated capacity psi/bar:	615) Stroke (inch):
	616) Power source (rig/other):	617) Truck / trailer mounted:	618) Yrs with company:
HAMMERS sizes in mm			
Hammer 1:	619) Make:	620) Model:	621) No. in use:
	622) Diameter:	623) Pressure drop psi/bar:	624) Max air flow m3:

	625) Min bit size:	626) Max bit size:	
Hammer 2:	627) Make:	628) Model:	629) No. in use:
	630) Diameter:	631) Pressure drop psi/bar:	632) Max air flow m3:
	633) Max bit size:		
Hammer 3:	634) Make:	635) Model:	636) No. in use:
	637) Diameter:	638) Pressure drop psi/bar:	639) Max air flow m3:
	640) Max bit size:		
Hammer 4:	641) Make:	642) Model:	643) No. in use :
	644) Diameter:	645) Pressure drop psi/bar:	646) Max air flow m3:
	647) Max bit size:		
Hammer 5:	648) Make:	649) Model:	650) No. in use:
	651) Diameter:	652) Pressure drop psi/bar:	653) Max air flow m3:
	654) Max bit size:		
GENERATORS			
Generator 1:	655) Make:	656) Model:	657) Year of manufact.
	658) Rating: (KVA):	659) No. in use	
Generator 2:	660) Make:	661) Model:	662) Year of manufact.
	663) Rating: (KVA):	664) No. in use	
Generator 3:	665) Make:	666) Model:	667) Year of manufact.
	668) Rating: (KVA):	669) No. in use	
Generator 4:	670) Make:	671) Model:	672) Year of manufact.
	673) Rating: (KVA):	674) No. in use	
Generator 5:	675) Make:	676) Model:	677) Year of manufact.
	678) Rating: (KVA):	679) No. in use	
SUBMERSIBLE PUMPS			
Pump 1:	680) Make:	681) Model:	682) Year of manufact.
	683) Rating Qmax: (m^3/hr):	684) Rating head max at Qmax(m)	685) No. in use
Pump 2:	686) Make:	687) Model:	688) Year of manufact.
	689) Rating Qmax: (m^3/hr):	690) Rating head max at Qmax(m)	691) No. in use
Pump 3:	692) Make:	693) Model:	694) Year of manufact.
	695) Rating Qmax: (m^3/hr):	696) Rating head max at Qmax(m)	697) No. in use
Pump 4:	698) Make:	699) Model:	700) Year of manufact.
	701) Rating Qmax: (m^3/hr):	702) Rating head max at Qmax(m)	703) No. in use

Pump 5:	704) Make:	705) Model:	706) Year of manufact.
	707) Rating Qmax: (m^3/hr):	708) Rating head max at Qmax(m)	709) No. in use
Pump 6:	710) Make:	711) Model:	712) Year of manufact.
	713) Rating Qmax: (m^3/hr):	714) Rating head max at Qmax(m)	715) No. in use
VEHICLES (purpose use: carrying rig / carrying compressor / carrying water tank /			
Truck / Car 1	716) Make:	717) Model:	718) Year of manufacturing.
	719) Year arrived in UG:	720) Km since last overhaul:	721) 4WD (Y/N):
	722) Purpose: Carrying rig	723) Load capacity (tons):	724) Engine capacity (cc):
Truck / Car 2	725) Make:	726) Model:	727) Year of manufacturing.
	728) Year arrived in UG:	729) Km since last overhaul:	730) 4WD (Y/N):
	731) Purpose: Carrying rig	732) Load capacity (tons):	733) Engine capacity (cc):
Truck / Car 3	734) Make:	735) Model:	736) Year of manufacturing.
	737) Year arrived in UG:	738) Km since last overhaul:	739) 4WD (Y/N):
	740) Purpose: Carrying rig	741) Load capacity (tons):	742) Engine capacity (cc):
Truck / Car 4	743) Make:	744) Model:	745) Year of manufacturing.
	746) Year arrived in UG:	747) Km since last overhaul:	748) 4WD (Y/N):
	749) Purpose: Carrying rig	750) Load capacity (tons):	751) Engine capacity (cc):
Truck / Car 5	752) Make:	753) Model:	754) Year of manufacturing.
	755) Year arrived in UG:	756) Km since last overhaul:	757) 4WD (Y/N):
	758) Purpose: Carrying rig	759) Load capacity (tons):	760) Engine capacity (cc):
Truck / Car 6	761) Make:	762) Model:	763) Year of manufacturing.
	764) Year arrived in UG:	765) Km since last overhaul:	766) 4WD (Y/N):
	767) Purpose: Carrying rig	768) Load capacity (tons):	769) Engine capacity (cc):
Truck / Car 7	770) Make:	771) Model:	772) Year of manufacturing.
	773) Year arrived in UG:	774) Km since last overhaul:	775) 4WD (Y/N):
	776) Purpose: Carrying rig	777) Load capacity (tons):	778) Engine capacity (cc):
Truck / Car 8	779) Make:	780) Model:	781) Year of manufacturing.
	782) Year arrived in UG:	783) Km since last overhaul:	784) 4WD (Y/N):
	785) Purpose: Carrying rig	786) Load capacity (tons):	787) Engine capacity (cc):

Truck / Car 9	788) Make:	789) Model:	790) Year of manufacturing.
	791) Year arrived in UG:	792) Km since last overhaul:	793) 4WD (Y/N):
	794) Purpose: Carrying rig	795) Load capacity (tons):	796) Engine capacity (cc):
Truck / Car 10	797) Make:	798) Model:	799) Year of manufacturing.
	800) Year arrived in UG:	801) Km since last overhaul:	802) 4WD (Y/N):
	803) Purpose: Carrying rig	804) Load capacity (tons):	805) Engine capacity (cc):
Truck / Car 11	806) Make:	807) Model:	808) Year of manufacturing.
	809) Year arrived in UG:	810) Km since last overhaul:	811) 4WD (Y/N):
	812) Purpose: Carrying rig	813) Load capacity (tons):	814) Engine capacity (cc):
Truck / Car 12	815) Make:	816) Model:	817) Year of manufacturing.
	818) Year arrived in UG:	819) Km since last overhaul:	820) 4WD (Y/N):
	821) Purpose: Carrying rig	822) Load capacity (tons):	823) Engine capacity (cc):
Truck / Car 13	824) Make:	825) Model:	826) Year of manufacturing.
	827) Year arrived in UG:	828) Km since last overhaul:	829) 4WD (Y/N):
	830) Purpose: Carrying rig	831) Load capacity (tons):	832) Engine capacity (cc):
Truck / Car 14	833) Make:	834) Model:	835) Year of manufacturing.
	836) Year arrived in UG:	837) Km since last overhaul:	838) 4WD (Y/N):
	839) Purpose: Carrying rig	840) Load capacity (tons):	841) Engine capacity (cc):
Truck / Car 15	842) Make:	843) Model:	844) Year of manufacturing.
	845) Year arrived in UG:	846) Km since last overhaul:	847) 4WD (Y/N):
	848) Purpose: Carrying rig	849) Load capacity (tons):	850) Engine capacity (cc):
Truck / Car 16	851) Make:	852) Model:	853) Year of manufacturing.
	854) Year arrived in UG:	855) Km since last overhaul:	856) 4WD (Y/N):
	857) Purpose: Carrying rig	858) Load capacity (tons):	859) Engine capacity (cc):
Truck / Car 17	860) Make:	861) Model:	862) Year of manufacturing.
	863) Year arrived in UG:	864) Km since last overhaul:	865) 4WD (Y/N):
	866) Purpose: Carrying rig	867) Load capacity (tons):	868) Engine capacity (cc):

Truck / Car 18	869) Make:	870) Model:	871) Year of manufacturing.
	872) Year arrived in UG:	873) Km since last overhaul:	874) 4WD (Y/N):
	875) Purpose: Carrying rig	876) Load capacity (tons):	877) Engine capacity (cc):
Truck / Car 19	878) Make:	879) Model:	880) Year of manufacturing.
	881) Year arrived in UG:	882) Km since last overhaul:	883) 4WD (Y/N):
	884) Purpose: Carrying rig	885) Load capacity (tons):	886) Engine capacity (cc):
Truck / Car 20	887) Make:	888) Model:	889) Year of manufacturing.
	890) Year arrived in UG:	891) Km since last overhaul:	892) 4WD (Y/N):
	893) Purpose: Carrying rig	894) Load capacity (tons):	895) Engine capacity (cc):
Truck / Car 21	896) Make:	897) Model:	898) Year of manufacturing.
	899) Year arrived in UG:	900) Km since last overhaul:	901) 4WD (Y/N):
	902) Purpose: Carrying rig	903) Load capacity (tons):	904) Engine capacity (cc):
Truck / Car 22	905) Make:	906) Model:	907) Year of manufacturing.
	908) Year arrived in UG:	909) Km since last overhaul:	910) 4WD (Y/N):
	911) Purpose: Carrying rig	912) Load capacity (tons):	913) Engine capacity (cc):
Truck / Car 23	914) Make:	915) Model:	916) Year of manufacturing.
	917) Year arrived in UG:	918) Km since last overhaul:	919) 4WD (Y/N):
	920) Purpose: Carrying rig	921) Load capacity (tons):	922) Engine capacity (cc):
Truck / Car 24	923) Make:	924) Model:	925) Year of manufacturing.
	926) Year arrived in UG:	927) Km since last overhaul:	928) 4WD (Y/N):
	929) Purpose: Carrying rig	930) Load capacity (tons):	931) Engine capacity (cc):
Truck / Car 25	932) Make:	933) Model:	934) Year of manufacturing.
	935) Year arrived in UG:	936) Km since last overhaul:	937) 4WD (Y/N):
	938) Purpose: Carrying rig	939) Load capacity (tons):	940) Engine capacity (cc):

6. From costs of materials and suppliers to selling rates

(all amounts in UGX ex VAT)

Direct cost - cost materials and allowances for fictive 5 borehole contract at 300 km from base (unit rate is in UGX and including discount and VAT, if item is part of overhead then put "overhead"). In mobilisation also include price for delivering materials on site. **PLEASE FILL ACTUAL COST AT SUPPLIER NOT AMOUNTS YOU ARE NORMALLY QUOTING**

material	unit	unit rate	supplier	nr. per BH	Comment
Siting	BH	941)	942)	1	943)
Mobilisation	km	944)	945)	300	946)
Insurances	BH	947)	948)	1	949)
Move between sites	km	950)	951)	30	952)
5"PVC casing	m	953)	954)	955)	956)
5" PVC screen	m	957)	958)	959)	960)
Diesel for rig	liters	961)	[redacted]	962)	963)
Diesel for compressor	liters	964)	[redacted]	965)	966)
Rock oil	liter	967)	968)	969)	970)
Foam	liter	971)	972)	973)	974)
Polymere	bags	975)	976)	977)	978)
Bit use	hrs	979)	980)	981)	982)
Gravel	bags	983)	984)	985)	986)
Cylinder	unit	987)	988)	1	989)
Pedestal	unit	990)	991)	1	992)
Rising main	m	993)	994)	995)	996)
Pump rods	m	997)	998)	999)	1000)
Cement	bag	1001)	1002)	1003)	1004)
Generator fuel	liter	1005)	1006)	1007)	1008)
Pumping test 3 hrs	LS	1009)	1010)	1	only fill when sub contracted
Hardcore	ton	1011)	[redacted]	1012)	1013)
Sand	ton	1014)	[redacted]	1015)	1016)
Water Analysis	unit	1017)	1018)	1019)	1020)
Airtime	LS	1021)	[redacted]	1	1022)
Stationary, etc	BH	1023)	[redacted]	1	1024)
Commissions	BH	1025)	[redacted]	1	1026)
Allowance drilling crew	BH	1027)	[redacted]	1	1028)
subcontractors			[redacted]		1029)
test pumping	BH	1030)	[redacted]		1031)
platform casting 1	BH	1032)	[redacted]		subcontractor provides material
platform casting 2	BH	1033)	[redacted]		only labour, you pay pedestal
installation 1	BH	1034)	[redacted]	30 m	subcontractor provides all
installation 2	Bh	1035)	[redacted]		only labour, you pay pump etc.

Comment 1	1036)
Comment 2	1037)

Towards selling rates			
1038) Do you make a cost estimate for each project (fill "project estimate") or do you make use of approximate commonly used market rates (fill "market") :			
What is market rate per borehole BoQ contract excluding siting :	1039) Minimum :	1040) Maximum:	
Variation mainly depends on (Client, distance, type of project)		1041) Client	
What is market rate per borehole Lump sum no cure no pay including siting:	1042) Minimum :	1043) Maximum:	
Variation mainly depends on (Client, distance, type of project)		1044) Client	
What percentage of profit do you target :	1045) Minimum %:	1046) Maximum %:	
How much do you include in your quote per borehole for overhead (administrative cost):			
1047) Overhead % of costs:	1048) Overhead in UGX:	1049) :	
How much do you include in your quote per borehole for depreciation :			
1050) Depreciation % of costs:	1051) Depreciation in UGX:	1052) :	
How many borehole does one drilling unit drill per year on average :			
1053) number of boreholes planned per rig:	1054) actual number of boreholes drilled per rig on average:	1055) reason for difference :	

7. Contract type

Please give your comments on the type of contracts (BoQ, Lump Sum No Water No Payment, Lump Sum but payment for dry boreholes, others…. being used in country:			
Contract / Comment 1	1056)		
Contract / Comment 2	1057)		
Contract / Comment 3	1058)		
Contract / Comment 4	1059)		
Do you prefer No Water No Payment contracts or BoQ based contracts:			1060)
Why do you prefer these contracts:	1061)		
For no water no payment contracts what success rate do you anticipate:			1062)
Have you been paid for dry boreholes in lump sum contracts? If yes what percentage of the LS price for a productive borehole (give range min and max)?		1063) Y/N:	1064) % for dry BH min
			1065) % for dry BH max
In areas with low groundwater potential do you spent more time / money on, if yes how much more than for normal areas, in %:		1066) Y/N:	1067) % more money/ time spent
How much does a dry borehole cost you in other costs (depreciation, overhead), or do you include these costs in your successful boreholes (amount in UGX).			
1068) Included in overhead (Y/N):	1069) Amount Direct costs:	1070) Depreciation (amount or comment):	1071) Overhead (amount or comment):
Do you accept no cure no pay contracts in difficult areas?:			1072) Y/N:

Below which success rate would you withdraw or ask for compensation?:	1073) Y/N:
Would you breach contract if no compensation is given?:	1074) Y/N:
Under what conditions (higher rates, up to a certain number) would you accept No Water No Payment contracts?:	
Condition 1	1075)
Condition 2	1076)

8. Borehole siting

(who does it, what quality, comments and challenges)

Do you have your own borehole siting department:	1077) Y/N:		
Do you have your own equipment, if yes mention which one, type = resistivity / EM / VLF :			
1078) Type:	1079) Make:	1080) Model:	1081) No. in use
1082) Type:	1083) Make:	1084) Model:	1085) No. in use
1086) Type:	1087) Make:	1088) Model:	1089) No. in use
1090) Type:	1091) Make:	1092) Model:	1093) No. in use
1094) Do you use divining (dowsing rods / sticks) as a siting technique?			1095) Y/N:
Which company or individual do you use for borehole siting:			
1096) Consultant 1:	1097) Consultant 2:	1098) Consultant 3:	
Do you give specifications for the survey to the person or do you follow the clients specification?			1099) Y/N:
In areas with low groundwater potential do you spent more time / money on, if yes how much more than for normal areas, in %:		1100) Y/N:	1101) % more money/ time spent
For no water no payment contracts do you do more intensive surveys, if yes how much more (		1102) Y/N:	1103) % more money/ time spent
If you subcontract a hydrogeologist do you pay him for dry boreholes:		1104) Y/N:	1105) % less money

9. Data management and project analysis

(how are data processed, stored, analysed, success rates etc.)

Technical

Do you keep a copy of your borehole completion report ?:			1106) Y/N:
Do you keep them in a digital format, if yes which format (Excel, Access, Word)?:			1107) Y/N:
Do you use the historic information to for the preparation of financial proposals?:			1108) Y/N:
Do you calculate success rates per project or for the areas you have been working in?:			1109) Y/N:
Are you willing to share your date with consultants?	1110) Y/N:	with government	1111) Y/N:
Comment:	1112)		
Do you allocate a DWD borehole number for dry boreholes and submit a completion report for that borehole to DWD			1113) Y/N:
Do you allocate a DWD borehole number for technical failures and submit a completion report for that borehole to DWD			1114) Y/N:
Mention the areas where you have been drilling of recent with difficulties with dry boreholes, mention the reason			

(poor siting, low groundwater potential) or with geological formations (mention running sands, collapsing, deep overburden, etc)		
District	Sub Counties	Reason
1115)	1116)	1117)
1118)	1119)	1120)
1121)	1122)	1123)
1124)	1125)	1126)
1127)	1128)	1129)
1130)	1131)	1132)
1133)	1134)	1135)
1136)	1137)	1138)
1139)	1140)	1141)
1142)	1143)	1144)
1145)	1146)	1147)
1148)	1149)	1150)

Financial reporting	
Do you make a monthly financial report showing performance of the company?	1151) Y/N:
Do you make an analysis report of each project completed showing the profit and loss per project?	1152) Y/N:
If not why not?	1153)

10. Projects and area of operation of the company

Volume of work (number of successful installed boreholes plus dry wells either paid in BoQ or non paid as part of LS contract)) number of borehole drilled per year (2002,2003,2004,2005,2006,2007,2008), number of rigs, North, Central, East, SW, West, West Nile ➔ get queries from database WRMD to compare

2004	1154) Deep BH OK	1155) Deep BH dry	1156) Shallow BH OK:	1157) Shallow BH dry	1158) Rehabilitation
2005	1159) Deep BH OK	1160) Deep BH dry	1161) Shallow BH OK:	1162) Shallow BH dry	1163) Rehabilitation
2006	1164) Deep BH OK	1165) Deep BH dry	1166) Shallow BH OK:	1167) Shallow BH dry	1168) Rehabilitation
2007	1169) Deep BH OK	1170) Deep BH dry	1171) Shallow BH OK:	1172) Shallow BH dry	1173) Rehabilitation
2008	1174) Deep BH OK	1175) Deep BH dry	1176) Shallow BH OK:	1177) Shallow BH dry	1178) Rehabilitation
2009	1179) Deep BH OK	1180) Deep BH dry	1181) Shallow BH OK:	1182) Shallow BH dry	1183) Rehabilitation

Location of work *as percentage of total number of boreholes drilled in Uganda : (West Nile [WN – TSU1], North [N-TSU2], NorthEast [NE-TSU3], East [E-TSU4], , Central [C-TSU5], West [W-TSU6], Central West CW-TSU7, South West [SW-TSU8], Outside Uganda [ex UG].*

2004	1184) WN	1185) N	1186) NE	1187) E	1188) C	1189) W	1190) CW	1191) SW	1192) exU
2005	1193) WN	1194) N	1195) NE	1196) E	1197) C	1198) W	1199) CW	1200) SW	1201) exU
2006	1202) WN	1203) N	1204) NE	1205) E	1206) C	1207) W	1208) CW	1209) SW	1210) exU
2007	1211) WN	1212) N	1213) NE	1214) E	1215) C	1216) W	1217) CW	1218) SW	1219) exU
2008	1220) WN	1221) N	1222) NE	1223) E	1224) C	1225) W	1226) CW	1227) SW	1228) exU
2009	1229) WN	1230) N	1231) NE	1232) E	1233) C	1234) W	1235) CW	1236) SW	1237) exU

Please list 20 project examples of projects you carried out in the last years (2007, 2008, 2009) with the details listed below. Please select from contract type (no water no payment or Lump Sum = NWNP/LS or BoQ based where it is assumed that the BoQ based is excluding siting and NWNP is including siting). Contract amounts are in UGX and include WHT and District taxes and paid amounts are in millions UGX and should include WHT but excludes District tax.

No.	Client	Area	No. of BH	Contract Amount '000 UGX	Paid amount '000 UGX	average depth BH	Contract (NWNP/LS or BoQ)	No. of BH drilled	No. of dry BH
1	1238)	1239)	1240)	1241)	1242)	1243)	1244)	1245)	1246)
2	1247)	1248)	1249)	1250)	1251)	1252)	1253)	1254)	1255)
3	1256)	1257)	1258)	1259)	1260)	1261)	1262)	1263)	1264)
4	1265)	1266)	1267)	1268)	1269)	1270)	1271)	1272)	1273)
5	1274)	1275)	1276)	1277)	1278)	1279)	1280)	1281)	1282)
6	1283)	1284)	1285)	1286)	1287)	1288)	1289)	1290)	1291)
7	1292)	1293)	1294)	1295)	1296)	1297)	1298)	1299)	1300)
8	1301)	1302)	1303)	1304)	1305)	1306)	1307)	1308)	1309)
9	1310)	1311)	1312)	1313)	1314)	1315)	1316)	1317)	1318)
10	1319)	1320)	1321)	1322)	1323)	1324)	1325)	1326)	1327)
11	1328)	1329)	1330)	1331)	1332)	1333)	1334)	1335)	1336)

12	1337)	1338)	1339)	1340)	1341)	1342)	1343)	1344)	1345)
13	1346)	1347)	1348)	1349)	1350)	1351)	1352)	1353)	1354)
14	1355)	1356)	1357)	1358)	1359)	1360)	1361)	1362)	1363)
15	1364)	1365)	1366)	1367)	1368)	1369)	1370)	1371)	1372)
16	1373)	1374)	1375)	1376)	1377)	1378)	1379)	1380)	1381)
17	1382)	1383)	1384)	1385)	1386)	1387)	1388)	1389)	1390)
18	1391)	1392)	1393)	1394)	1395)	1396)	1397)	1398)	1399)
19	1400)	1401)	1402)	1403)	1404)	1405)	1406)	1407)	1408)
20	1409)	1410)	1411)	1412)	1413)	1414)	1415)	1416)	1417)

11. Constraints and the future

what is the major constraint in the drilling sector, list the following constraints and/or others in order of importance: corporate tax, VAT, import duties/problems, no quality control, low rates NGOs, tough competition, poor regulation, commissions, budget ceilings, late payments etc.

Number	Constraint		Number	Constraint
1	1418)		5	1419)
2	1420)		6	1421)
3	1422)		7	1423)
4	1424)		8	1425)

What improvements do you suggest to the above constraints, fill the ones for which you have a suggestion

Constraint	Solution		Constraint	Solution
1	1426)		5	1427)
2	1428)		6	1429)
3	1430)		7	1431)
4	1432)		8	1433)

What are your expansion plans (additional drilling units) for the coming years and what are the assumptions that need to be realised before you make the investment. If you do not know now please put "not known".			
Year	Planned new drilling units independent of any actions	Planned if condition is met	Condition *(give description e.g: if government plans more investment, you get framework contracts etc.)*
2010	1434) Number of extra units:	1435) Number of extra units:	1436)
2011	1437) Number of extra units:	1438) Number of extra units:	1439)
2012	1440) Number of extra units:	1441) Number of extra units:	1442)

What are you suggestions for improving the working environment for the siting and drilling sector	
Borehole siting:	1443)
	1444)
Contract types:	1445)
	1446)
Regulation	1447)
	1448)
Organisation of drilling contractor	1449)
	1450)
Others	1451)

Please send the completed questionnaire back to ron@we-consult.info. For any information or clarifications please give me a call on 0772-222049.

The Republic of Uganda
Ministry of Water and Environment

Questionnaire

Consultancy companies

Questionnaire number *(to be filled by Consultant):*

Please fill the questionnaire on the computer; it will save us some entry time. Then save it (please in filename replace "UNICEF" by your company name) and email it back. In case you cannot manage to fill it on the computer, print the file and fill it. Please give us a call to collect the hard copy. In case of any problems please give me a call for assistance at 0772-222049. *Your cooperation is highly appreciated!*

Capacity assessment of drilling companies and siting/supervision consultants in Uganda

Table of Content

Name person entering sheet:	Position:	Phone:	Date:

All amounts in this form should be Ugandan Shillings (UGX) Please use an exchange rate of 1 US$ = UGX 2,000 if your amounts are in US$

1. Company information - Establishment

1) Company name:		
2) P.O.Box :	3) City:	4) Email:
5) Phone 1:	6) Phone 2:	
7) Physical address office 1:	8) Physical address office 2:	
9) Legal status (LTD, NGO, partnership):	10) VAT registration nr. or not registered:	
11) Certificate of incorporation Nr.:	12) Date of incorporation:	
13) Company auditors:	14) Company secretary:	
Directors		
15) Nationality Director 1:	16) Profession D1:	
17) Nationality Director 2:	18) Profession D2:	
19) Nationality Director 3:	20) Profession D3:	
21) Nationality Director 4:	22) Profession D4:	
Shareholders		
23) Share capital in UGX:		
24) Shareholder 1 nationality:	25) % of shares:	

26) Shareholder 2 nationality:	27) % of shares:
28) Shareholder 3 nationality:	29) % of shares:
30) Shareholder 4 nationality:	31) % of shares:
32) Shareholder 5 nationality:	33) % of shares:

2. Company information - Financial

Turnover and performance data *(to be obtained from audited accounts, cost of sales = Project Direct Costs, all amounts in UGX)*

2004		
34) Turnover:	35) Net profit/ loss :	36) Depreciation:
37) Total costs:	38) Cost of sales :	39) Admin cost:
40) Total assets:	41) Current assets :	42) Current liabilities:
2005		
43) Turnover:	44) Net profit/ loss :	45) Depreciation:
46) Total costs:	47) Cost of sales :	48) Admin cost:
49) Total assets:	50) Current assets :	51) Current liabilities:
2006		
52) Turnover:	53) Net profit/ loss :	54) Depreciation:
55) Total costs:	56) Cost of sales :	57) Admin cost:
58) Total assets:	59) Current assets :	60) Current liabilities:
2007		
61) Turnover:	62) Net profit/ loss :	63) Depreciation:
64) Total costs:	65) Cost of sales :	66) Admin cost:
67) Total assets:	68) Current assets :	69) Current liabilities:
2008		
70) Turnover:	71) Net profit/ loss :	72) Depreciation:
73) Total costs:	74) Cost of sales :	75) Admin cost:
76) Total assets:	77) Current assets :	78) Current liabilities:
2009 estimate		
79) Turnover:	80) Net profit/ loss :	81) Depreciation:
82) Total costs:	83) Cost of sales :	84) Admin cost:
85) Total assets:	86) Current assets :	87) Current liabilities:

Bankers and access to credit

What amount of money is required as a buffer to allow a good cash flow?		88) As % of annual turnover:		89) Absolute in UGX:
90) Bank 1	91) Overdraft Y/N:	92) Overdraft amount:	93) Bonds Y/N:	94) Interest % annual:
95) Bank 2	96) Overdraft Y/N:	97) Overdraft amount:	98) Bonds:	99) Interest % annual:
100) Bank 3	101) Overdraft Y/N:	102) Overdraft amount:	103) Bonds:	104) Interest % annual:
105) Comments:				

3. Operational aspects and type of projects

How much turnover came from neighbouring countries in % of turnover, 2009 and 2010 projections

2005	106) Uganda:	107) Sudan:	108) Rwanda/Burundi:	109) Tanzania:	110) Other:
2006	111) Uganda:	112) Sudan:	113) Rwanda/Burundi:	114) Tanzania:	115) Other:
2007	116) Uganda:	117) Sudan:	118) Rwanda/Burundi:	119) Tanzania:	120) Other:
2008	121) Uganda:	122) Sudan:	123) Rwanda/Burundi:	124) Tanzania:	125) Other:
2009	126) Uganda:	127) Sudan:	128) Rwanda/Burundi:	129) Tanzania:	130) Other:
2010	131) Uganda:	132) Sudan:	133) Rwanda/Burundi:	134) Tanzania:	135) Other:

How much turnover came from government, NGOs, private sector in % of turnover, 2009 and 2010 projections

2005	136) Government Central	137) Government District:	138) NGO:	139) Private Sector:
2006	140) Government Central	141) Government District:	142) NGO:	143) Private Sector:
2007	144) Government Central	145) Government District:	146) NGO:	147) Private Sector:
2008	148) Government Central	149) Government District:	150) NGO:	151) Private Sector:
2009	152) Government Central	153) Government District:	154) NGO:	155) Private Sector:

What services are being offered by your company *(select from borehole siting, drilling supervision, contract management, socio economic surveys, geotechnical surveys, design of water supplies, construction supervision of water supplies,, … others)***. List in order of volume of work**

156) Activity 1:	157) Activity 2:	158) Activity 3:
159) Activity 4:	160) Activity 5:	161) Activity 6:
162) Activity 7:	163) Activity 8:	164) Activity 9:

What percentage of turnover is originating from what type of work, 2009 and 2010 projections. *Please make sure that borehole siting is included in boreholes/wells unless the drilling is done by others then it will be entered in others*

Item	2004	2005	2006	2007	2008	2009
Borehole siting rural						
Drilling supervision rural						
Borehole siting production						
Drilling supervision production						

Socio economic surveys						
Water supply design and construction supervision						

4. Staff

(position [MD, FM, Office/Logistics Manager, Hydrogeologist, Geophysical team leader, Logistics Manager, Operation Manager, Sit Workshop Manager, Store Manager, Hydrogeologist, Driller, Ass. Driller, Driver, technical assistants], education level [PhD, Msc, Bsc, Diploma, certificate, none], Education topic [geology, water engineering, civil engineering], nationality, experience in years, remuneration [approximate gross salary[incl. tax / NSSF] in UGX]), YwC: years with company)

Full time staff *(mention drivers, low level technician separately)*

Position	Education level	Subject	YwC	Nationality	Experience (yrs)	Monthly salary:	Monthly allowance:
165)	166)	167)	168)	169)	170)	171)	172)
173)	174)	175)	176)	177)	178)	179)	180)
181)	182)	183)	184)	185)	186)	187)	188)
189)	190)	191)	192)	193)	194)	195)	196)
197)	198)	199)	200)	201)	202)	203)	204)
205)	206)	207)	208)	209)	210)	211)	212)
213)	214)	215)	216)	217)	218)	219)	220)
221)	222)	223)	224)	225)	226)	227)	228)
229)	230)	231)	232)	233)	234)	235)	236)
237)	238)	239)	240)	241)	242)	243)	244)
245)	246)	247)	248)	249)	250)	251)	252)
253)	254)	255)	256)	257)	258)	259)	260)

Position	No,	App. Monthly salary:	Monthly allowance:
Driver	261)	262)	263)
Technicians	264)	265)	266)
Secretary	267)	268)	269)

Comment	270)

Project based staff – borehole siting					
Do you hire free lance hydrogeologist for borehole siting jobs ?:	271) Y/N:				
What is his remuneration and qualification?					
Education level	272)	Subject	273)	Years of experience	274)
per BH				per day	
per BH siting only	275)		per day fees in field incl. allowance	276)	
extra amount for reporting	277)		per day for reporting in office	278)	
extra amount for his transport	279)			280)	
extra amount for his equipment	281)			282)	
What is his remuneration and qualification?					
Education level	283)	Subject	284)	Years of experience	285)
per BH				per day	
per BH siting only	286)		per day fees in field incl. allowance	287)	
extra amount for reporting	288)		per day for reporting in office	289)	
extra amount for his transport	290)			291)	
extra amount for his equipment	292)			293)	

Do you pay him for dry boreholes sited? *Select yes/no/50% depends on client*	294) :

Project based staff – borehole drilling supervision					
Do you hire free lance hydrogeologists for borehole drilling supervision jobs ?:	295) Y/N:				
What is his remuneration and qualification?					
Education level	296)	Subject	297)	Years of experience	298)
per BH				per day	
per BH drilling supervision only	299)		per day fees in field incl. allowance	300)	
extra amount for reporting	301)		per day for reporting in office	302)	
extra amount for his transport	303)			304)	
What is his remuneration and qualification?					
Education level	305) S4	Subject	306)	Years of experience	307)
per BH				per day	
per BH drilling supervision only	308)		per day fees in field incl. allowance	309)	
extra amount for reporting	310)		per day for reporting in office	311)	
extra amount for his transport	312)			313)	

Project based staff – other consultancies
What fees are you paying sub-consultants for longer assignments (fill monthly salary = 20 x daily rate)

Position	Education level	Subject	No.	Nationality	Experience (yrs)	Monthly salary:	Monthly allowance:
314)	315)	316)	317)	318)	319)	320)	321)
322)	323)	324)	325)	326)	327)	328)	329)
330)	331)	332)	333)	334)	335)	336)	337)
Comments: 338)							

5. Equipment

General number of items owned

Item	Nr.	Item	Nr.	Item	Nr
Terrameters	339)	VLF	340)	EM	341)
Cars	342)	Computers	343)	GPS receivers	344)
A3 printers B/W	345)	A4 B/W printers	346)	A4 Colour printer	347)
A3 printer colour	348)	EC meter	349)	Water level meter	350)
Multi cable 3D imaging	351)	GIS software	352)	Stereoscope	353)
	354)		355)		356)

RESISTIVITY EQUIPMENT			
Machine No.1:	357) Make:	358) Model:	359) Year of manufacture:
	360) Multi Cable (length) :	361) Owned / leased:	362) Leased from :
Machine No.1:	363) Make:	364) Model:	365) Year of manufacture:
	366) Multi Cable (length) :	367) Owned / leased:	368) Leased from :
Machine No.1:	369) Make:	370) Model:	371) Year of manufacture:
	372) Multi Cable (length) :	373) Owned / leased:	374) Leased from :
Machine No.1:	375) Make:	376) Model:	377) Year of manufacture:
	378) Multi Cable (length) :	379) Owned / leased:	380) Leased from :
VLF EQUIPMENT			
Machine No.1:	381) Make:	382) Model:	383) Year of manufacture:
		384) Owned / leased:	385) Leased from :
Machine No.1:	386) Make:	387) Model:	388) Year of manufacture:

		389) Owned / leased:	390) Leased from :
EM EQUIPMENT			
Machine No.1:	391) Make:	392) Model:	393) Year of manufacture:
		394) Owned / leased:	395) Leased from :
Machine No.1:	396) Make:	397) Model:	398) Year of manufacture:
		399) Owned / leased:	400) Leased from :

VEHICLES			
Truck / Car 1	401) Make:	402) Model:	403) Year of manufacturing.
	404) Year arrived in UG:	405) Km since last overhaul:	406) 4WD (Y/N):
Truck / Car 2	407) Make:	408) Model:	409) Year of manufacturing.
	410) Year arrived in UG:	411) Km since last overhaul:	412) 4WD (Y/N):
Truck / Car 3	413) Make:	414) Model:	415) Year of manufacturing.
	416) Year arrived in UG:	417) Km since last overhaul:	418) 4WD (Y/N):
Truck / Car 4	419) Make:	420) Model:	421) Year of manufacturing.
	422) Year arrived in UG:	423) Km since last overhaul:	424) 4WD (Y/N):
Truck / Car 5	425) Make:	426) Model:	427) Year of manufacturing.
	428) Year arrived in UG:	429) Km since last overhaul:	430) 4WD (Y/N):
Truck / Car 6	431) Make:	432) Model:	433) Year of manufacturing.
	434) Year arrived in UG:	435) Km since last overhaul:	436) 4WD (Y/N):
Truck / Car 7	437) Make:	438) Model:	439) Year of manufacturing.
	440) Year arrived in UG:	441) Km since last overhaul:	442) 4WD (Y/N):
Truck / Car 8	443) Make:	444) Model:	445) Year of manufacturing.
	446) Year arrived in UG:	447) Km since last overhaul:	448) 4WD (Y/N):
Truck / Car 9	449) Make:	450) Model:	451) Year of

			manufacturing.
	452) Year arrived in UG:	453) Km since last overhaul:	454) 4WD (Y/N):
Truck / Car 10	455) Make:	456) Model:	457) Year of manufacturing.
	458) Year arrived in UG:	459) Km since last overhaul:	460) 4WD (Y/N):

6. From costs of materials and suppliers to selling rates

(all amounts in UGX ex VAT)

Production			
How many boreholes (villages) do you site per day:	461) min :	462) max :	
How many meters of profiling do you do on average (including parallel profiling, if any)	463) min :	464) max :	
How many VES per day	465) min :	466) max :	
How many sites can be reported on in a day	467) min :	468) max :	

Costs (fill actual cost here, not the amounts you charge in your quotations)				
Team leader fees per BH	469)		percentage for overhead	470)
Team leader allowance per BH	471)		percentage for depreciation	472)
Liters of fuel per BH	473)		percentage for profit	474)
Casual labours fees per BH	475)			
Liters of fuel per BH	476)		Reporting person fees per day	478)
Other costs per BH	477)			

Selling rate (these are the rates you put in your quotation)		
What is you selling rate for a borehole siting? rural per BH	479) min :	480) max :
What is you selling rate for supervision? rural per BH	481) min :	482) max :
What is you selling rate for BH siting? production BH per BH	483) min :	484) max :
What is you selling rate for supervision? production BH per BH	485) min :	486) max :
Comment	487)	

7. Contract type

Do you prefer No Water No Payment contracts or BoQ based contracts:		488)
Why do you prefer these contracts:	489)	
For no water no payment contracts what success rate do you anticipate:		490) %
In areas with low groundwater potential do you spent more time / money on, if yes how much more than for normal areas, in %:	491) Y/N:	492) % more money/ time spent
How much does a dry borehole cost you in direct costs, or do you include these costs in your successful boreholes rates		

(amount in UGX).			
493) Included in overhead (Y/N):	494) Amount Direct costs:	495) Depreciation (amount or comment):	496) Overhead (amount or comment):

Do you accept No Water No Pay contracts in difficult areas?:	497) Y/N:
Below which success rate would you withdraw or ask for compensation?:	498) Y/N:
Would you breach contract if no compensation is given?:	499) Y/N:
Under what conditions (higher rates, up to a certain number) would you accept No Water No Payment contracts?:	
Condition 1	500)
Condition 2	501)

8. Hydrogeological Surveys

(use "yes, always", "only in difficult areas, only for production wells, no, depends on budget

Please give your comments on the type of contracts currently being used in country:	
Comment 1	502)
Comment 2	503)
Comment 3	504)
Comment 4	505)

Do you analyse district / sub county borehole data before starting a project	506) Y/N:
Do you buy/use topographical maps or your surveys	507) Y/N:
Do you buy / use aerial photos during the desk study	508) Y/N:
Do you make use of GIS techniques in your surveys (lineament mapping)	509) Y/N:
Do you make GIS location maps	510) Y/N:
Do you collect / analyse earlier results VES/profiles in same District / Sub County for site selection in new projects	511) Y/N:
Do you run profiles for your siting projects	512) Y/N:
Comment	513)
Do you run parallel profiles to determine the orientation of the anomaly	514) Y/N:

In Basement areas what length of profiles do you run for a rural village borehole and what station interval?					
Length	515) min :	516) max :	Interval	517) min :	518) max :
In Basement areas length of profiles do you run for a production well and what station interval?					
Length	519) min :	520) max :	Interval	521) min :	522) max :

How many VES do you do for a rural village borehole	523) min :	524) max :
How many VES do you do for a production well	525) min :	526) max :
Comment	527)	
Who determines the extend of the survey (ToR, Sr. Hydrogeologist, Field team)	528)	

Comment	529)

9. Data management and project analysis

(how are data processed, stored, analysed, success rates etc.

Do you keep a copy of your borehole siting reports ?:			530) Y/N:
Do you keep a copy of your borehole completion ?:			531) Y/N:
Do you get the results of drilling for boreholes sited by you from the driller?:			532) Y/N:
Do you keep a copy of your borehole data for boreholes surveyed / supervised by you ?:			533) Y/N:
Do you keep them in a digital format, if yes which format (Excel, Access, Word)?:			534) Y/N:
Do you use the historic information to for the preparation of financial proposals?:			535) Y/N:
Do you calculate success rates per project or for the areas you have been working in?:			536) Y/N:
Are you willing to share your date with consultants/drillers?	537) Y/N:	with government?	538) Y/N:
Comment:	539)		

Mention the areas where you have been drilling of recent with difficulties with dry boreholes, mention the reason (poor siting, low groundwater potential) or with geological formations (mention running sands, collapsing, deep overburden, etc)

District	Sub Counties	Reason
540)	541)	542)
543)	544)	545)
546)	547)	548)
549)	550)	551)
552)	553)	554)
555)	556)	557)
558)	559)	560)
561)	562)	563)
564)	565)	566)
567)	568)	569)
570)	571)	572)
573)	574)	575)

10. Projects and area of operation of the company

Volume of work in siting and supervision *(number of boreholes / villages)*

2004	576) Deep BH	577) Shallow BH	578) Supervision:
2005	579) Deep BH	580) Shallow BH	581) Supervision:

2006	582) Deep BH	583) Shallow BH	584) Supervision:
2007	585) Deep BH	586) Shallow BH	587) Supervision:
2008	588) Deep BH	589) Shallow BH	590) Supervision:
2009	591) Deep BH	592) Shallow BH	593) Supervision:

Location of work *as percentage of total number of boreholes drilled in Uganda : (West Nile [WN – TSU1], North [N-TSU2], NorthEast [NE-TSU3], East [E-TSU4], , Central [C-TSU5], West [W-TSU6], Central West CW-TSU7, South West [SW-TSU8], Outside Uganda [ex UG].*

2004	594) WN	595) N	596) NE	597) E	598) C	599) W	600) CW	601) SW	602) exU
2005	603) WN	604) N	605) NE	606) E	607) C	608) W	609) CW	610) SW	611) exU
2006	612) WN	613) N	614) NE	615) E	616) C	617) W	618) CW	619) SW	620) exU
2007	621) WN	622) N	623) NE	624) E	625) C	626) W	627) CW	628) SW	629) exU
2008	630) WN	631) N	632) NE	633) E	634) C	635) W	636) CW	637) SW	638) exU
2009	639) WN	640) N	641) NE	642) E	643) C	644) W	645) CW	646) SW	647) exU

Please list 20 project examples of projects you carried out in the last years (2007, 2008,2 009) with the details listed below. Contract amounts are in UGX and include WHT and District taxes and paid amounts are in UGX and should include WHT but excludes District tax.

Examples of siting and supervision projects (RBH=rural, PBH=production)

No.	Year	Client	Area	RBH/ PBH	No. of BH	Contract Amount	No. of BH drilled	No. of dry BH
1	648)	649)	650)	651)	652)	653)	654)	655)
2	656)	657)	658)	659)	660)	661)	662)	663)
3	664)	665)	666)	667)	668)	669)	670)	671)
4	672)	673)	674)	675)	676)	677)	678)	679)
5	680)	681)	682)	683)	684)	685)	686)	687)
6	688)	689)	690)	691)	692)	693)	694)	695)

7	696)	697)	698)	699)	700)	701)	702)	703)
8	704)	705)	706)	707)	708)	709)	710)	711)
9	712)	713)	714)	715)	716)	717)	718)	719)
10	720)	721)	722)	723)	724)	725)	726)	727)
11	728)	729)	730)	731)	732)	733)	734)	735)
12	736)	737)	738)	739)	740)	741)	742)	743)
13	744)	745)	746)	747)	748)	749)	750)	751)
14	752)	753)	754)	755)	756)	757)	758)	759)
15	760)	761)	762)	763)	764)	765)	766)	767)

Examples of siting only projects

No.	Year	Client	Area	RBH/ PBH	No. of BH	Contract Amount	No. of BH drilled	No. of dry BH
1	768)	769)	770)	771)	772)	773)	774)	775)
2	776)	777)	778)	779)	780)	781)	782)	783)
3	784)	785)	786)	787)	788)	789)	790)	791)
4	792)	793)	794)	795)	796)	797)	798)	799)
5	800)	801)	802)	803)	804)	805)	806)	807)
6	808)	809)	810)	811)	812)	813)	814)	815)
7	816)	817)	818)	819)	820)	821)	822)	823)
8	824)	825)	826)	827)	828)	829)	830)	831)
9	832)	833)	834)	835)	836)	837)	838)	839)
10	840)	841)	842)	843)	844)	845)	846)	847)

11	848)	849)	850)	851)	852)	853)	854)	855)
12	856)	857)	858)	859)	860)	861)	862)	863)
13	864)	865)	866)	867)	868)	869)	870)	871)
14	872)	873)	874)	875)	876)	877)	878)	879)
15	880)	881)	882)	883)	884)	885)	886)	887)
15	888)	889)	890)	891)	892)	893)	894)	895)

11. Constraints and the future

What is the major constraint in the siting, supervision and drilling sector, list the following constraints and or others in order of importance: corporate tax, VAT, import duties/problems, no quality control, low rates NGOs, tough competition, poor regulation, commissions, budget ceilings, level of students,….etc.)

Number	Constraint		Number	Constraint
1	896)		5	897)
2	898)		6	899)
3	900)		7	901)
4	902)		8	903)

What improvements do you suggest to the above constraints, fill the ones for which you have a suggestion

Constraint	Solution		Constraint	Solution
1	904)		5	905)
2	906)		6	907)
3	908)		7	909)
4	910)		8	911)

What are you suggestions for improving the working environment for the siting and drilling sector

Borehole siting:	912)
	913)
Contract types:	914)
	915)
Regulation	916)
	917)
Organisation of drilling contractor	918)
	919)
Others	920)

Please send the completed questionnaire back to ronsloots@gmail.com. For any information or clarifications please give me a call on 0772-222049.

The Republic of Uganda
Ministry of Water and Environment

Questionnaire

Individual Consultant

Questionnaire number *(to be filled by Consultant):*

Please fill the questionnaire on the computer; it will save us some entry time. Then save it (please in filename replace "UNICEF" by your surname) and email it back. In case you cannot manage to fill it on the computer, print the file and fill it. Please give us a call to collect the hard copy. In case of any problems please give me a call for assistance at 0772-222049. *Your cooperation is highly appreciated!*

Capacity assessment of drilling companies and siting/supervision consultants in Uganda

Table of Content

All amounts in this form should be Ugandan Shillings (UGX) Please use an exchange rate of 1 US$ = UGX 2,000 if your amounts are in US$

1. Consultant personal data

1) Name of Consultant surname:		2) Name of Consultant first name:	
3) P.O.Box :	4) City:	5) Email:	
6) Phone 1:	7) Phone 2:	8) Date of birth:	
9) Profession:			

Educational data *(level from highest degree to lowest degree, level [PhD, MSc, BSc, Diploma, Certificate])*

10) Education level :	11) Subject:	12) Institute:	13) Yr of graduation:
14) Education level :	15) Subject:	16) Institute:	17) Yr of graduation:
18) Education level :	19) Subject:	20) Institute:	21) Yr of graduation:

Employment in last 5 years *(government then put department/company only when on long term contract fill "free lance" in employer if you are free lance)*

22) Current employer:		23) since year:	
24) Position in the company:			
25) Earlier employer:	26) position:	27) from:	28) to:
29) Earlier employer:	30) position:	31) from:	32) to:
33) Earlier employer:	34) position:	35) from:	36) to:
37) Earlier employer:	38) position:	39) from:	40) to:
41) Earlier employer:	42) position:	43) from:	44) to:

45) Years of experience in borehole siting:	46) Years of experience in drilling supervision :

2. Equipment and methodology for borehole siting

Equipment

Which equipment do you use for geophysical field works	47) Make:		48) Type:
Is the equipment owned or rented	49)		
Who is owner of equipment 1	50)	51) daily rate:	52) operator included (Y/N):
Who is owner of equipment 2	53)	54) daily rate:	55) operator included (Y/N):
Who is owner of equipment 3	56)	57) daily rate:	58) operator included (Y/N):
Comment	59)		

Methodology

Who determines the methodology you use? *(you, company you work for, client of company)*	60)
What method do you normally use for borehole siting? *(VES only, profiling plus VES, divining, depends)*	61)
Do you use parallel profiling?	62)
On what does the method you use depend?	
63) IF	64) Then method used:
65) IF	66) Then method used:
67) IF	68) Then method used:
What set-up do you use for profiling (schlumberger/Wenner/don't know)	69)
How long are the profiles per village for a rural BH	70) m
At what interval are you profiling for a rural BH	71) m
How long are the profiles per village for a production BH	72) m
73) Comments:	

3. Financial

At what rate per village or BH do you do siting

siting fees only	74) min :	75) max :
when you pay for casual what do charge for top up	76) min :	77) max :
when you bring in the equipment what do you charge extra	78) min :	79) max :
when you arrange transport what do you charge extra	80) min :	81) max :
when you do reporting what do you charge extra	82) min :	83) max :

84) Comments:	
Do you accept No Water No Payment contracts?	85) Y/N:
yes but only if? :	86)

4. Experience

Please fill experience of last 5 years, fill name company or Client, if you are a manager fill the years you actually sited and supervised the boreholes your self

Fill number of boreholes sited / supervised			BH siting rural	BH super vision rural	BH siting production	BH super-vision production
87) Year :	88) Company :	89) Client :	90)	91)	92)	93)
94) Year :	95) Company :	96) Client :	97)	98)	99)	100)
101) Year :	102) Company :	103) Client :	104)	105)	106)	107)
108) Year :	109) Company :	110) Client :	111)	112)	113)	114)
115) Year :	116) Company :	117) Client :	118)	119)	120)	121)
122) Year :	123) Company :	124) Client :	125)	126)	127)	128)
129) Year :	130) Company :	131) Client :	132)	133)	134)	135)
136) Year :	137) Company :	138) Client :	139)	140)	141)	142)
143) Year :	144) Company :	145) Client :	146)	147)	148)	149)
150) Year :	151) Company :	152) Client :	153)	154)	155)	156)
157) Year :	158) Company :	159) Client :	160)	161)	162)	163)
164) Year :	165) Company :	166) Client :	167)	168)	169)	170)
171) Year :	172) Company :	173) Client :	174)	175)	176)	177)
178) Year :	179) Company :	180) Client :	181)	182)	183)	184)
185) Year :	186) Company :	187) Client :	188)	189)	190)	191)
192) Year :	193) Company :	194) Client :	195)	196)	197)	198)

199) Year :	200) Company :	201) Client :	202)	203)	204)	205)
206) Year :	207) Company :	208) Client :	209)	210)	211)	212)
213) Year :	214) Company :	215) Client :	216)	217)	218)	219)
220) Year :	221) Company :	222) Client :	223)	224)	225)	226)
227) Year :	228) Company :	229) Client :	230)	231)	232)	233)
234) Year :	235) Company :	236) Client :	237)	238)	239)	240)
241) Year :	242) Company :	243) Client :	244)	245)	246)	247)
248) Year :	249) Company :	250) Client :	251)	252)	253)	254)

5. Constraints and the future

What do you think are the major constraint in the borehole siting and supervision sector, list the following constraints and/or others in order of importance: corporate tax, VAT, import duties/problems, no quality control, low rates NGOs, tough competition, poor regulation, commissions, budget ceilings, level of students,….etc.)

Number	Constraint		Number	Constraint
1	255)		5	256)
2	257)		6	258)
3	259)		7	260)
4	261)		8	262)

What improvements do you suggest to the above constraints, fill the ones for which you have a suggestion

Constraint	Solution		Constraint	Solution
1	263)		5	264)
2	265)		6	266)
3	267)		7	268)
4	269)		8	270)

What are you suggestions for improving the working environment for the siting and drilling sector	
Borehole siting:	271)
	272)
Contract types:	273)
	274)
Regulation	275)
	276)
Organisation of drilling consultants	277)
	278)
Others	279)

Please send the completed questionnaire back to ronsloots@gmail.com. For any information or clarifications please give me a call on 0772-222049.

Annex 2: Drilling permits 2010

VALID DRILLING PERMITS AS OF 31ST JULY 2009

No.	RegNo	Name	rganisatic	Town Office	CommenceDate	ExpiryDate	Status	phone 1	phone 2	email1
1	00670	ABSOLOM AND BROTHERS LTD	PS	Kampala	27/11/2008	26/11/2009	valid	772675030		absbro@yahoo.com
2	00222	ACTION AGAINST HUNGER - ACF USA	NGO	Kampala	31/01/2009	31/01/2010	valid	773356915		washco.ug@acf-international.org
3	00702	ACTION WELL DRILLING & CONTRACTORS CO. LTD	PS	Kampala	02/09/2009	02/08/2010	valid	41250276	752750250	super@imul.com
4	00188	AGRO MACHINERY (U) LTD	PS	Kampala	24/10/2008	23/10/2009	valid	41233181	712391329	agromachine@utlonline.co.ug
5	00707	ALAKARA ENTERPRISES LIMITED	PS	Soroti	03/02/2009	03/01/2010	valid	772345204	7726410140	alakaraenterpriseslimited@yahoo.com
6	00190	AQUA DRILL TECH (U) LTD	PS	Kampala	17/12/2008	16/12/2009	valid	414221565	782660926	office@aquadrilltech.com
7	00268	ASSOCIAZIONE CENTRO AIUTI VOLUNTARI (ACAV)	NGO	Kampala	31/05/2009	30/05/2010	valid	41505839		emmanuelh@jms.co.ug
8	00404	BIK Water Systems Limited	PS	Kampala	30/10/2008	29/10/2009	valid	772435038	392961108	bikwater@hotmail.com
9	00050	CHINA GEO-ENGINEERING CO. UGANDA LIMITED	PS	Kampala	31/05/2009	31/05/2010	valid	392715498		cgcuganda@yahoo.com
10	00175	DRACO (U) LTD	PS	Kampala	12/02/2009	11/02/2010	valid	414340824		draco@infocom.co.ug
11	00027	DRILLCO CONSULT UGANDA LIMITED	PS	Iganga	24/10/2008	24/10/2009	valid	77466217	43242365	
12	00528	DRILLTECK (U) LTD	PS	Gulu	14/07/2009	13/07/2010	valid	773293826	773170888	drilltek_ug@yahoo.com
13	00719	DUNIA ENGINEERING COMPANY LIMITED	PS	Lira	06/05/2009	06/04/2010	valid	772418442	392942264	bitokelo@gmail.com
14	00386	E- PLUS GENERAL ENGINEERING SERVICES LTD.	PS	Soroti	05/06/2009	04/06/2010	valid	772538910	772546956	etometsteven2007@yahoo.co.uk
15	00733	EBOWA INVESTMENTS LIMITED	PS	Lira	06/05/2009	06/04/2010	valid	392826632	772647763	ebowainvestments@yahoo.com
16	00406	EQUATOR WATER WELL DRILLING LTD	PS	Kampala	13/02/2009	02/12/2010	valid	414250687	774138243	ewwdltd@yahoo.com
17	00550	Erika Drilling and Technical Services	PS	Soroti	19/12/2008	19/12/2009	valid	392965290		erikadrilltd@yahoo.co.uk
18	00505	GALAXY AGRO TECH (U) LTD.	PS	Kampala				414378891	712744833	galaxyagrotech@gmail.com
19	00538	GEOTECH ENGINEERING AND TRADING CO. LTD	PS	Lira	24/10/2008	24/10/2009	valid	473220209	772510930	okellobo@yahoo.com
20	00205	HIPPO TECHNICAL SERVICES LIMITED	PS	Kampala	11/10/2008	10/10/2009	valid	414347602	312272059	hippo_tec@yahoo.com
21	00537	IDRICO INTERNATIONAL DRILLING COMPANY	PS	Arua	27/08/2008	27/08/2009	valid	476420231	752517426	idricoltd@hotmail.it
22	00233	International Aid Sweden,	NGO	Kampala						
23	00357	INTERNATIONAL COMMITTEE OF THE RED CROSS (ICRC)	NGO	Kampala				392221583		kampala.kam@icrc.org
24	00712	C&D INTERNATIONAL DEVELOPMENT INSTITUTE UGANDA	NGO	Kampala	06/05/2009	06/04/2010	valid	414233402		coopdevkla@yahoo.it
25	00696	INTERNATIONAL LIFELINE FUND	NGO	Lira	02/03/2009	02/02/2010	valid	775828357	779511160	acapelier@lifelinefund.org
26	00486	KAMU KAMU DRILLING EXPERTS LTD	PS	Kampala	12/02/2009	11/02/2010	valid	772485979		mukadrill@infocom.co.ug
27	00662	KLR UGANDA LTD	PS	Kampala	19/06/2009	19/06/2010	valid	414258530		klruganda@gmail.com
28	00680	NADA WATER SERVICES AND CONSTRUCTION LTD	PS	Jinja	27/11/2009	26/11/2010	valid	782198864		kirundali@yahoo.com
29	00647	NGAI ONE INVESTMENTS LTD	PS	Kampala	19/06/2009	18/06/2010	valid	772465032	392961300	ngai_one1@yahoo.com
30	00030	Nile Drilling Company Uganda Limited	PS	Kampala				77424634	77461985	niledrilling@utlonline.co.ug
31	00661	NOBLE TECHNICAL SERVICES LIMITED	PS	Kampala	20/06/2009	20/06/2010	valid	772368896	772456059	aquatech@utlonline.co.ug
32	00485	PAT-DRILL UGANDA LTD	PS	Kampala				41288652	772424152	kampala@pat-drill.com
33	00359	PWAVKO ENTERPRISES LIMITED	PS	Masindi	24/11/2008	23/11/2009	valid	46520448	77452247	
34	00189	ROYAL TECHNO INDUSTRIES LTD	PS	Kampala	12/02/2009	11/02/2010	valid	41220998	782905839	rtiluganda@yahoo.co.in
35	00278	STRATAGEM LIMITED	PS	Kampala	09/08/2008	08/08/2009	valid	752462647		andama.godfrey@gmail.com
36	00177	Sumadhura Technologies Limited	PS	Kampala	10/04/2009	10/04/2010	valid	752222111	392747379	response@sumadhura.co.ug
37	00539	TGS Water Limited	PS	Kampala	22/10/2008	21/10/2009	valid	OK		uganda@tgswater.info
38	00266	TRANS AFRICAN DRILLCO SYSTEM & ENG. WORKS LTD	PS	Kaberamaido	18/07/2009	17/07/2010	valid	41370069	77303997	menangu@yahoo.com
39	00185	UGANDRILL Ltd.	PS	Iganga				414501432	772400803	ugandrill@ticino.com
40	00360	Victoria Pumps Limited	PS	Kampala	14/07/2009	13/07/2010	valid	41342483		vpl@infocom.co.ug
41	00715	WATER TECH SERVICES LTD	PS	Kampala	16/04/2009	15/04/2010	valid	Ok		watertech@bushnet.net
42		Drill services and Construction (U) Ltd	PS	Kampala				0773000061,	752481278	drillerserves@gmail.com
43		REICH DRILL Technical Works	numbers					77411517		drillmechltd@myway.com
44		CARE Mission								

Annex 3: Mailing lists consultants, DWO, drilling companies

LIST OF GROUNDWATER PROFESSIONALS

S/N	Surname	First name	ORGANISATION	TITLE/Profession	Phone	E-MAIL ADDRESS
1	Andama	Godfrey	Stratagem	Hydrogeologist	772462647	andama.godfrey@gmail.com
2	Atuhaire	Moreen	WE Consult	Engineer	782167776	moreen@we-consult.info
3	Azuba	Samuel	Fels Consultants Ltd	Hydrogeologist	772456009	Samazuba2000@yahoo.com
4	Behakanira	Alex	ECOSAN	Hydrogeologist	772694390, 75460448	Ecosan@ymail.com
5	Bunnya	Elly	Free Lance	Hydrogeologist	772318427	Ellyb4all@yahoo.co.uk
6	Burungi	Ivan	Rica consult	Hydrogeologist	0392960506	Rica2consult@yahoo.com
7	Bwizi	Angella	TSU4	Hydrogeologist	0702183169, '0772404758	angellabwizi@gmail.com
8	Byarugaba	Vincent	TGS Water Ltd	Engineer	0772869119	vincent@tgswater.info
9	Ddimirire	Charles	Draco	Hydrogeologist	772827145	dracogm@infocom.co.ug
10	Emeja	Patrick	Fels Consultants Ltd	Technician	0772589985	emejapatric@yahoo.com
11	Enangu	Moses	DWD	Drilling superintenden	772303997	menangu@yahoo.com
12	Galubuzi	Dennis	Hydrocon (U) Ltd	Hydrogeologist	772425205	
13	Geria	Isaac	Hydrogaps (U)Ltd	Hydrogeologist	0775732117	Hydro_gaps@yahoo.com
14	Johnson	Pule	DWRM	Hydrogeologist	0772 441677	pule.johnson@mwe.go.ug
15	Kabateraine	P	P.K.Hydroexperts	Hydrogeologist	0772 487394	pkabateraine@yahoo.com
16	Kabirizi	Aaron	DWD	Engineer	0772400876	Aaron.kabirizi@mwe.go.ug
17	Kagaba	Stephen	Free Lance	Hydrogeologist		
18	Karundu	John	Free Lance	Hydrogeologist	0752773366	
19	Kasozi	Samuel	Scan Water Consultants	Hydrogeologist	0772 432307	sewceltd@yahoo.co.uk
20	Kaweesa	Ronnie	Compassion International	Hydrogeologist	0772413678	Rkaweesa@ug.ci.org
21	Kiggundu	Henry	Sumadhura	Hydrogeologist	0772880366, '0754880366	hxk029@yahoo.co.uk, hxk029@hotmail.co
22	Kiguundu	Ronald OR (Her	Scan Water Con	Hydrogeologist		
23	Kisinsa	Charity	Fels Consultants Ltd	Hydrogeologist	0772 428731	chattykisa@yahoo.co.uk
24	Kisuule	Micheal	C&D	Geologist	0772 618558	mkisuule@gmail.com
25	Knudsen	Leif	Water Tech Services Ltd	Hydrogeologist	0772760151	watertech@bushnet.net
26	Komakech	Hans	Norplan Uganda	Engineer	772546160	hansk@norplan.co.ug
27	Kyalirizo	Anthony	WE Consult	Hydrogeologist	077280935	anthony@we-consult.info
28	Kyeyune	Erisa	DWD	Hydrogeologist	0772521009	emutkyeyune@yahoo.com
29	Lubega	Henry	BUCADEF	Hydrogeologist	0772 567636	henlubuk@yahoo.co.uk
30	Lugayizi	Isa	Geological Survey	Geologist	0703022034	Isalugayizi@yahoo.com
31	Lugoko	Paul	Palm Hydro Consultancy	Hydrogeologist	772915395	Lugokopaul@yahoo.com
32	Luutu	Anthony	Aquatech Enterprises Ltd	Hydrogeologist	0772 368896	aquatech@utlonline.co.ug
33	Lwanga	Eva	DWRM	Hydrogeologist	0772 409378	Lena0003@yahoo.co.uk
34	Makooma	Daudi	DAUMAK	Hydrogeologist	772420880, '0718332020	daumakconsult@yahoo.com
35	Matovu	Jude	Free Lance	Hydrogeologist	0782 943193	matovuthaddeus@yahoo.com
36	Mbiro	Andrew	ADB	Hydrogeologist	0772403854	mbiroandrew@yahoo.com
37	Mugalu	Rose	Scan Water Con	Engineer	0752 506307	rmugalur@yahoo.com
38	Muhebwa	Lillian	Water Aid	Engineer	041 505795	lillianmuhebwa@wateraid.or.ug
39	Mukose	Geoffrey	Fels Consultants Ltd	Hydrogeologist	772438871	g-mukose@yahoo.com
40	Mukwaya	Christine	DWRM	Hydrogeologist	0772 496645	christine.mukwaya@mwe.go.ug
41	Mulders	Clarissa	WE Consult	Hydrogeologist	0772222010	clarissa@we-consult.info
42	Musota	Richard	DWRM	Hydrogeologist	0772 520966	rgmusota@hotmail.com
43	Mutabazi	Eric	Free Lance	Hydrogeologist	772842330	Emutabaazi@yahoo.com
44	Mutibwa	Robert	Fels Consultants Ltd	Hydrogeologist	0752447894	mutroky@yahoo.co.uk
45	Muwanga	Andrew	Makerere University	Lecturer	0712 803362	amuwanga@mak.sciac.ug
46	NabideKiti	Isac	NBI	Hydrogeologist	0772 480111	Nabide@yahoo.com
47	Naguyo	Robert	Groundwater and GIS Co	Hydrogeologist	0772468895	naguyo@hotmail.com
48	Nahabo	Nancy	Free Lance	Hydrogeologist	0782614046	nancypule@yahoo.com
49	Nakalyango	Caroline	DWRM	Hydrogeologist	0712 890250	caroline.nakalyango@mwe.go.ug
50	Nakato	Deborah	DWRM	Hydrogeologist	0772 416794	deborah.nakato@mwe.go.ug
51	Nakiyingi	Eva	JICA	Hydrogeologist	0772 447741	Evanakiyingi.ug@jica.go.jp
52	Nimanya	Cate	WRECO/NETWAS	Hydrogeologist	0772 981462	cnimanya@yahoo.com
53	Nono	Denis	Makerere University	Geologist	0752 812247	denisnon@yahoo.com
54	Nsubuga	Robert	Aquatech Enterprises Ltd	Hydrogeologist	0772537114	ronsubuga@yahoo.com
55	Nyende	Jacob	Kyambogo University	Lecturer		jmnyende@yahoo.com
56	Nyenje	Philip	Kuleuven, Belgium	Hydrogeologist	0712 630482	Nyenje-p@yahoo.com
57	Odeke	Joseph	Technodrill	Hydrogeologist	0782767373	jfodeke@yahoo.com
58	Okoed	Esther	Draco	Hydrogeologist	0772444246	dracogm@infocom.co.ug
59	Oloya	Simon	K.L.G.	Hydrogeologist	0752 887691	clementegulu@yahoo.com
60	Olukiwta	Tom	WE Consult	Hydrogeologist	0772465497	tom@we-consult.info

LIST OF GROUNDWATER PROFESSIONALS

S/N	Surname	First name	ORGANISATION	TITLE/Profession	Phone	E-MAIL ADDRESS
61	Onekigiwu	Francis	Aquatech Enterprises Ltd	Hydrogeologist	772696806	aquatech@utlonline.co.ug
62	Ongola	Alex	ASCON (U) LTD	Hydrogeologist	0772 453975	alexngola@yahoo.com
63	Osiimwe	Gaston	DWRM	Hydrogeologist	0772418152	gaston.osiimwe@mwe.go.ug
64	Otaka	George	Geostac Ltd	Hydrogeologist	0712 525929	geostak@yahoo.com
65	Rugumayo	Albert	Makerere University	Lecturer	0772 428763	rugumayo@energy.go.ug
66	Rwamarinda	Martin	DWRM	Hydrogeologist	772619590	emrwamarinda@yahoo.com
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Annex 4: Attendance list of the stakeholder workshop

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Annex 5: Drillers association's letter to minister of water

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3 November 2009

THE HONORABLE MINISTER
WATER AND ENVIRONMENT

Dear Hon. Maria Mutagamba

CHALLENGES DRILLING CONTRACTORS FACE IN THE PROVISION OF SERVICES IN THE WATER SECTOR

Introduction

We address your honorable office as Uganda Drilling Contractors Association (UDCA) who provide the private sector led services for provision of potable water sources in the country. As you may be aware around 1995 with government policy to provide better service through the private sector the drilling sector in the Directorate of Water Development was privatized. The drilling rigs in DWD were leased out to individuals or companies. Also private companies registered in Uganda were encouraged to participate. As a result the coverage of potable water sources increased from a mere 30% to almost an average of 65% in recent years. Sound government policies such as recovery of VAT paid on materials and importation of Machinery made it possible for companies to flourish. As a result a number of drilling contractors have substantially contributed to revenues collection of the Country by being among the top 1000 tax payers for the last 5 or so years.

However in the last 2 years we have been faced with a lot of problems in the Water sector. Some of these problems have been communicated to the Directorate of Water Development in the past.

Solving these problems will lead to quality and better products supplied to rural communities by drilling contractors.

1. **District Tenders:**
    - Districts often request for Pre-qualification as initial tendering process. Then later they carry out an " Open Tender" for the same works disregarding pre-qualification! Has the tendering process become a source of revenue to the Districts?
    - Government procurement procedures stipulate that contracts worth **Shs. 50,000,000/= and above** should be procured by open tendering. Most of the water drilling contracts (if not all) are above that mark, but Districts still insist on pre-qualification.
    - Drilling Contractors are made to pay for district **trading license,** and on getting the contract, you are required to pay **2% of contract** as District tax. Is it legal?
    - Districts are demanding **current Bank statements** (this should be a confidential matter)**.** Aware of the degree of fraud in the country how safe is the contractors' money in the Bank? Why don't they stick to annual financial returns?
    - In some Districts, some of your vital documents are removed intentionally to fail you.
    - The District procurement systems are frequently confused by administration/politicians in the selection of the drilling companies for reasons external to technical and financial aspects (even when you are the best qualified and cheaper driller they can refuse you the drilling award in favour of other unqualified / some time not licensed contractors).
    - To get contracts from the District, you are told to show commitment!!

2. **Value Added Tax (VAT):**
    - All water works are VAT exempted, but drillers (now officially VAT deregistered by URA) need to pay VAT on water pumps, PVC casing, GI pipes, rods, foam, polymers, drilling bits and hammers, etc., even if material and equipment are specifically made only for borehole drilling/installation. VAT has become a dead cost for the drillers and the utilizers can not benefit of the VAT water exemption! Now VAT is paid by the contractors instead of the beneficiary, contrary to the VAT principle.

Uganda Drilling Contractors' Association has made presentations to DWD, URA, Ministry of Water and Environment and Ministry of Finance, Planning and Economic Development about this situation, but nothing has come out.

3. **Duty Tax waiver on Diesel:**
    - We request the Government to extend the waiver of Duty Tax on Diesel used by Drilling Contractors. Generators of **100 KVA** and above are given waivers especially to UMA. The Compressors we use are rated **225-450 Hp** equivalent to **300-500 KVA**.
    - Diesel is one of the most costly in put in drilling (an average of 1,000 Lts. Of diesel per Borehole drilled).

4. **Fragmentation of Drilling Works:**
    - Drilling works given by districts are fragmented. A district with 10 Boreholes subdivides the work into 02 Lots of 05 Boreholes each! This unnecessarily increases the drilling contractors' overhead costs for the tender and raises the overall costs of implementing the contracts.
    - The above practice is unacceptable. If every District in Uganda subdivided the water works, how many drilling contractors will be needed?
    - Drilling Rigs are not made to be driving up and down on highways!
    - In fact UDCA had recommended to DWD some time back to group districts along TSU system so that each group would be serviced by one contractor.
    - This would speed up delivery of services and would be cost effective to both client and contractor.

5. **Shallow Wells:**
    - A lot of money meant for providing **safe clean** water is channeled into **Hand dug** shallow wells. These shallow wells have no DWD numbers, no GPS coordinates and are not sighted. Frequently they are dug in wetlands and in many cases they dry up during the dry season when the water demand is even higher. Who takes these contracts? Questionable companies, in many cases linked to the water officers.
    - These sources are highly contaminated because of the shallowness. In fact rural communities are deliberately being polluted on falsehood that they have been provided with **safe clean** water!

Why spend so much money on this type of water source?

6. **Drilling Permits:**
    - No company should carry out or be issued drilling works without a valid drilling permit.
    - There are many companies with drilling permits who don't have drilling equipment.
    - Drilling permits should be issued to companies with certified ownership/lease of drilling plant.
    - There are many companies not involved with drilling who obtain contracts from Districts. This should not be allowed.
    - Renew of drilling permits should be only to those companies that are up to date with their quarterly submission of completion reports to Water Resource Management Directorate.

7. **Cost of drilling Boreholes:**
    - When drilling works was privatized in 1995, the cost of drilling a borehole was fixed at US $ 10,000.
    - Despite the general increment in the cost of materials, diesel, equipment, spare parts and rate of US Dollar against Uganda Shilling, the costs of borehole

drilling are going down up to 50-60% of the original amount! This is not realistic and it leads to taking short cuts ending with a poor product.

DWD need to come up with a realistic reserve price depending on the location of the project.

Competition is healthy but if prices being quoted are very unrealistic, something must be done. In tendering process if your quotation is within + or – 15% of the **reserve price,** your quotation is acceptable but if it is outside these limits, it should be rejected out rightly.

Serious forensic audit of drilling works should be carried out to determine the quality of works being done.

(III) RECCOMENDATIONS

- Drilling Contractors be engaged in the construction of water sources while consultancy services such as hydrogeological survey and supervision of contractors be left to qualified Consultants. This should be adhered to by Districts, NGO's and other Clients willing to engage in borehole drilling.
- DWD needs to come up with a fair compensation scheme for dry boreholes so as to encourage submission and sharing of data on such boreholes and areas where they are located.
- We are of opinion that the current Districts' water sector needs to be re-examined. It is not possible to build drilling capacity in each District and it is difficult to reach the periphery if the information and services are not properly organized (currently we have 95 Districts in Uganda). We are not against decentralization, but if the intended goals can not be fulfilled, some drastic measures need to be taken.
- Cost of drilling a borehole must be addressed so that a quality product is delivered to the end user.
- Hand dug / Shallow Wells should be discontinued forthwith.
- Districts should be grouped according to TSU set up to reduce costs and ease delivery of services.
- Drilling works in the water sector should be equitably distributed among the drilling contractors.
- Government through the relevant line ministries should study and consider waiving off VAT on material supplies for borehole construction and water works.

(IV) <u>CONCLUSION</u>

The problems highlighted above which drilling contractors experience need to be addressed seriously for betterment of rural water sector specifically.

Drilling contractors are ready to play their part efficiently and promptly in contributing to the development of the rural water sector.

Unchecked market forces can ruin a sector! We need to learn about the recent Global Economic Downturn vis a vis Banks and Stock Markets in relation to the rural water sector contributions to the Ugandan economy.

Yours sincerely,

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