



Water & Environmental Projects

www.bannagaconsult.com.sd

BANNAGA CONSULT

Bannaga Consult is a professional consulting engineering office, established in 2001, staffed and organized to provide fully integrated multidisciplinary services to both the public and the private sectors.

We are progressively evolving as a recognized consulting firm providing services in spatial planning, architecture and engineering designs and in addition to the outstanding expertise in the field of environmental pollution control, urban networking and engineering infrastructure.

Bannaga Consult services extend to cover project development from its initial stage, which starts by including feasibility studies, site development, plan layout and spatial organization, preliminary architectural and engineering designs to appropriate design and detailing and further to supervision of construction.

Scope of Works in Brief:

- Environmental Engineering
- Environmental Impact Assessments
- Water Supply, Sewerage and Storm Water Networks
- Water and Sewage Treatment Plants and Desalination of Salty Water
- Dams and Dykes and Water Harvesting Structures
- Road & Bridges, Structures and all Civil Engineering Disciplines
- Electromechanical Works and Pumping Stations
- Physical Planning and Architectural Disciplines
- Feasibility Studies
- Urban and Human Settlements Studies.

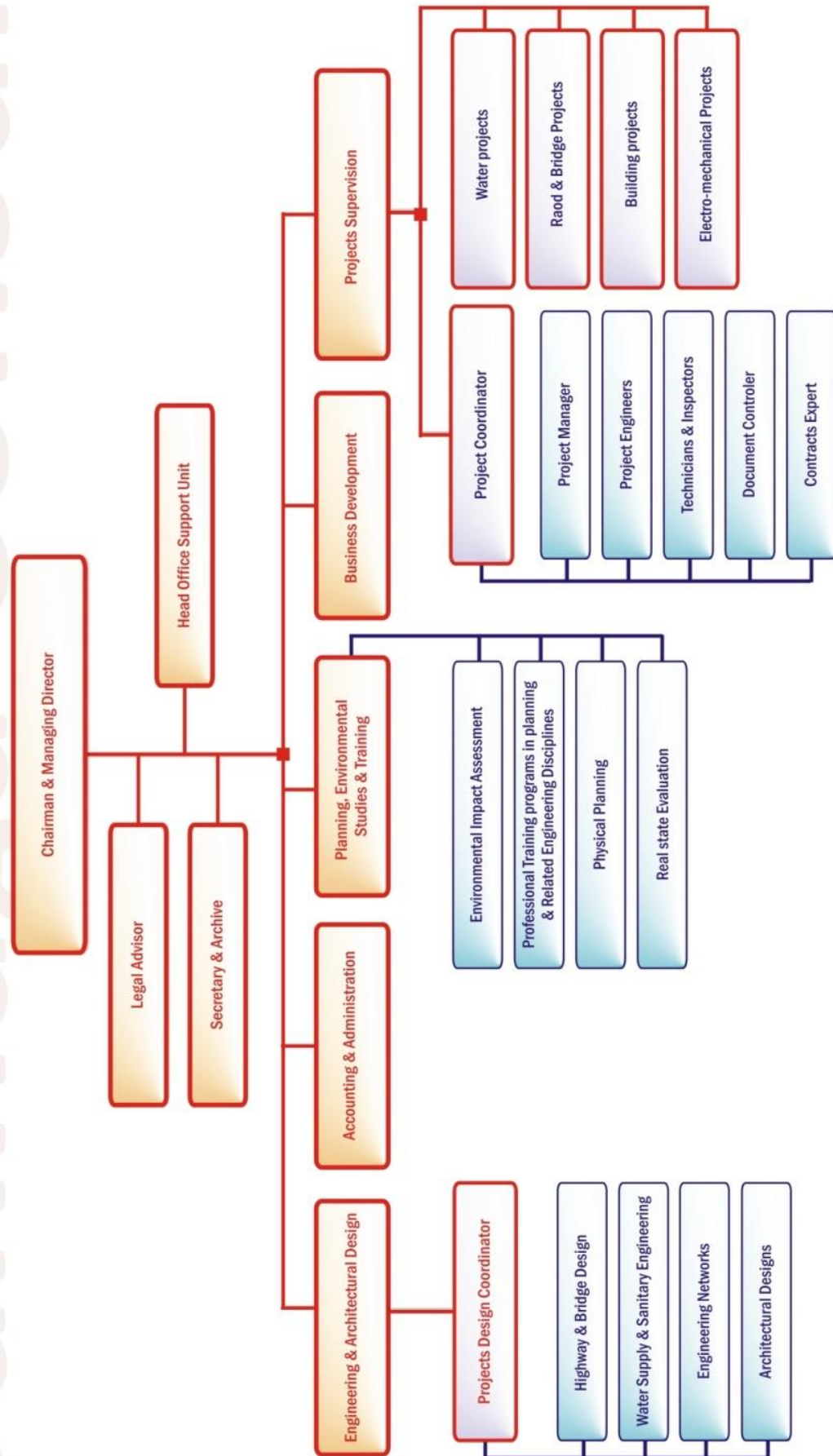
Clients

- IGAD African Region
- Malawi Government – Ministry of Education
- UNDP
- Federal Council of Ministers, Sudan
- Federal Ministry of Finance, Sudan
- Ministry of Interior, Sudan
- Khartoum State -Ministry of Finance
- Khartoum State Ministry of Health
- Higher Council of Environment, Sudan
- Khartoum State Higher Council of Environment
- Ministry of Agriculture and Irrigation, Khartoum State
- Ministry of Physical Planning and Infrastructure, Khartoum State
- Dams Implementation Unit (DIU)- Sudan
- Khartoum State Water Corporation
- Khartoum State Sanitary Corporation
- Sudan Free Zones
- Sudanese Sugar Company
- Sudanese Telecommunication Company (Sudatel)
- Zakat Chamber, Sudan
- National Corporation for Highways and Bridges

Legal Status:

Name of the Consultancy Office:	BANNAGA CONSULT
Date of establishment:	2001
Address:	471, Mamoun Behiri Street P.O. Box 2256- Khartoum - Sudan
Tel:	+249 9 12208105, +249154889269, +249 155 145 853, +249 155 662 774
E-mails:	ashraf@bannagaconsult.com.sd shbannaga@bannagaconsult.com.sd ;
OCCF Certificate of Registration No.:	169
Business Name No.:	41729
General Manager Name:	Dr. Sharaf Eldin Ibrahim Bannaga
Academic Qualification:	BSC, MSc, PhD (Loughborough, U. K.)
Professional Affiliations:	FCIWEM, FSES, FISICARP, M-ISOCARP
Website:	www.bannagaconsult.com.sd

Bannaga Consult Organization Chart



Experiences in Water and Environmental projects:

Bannaga Consult designed and supervised many projects in the field of water disciplines, these activities include:

The specific designs included:

- Preparation of scheme and detailed designs for **water supply** distribution networks.
- Carrying out a comprehensive study to evaluate and assess the existing conditions of the Khartoum State Environment as a prerequisite to the formulation of Khartoum Environmental Strategy as well as preparing a Design Manual for the design and construction of Khartoum Storm Drainage Systems and Protection against Storms.
- Detailed designs of **waste water** collection systems and treatment plants for a number of projects.
- Detailed designs of **storm water** collection systems and preparation of proposals for the accommodation and diversion of **flood water** from Alwadi Akakhdar that traversed the new journalists' city.

Bannaga Consult is currently designing and supervising construction of huge projects and conducted a number of environmental impacts assessment studies for large national project in Sudan and abroad as well.

- Environmental impact assessments for numerous developmental projects and of different natures.
- Water Desalination plants for Red Sea State, Sudan and groundwater production through borehole construction in a number of places in Sudan.
- Many types of Waste Water Treatment Plants in different localities in Khartoum State, Sudan.
- Twenty of the Dams and Dikes and earth excavated lagoons in Khartoum and Kassala states, Sudan.
- A number of Water and sewerage networks

Page
8

Page
43

Water Projects

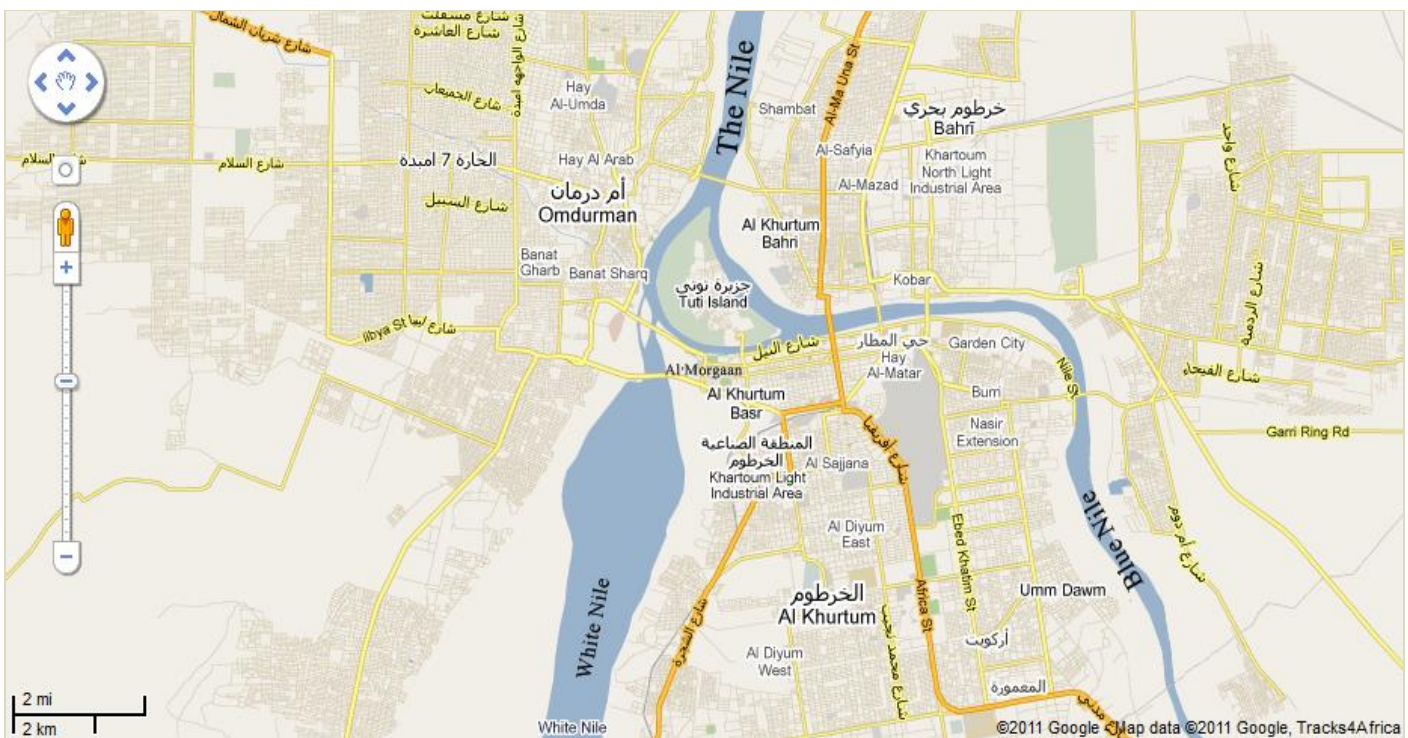
Project Name:

The Preparation of Khartoum State Master Plan for the Sewerage Networks, the Sewage Treatment Plants, Reuse & Disposal (in joint venture with the Italian consultant "TECHNIPLAN")

Client: Khartoum State Sanitary Corporation (KSSC)

Country: Sudan **Location:** Khartoum State

Value of the contract: 5,980,000 SDG



Project Description:

The overall objective of the consulting services is to: formulate a sound Master Plan to enable efficient development of wastewater infrastructure to serve Greater Khartoum (Khartoum, Omdurman and Khartoum North) population with a view of improving the public health, enhancing the urban environment, preventing water pollution and contributing to sustainability of urban growth. In fulfilling his assignment, the Consultant obligations in brief will include but not limited to the following:

- Study the existing conditions of the sewerage network (sewer lines, pump stations and treatment plants) and will produce a report on how to upgrade the sewerage systems considering future urban growth and the expected development in the old served areas and particularly on how to rehabilitate the existing wastewater treatment plants, giving the best technology to be used and equipment compatible with Greater Khartoum local conditions.
- Formulate workable and flexible Wastewater Master Plans for different scenarios prepared to a sufficient level of details and the selected/ approved Master Plan to be implemented in stages. This is to enable the development of wastewater infrastructures in phases with the required degree of flexibility for amendment during the implementation periods. These plans will provide various alternatives for wastewater collection,

treatment, disposal and or reuse of the final effluents and sludge. The most appropriate economically and environmentally feasible and sustainable system whether centralized or decentralized will be recommended for each drainage zone with consideration, of course, to the approval of the general public

- Provide a clear plan for effluent reuse and disposal. Details on how to reuse or where to dispose the treated effluent will be drawn on how to manage industrial wastewater disposal.
- Provide detailed cost estimate for the various Master Plans together with the cost estimate of development that pertains to each stage and phase of the selected Master Plan.
- Innovate wastewater management policies and strategies and give details of institutional and capacity building to the strategy level to ensure that the institutions are capable to carry out the works that assigned to them effectively and efficiently.
- Perform a feasibility study for Phase A of the Wastewater Master Plan. This will include wastewater developmental projects and the rehabilitation works identified for the first ten years of the Master Plan and produced in the template required for funding.

Start Date: August 2017

Completion Date: Ongoing

Duration: 12 Months

Consultancy Services:

Study

Project Name:

Review and Update of Rural Water and Sanitation Construction Standards (in joint venture with the Italian consultant "TECHNIPLAN")

Client: Drinking Water & Sanitation Unit (DWSU) - Ministry of Water Resources, Irrigation and Electricity

Country: Sudan **Location:** West Kordofan State

Value of the contract: 104,100 USD

**Project Description:**

The overall project objective is to contribute to building a resilient and sustainable water and sanitation sector that meets the needs of all users or beneficiaries in Sudan in particular West Kordofan State with a view to contribute to peace building, improving livelihoods and building resilience against climate variability and change.

Start Date: November 2017

Completion Date:

Ongoing

Duration: 6 Months

Consultancy Services:

Study

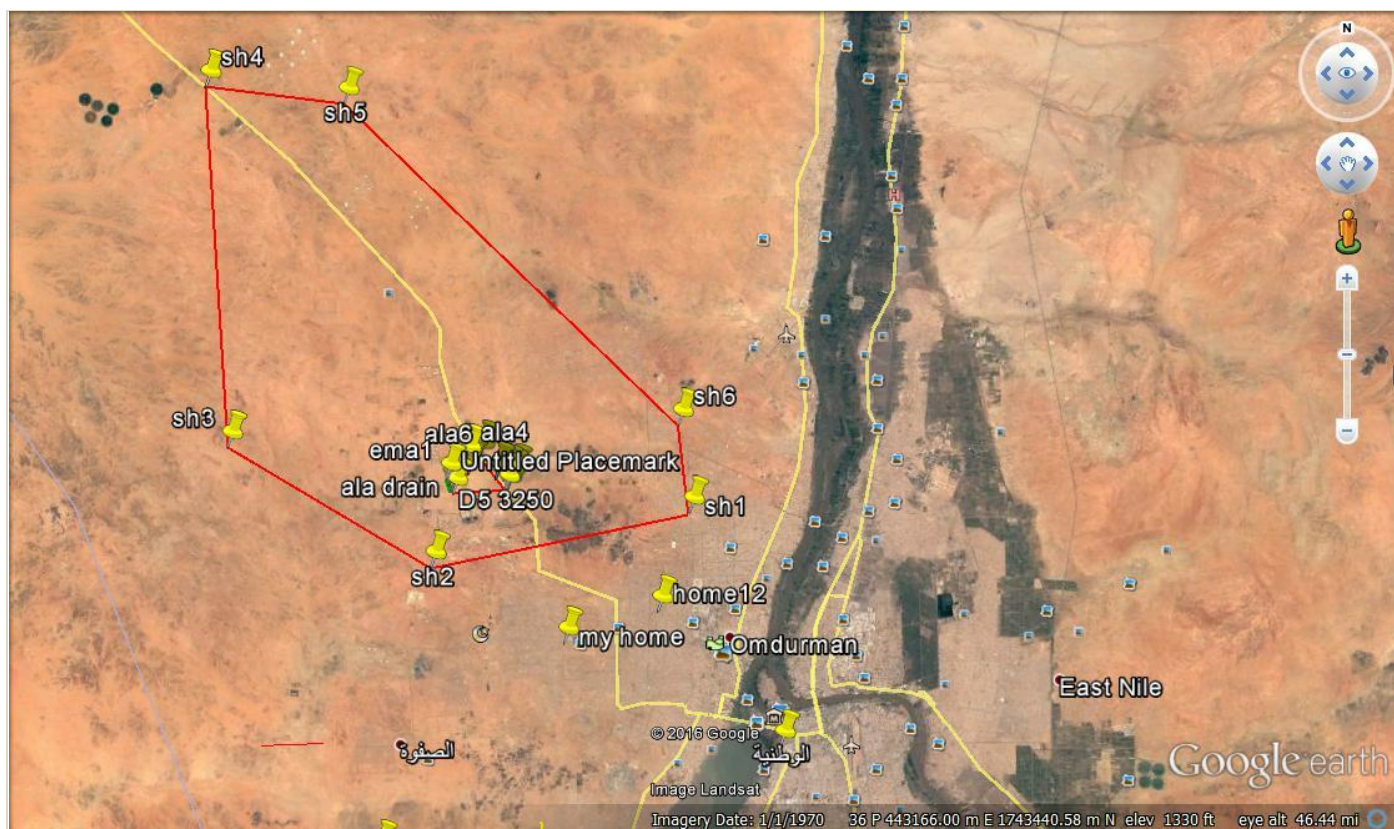
Project Name:

Hydrological study of the Drain Channel of *Al Markhiyat / Shambat Watershed*

Client: Ministry of Physical Planning and Infrastructures

Country: Sudan **Location:** Omdurman Locality North, Khartoum State

Value of the contract: 425,000 SDG



Project Description:

Stormwater networks for protecting residential neighbourhoods covering an area of 36 km²

Start Date: 2016

Completion Date: 2016

Duration: 3 Months

Consultancy Services:

Study and design

Project Name:

Study and Design of stormwater networks and Culverts for protection of *Old Warriors* Settlements

Client: Lands Dept., Ministry of Physical Planning and Infrastructures

Country: Sudan **Location:** Omdurman West, Khartoum State

Value of the contract: 220,000 SDG



Project Description:

stormwater networks covering Old warriors quarters and consisting of drainage lines discharging into trunk sewers conveying rainwater and land floods to the White Nile River, including drainage culverts for traffic easement.

Start Date: 2016

Completion Date: 2016

Duration: 4 Months

Consultancy Services:

Study and design

Project Name:Study and Design of drainage Channels and Culverts for *Almarafi* Township**Client:** Land Dept., Ministry of Physical Planning and Infrastructures**Country:** Sudan **Location:** Omdurman West, Khartoum State**Value of the contract:** 180,000 SDG**Project Description:**

A network of drainage lines connected to large sewer lines which discharge in Shambat and Abu Anja seasonal water courses that run to the River Nile

Start Date: 2016**Completion Date:** 2016**Duration:** 2 Months**Consultancy Services:**

Study and design

Project Name:

"Al Ghaba – Al Qurashi Park" Water Supply Pipe line

Client: Qinwan for Environmental Improvement and Protection Co. Ltd.

Country: Sudan **Location:** Khartoum west, Khartoum State

Value of the contract:**Project Description:**

Start Date: 2016

Completion Date:

Duration:

Consultancy Services:

Design review and amendment

Project Name:

Design of Wad Albasheer Drinking Water Tank and Pumping Station

Client: Qinwan for Environmental Improvement and Protection Co. Ltd.**Country:** Sudan **Location:** Omdurman West, Khartoum State**Value of the contract:** 240000 SDG**Project Description:**

The project comprises a large water tank of 40x40x4m dimension, a large pumping station housing five large-capacity pumps with an elevated crane to ease maintenance. The other project components include fencing and amenities for the operators. The soil needed special treatment for overcoming its unfavourable characteristics

Start Date: 2016**Completion Date:** 6 weeks**Duration:****Consultancy Services:**

Design and supervision

Project Name:

Design of three dams at *Wady Alrwakeeb, Elgea "1" and Elgea "2"* for Protecting *Salha* Township from land Floods

Client: Khartoum State

Country: Sudan **Location:** Omdurman, Khartoum State

Value of the contract: 450,000 SDG

**Project Description:**

The project is for hydrologic study of three watersheds For the purpose of impounding the runoffs from these watersheds by constructing three earth dams at locations that control the flow of rainwater. The largest watershed is Al Geaa and it is located about 20 km west of Omdurman along the shared boundary between Khartoum and Kordofan states and its storage capacity reaches 7.5 million cubic metres.

Bannaga Consult designed the three earth dams using the clay material which available at the three sites. The dams' drainage structures are made of reinforced concrete box culverts and the spillways are also constructed in reinforced concrete. The volumes of retained water are expected to huge which can be used in irrigation



Start Date: 2016

Completion Date: Completed

Duration: 5 month

Consultancy Services:

Study and Design of the three dams: Bannaga Consult staff performed physical surveys, soil sampling and analyses, hydrological and geological study, field investigation for identifying borrow pits and construction material, , embankment and dam layers design, structural design of spillway and drainage structures, bill of quantities, specifications, preparing all bid documents including plan layouts, engineering drawings, physical survey maps, wadi catchment area , contour lines, structural details, etc.

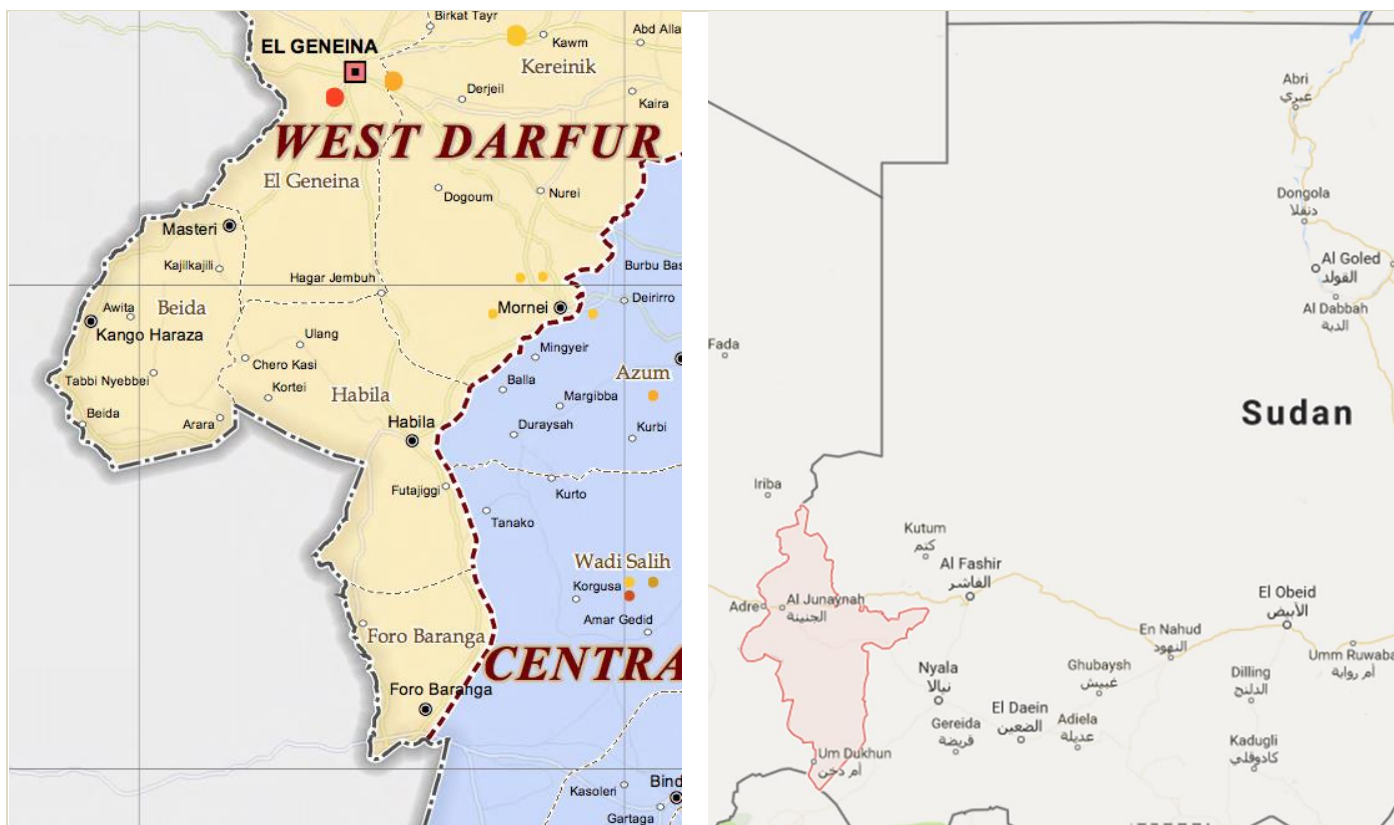
Project Name:

Study and Design Culverts and Bridges for *Aljinainah Forbaranga Road*

Client: National Roads and Bridges Corporation

Country: Sudan **Location:** Aljinainah, West Darfour State

Value of the contract: 2250000 SDG



Project Description:

Design of five wide culverts as road crossings over Forbaranga transient water course. Each culvert is designed in a number of cells to cross the wide channel of the water course. The culverts are designed in reinforced concrete.

Start Date: 2016

Completion Date: 2016

Duration: 9 Month

Consultancy Services:

Study and Design

Project Name:

Abo Dilaig Water Yard

Client: Qinwan for Environmental Improvement and Protection Co. Ltd.**Country:** Sudan **Location:** Abo Dilaeg, East Nile Locality, Khartoum State**Value of the contract:****Project Description:**

Construction of concrete Ground Water Tank and an Elevated GRP Water Tank. The groundwater tank is of 1,200 m³ capacity while the GRP elevated water tank is of 50m³. The two tanks are connected with a three kilometer pipeline representing the water delivery side of a pumping set fed from the groundwater tank. *Abo Dilaeg is situated at the far end of Khartoum State and poses construction difficulties because of its remoteness.*

Start Date: 2015**Completion Date:** 2015**Duration:** 3 Months**Consultancy Services:**

Design review and Supervision of construction

Project Name:Study, Plan, Design and Supervision of Three Teacher Training Colleges for *Malawi* Government**Client:** Ministry of Education, Republic of Malawi**Donor:** BADEA/ Saudi Fund of Development**Country:** Malawi**Location:** *Chikwawa, Rumphi, Mchinji***Value of the contract:** 1,400,000 USD**Project Description:**

The consultancy services are for undertaking detailed design of three Teachers Training Colleges at *Rumphi, Mchinji* and *Chikhwawa* Districts and they include:

- Preparation of detailed designs and tender documents, *including water sewerage and storm water drainage networks*, as per the requirements and approval of the financing institutions
- Tendering, analysis of bids for contractor selection after approval of the financing institutions
- Supervision for Construction of the three colleges
- Supervision of a one year maintenance Period

Start Date: Early 2014**Completion Date:** July 2015**Duration:** 16 months

Project Name:Study and Design of Stormwater Drainage Network and Protection Against Floods, *Gharb Alharat***Client:** Ministry of Physical planning - Khartoum**Country:** Sudan **Location:** City of Omdurman, Khartoum State**Value of the contract:** 220,000 SG**Project Description:**

A network of drainage lines connected to large sewer lines which discharge in local seasonal water courses that run to the River Nile

Start Date: 2015**Completion Date:** Complete**Duration:** 3 month**Consultancy Services:**

Study and Design

Project Name:

Design Review of Drinking Water Supply Network & Wastewater Sewer Lines of *Sitait* Township, *Sitait* Dam Project on *Atbara* River

Client: Qinwan for Environmental Improvement and Protection Co. Ltd.

Country: Sudan **Location:** Gedarif State

Value of the contract:

**Project Description:**

The project is for construction of water supply and wastewater system for serving Sitait Township that accommodates the staff and workers who will operate the dam which irrigates Rahad Agriculture Scheme and generates electricity feeding the national electricity grid.

Start Date: 2014

Completion Date: 2014

Duration: 1 Month

Consultancy Services: Redesign of the water supply and wastewater system to reduce the cost and decrease the depths of sewer lines trenches and the consequential reduction of water lifting and energy. Bannaga Consult acts as in-house consultant for the contractor - Qinwan for Environmental Improvement and Protection Co. Ltd.

Project Name:

Design of *Garri* Free Zone Infrastructure Network (Water supply, wastewater and storm drainage).

Client: Sudan Free Zone (SFZ), Sudan

Country: Sudan **Location:** Garri, North Khartoum, Khartoum State

Value of the contract: 320,000 SG

**Project Description:**

The project was to:

1. Supply drinking water for meeting the demand of Gurri Free Zone residences, warehouses and the administrative complex buildings by having a secured supply from municipal systems and supplemented by water resourced locally and to be developed for the entire use of the Free Zone. The water supply network includes groundwater storage, elevated tank, pumping set and a distribution system.
2. Collect, transport and safely dispose wastewater. The sewerage system includes house connection pipes, collection systems of different drainage sewer lines sizes discharging into trunk sewers and a number of decentralized treatment plants. A decentralized system is a wastewater system that is used to collect, treat and dispose relatively small volumes of wastewater. The effluents of the decentralized treatment units are often recycled rather than discharged into surface waters and this also suits the attitude of the Khartoum regulatory authorities
3. 3. Protect the free zone from stormwater and land floods originating from the further east.

Start Date: 2009 **Completion Date:** Complete

Duration: 4 month

Consultancy Services:

Design of Garri Free Zone Infrastructure Network (Water supply, wastewater and storm drainage), preparing bid documents and supervision of the first phase which comprised the water distribution network. The consultancy tasks include:

1. Water Supply:

- Estimation of the current and future demands
- The ground tank capacity was considered to store a volume of water enough for three days' demand.
- A lift station installed to lift water to an elevated tank if required.
- An elevated tank, if required, shall be erected to maintain pressure in the network. if the pressure of the active nodes on the network can be achieved by using a large storage tank placed in high terrain area an elevated tank may not be required.
- A piping distribution network including valves and fittings was designed to provide piped drinking water to residents. This is consisting of an interconnected series of pipes conveying uninterrupted supply of pressurized safe drinking water that meets residents' needs

2. Wastewater Drainage Network:

- Estimation of Wastewater Generated
- Design of a wastewater Collection and Conveyance Network including manholes and pumping sets if required and network was made of a series of linked sewer pipes but not a closed loop. The network expanded from the most upstream point branching at junctions to several downstream ends and ending into a treatment plant serving the upstream network. The design was therefore based on selecting a minimum slope where applicable and avoiding lifting of water unless necessary
- The appropriate system selected was in particular to meet site conditions and treatment objectives. A decentralized system was considered. It is a wastewater system that is used to collect, treat and dispose relatively small volumes of wastewater. Extended aeration processes were used in the design.
- Advanced treatment units were added to function as post-secondary wastewater treatment to achieve further organic and solids removals and to allow for the removal of undesired nutrients and toxic materials so as to be used for irrigation.

Project Name:

Design and Supervision of two (2) water desalination plants at *Garoora* and *Jabaeit* + 4 boreholes including storage structures and fences

Client: Zakat Champer- Khartoum

Contractor: Qinwan for Environmental Improvement and Protection Co. Ltd.

Country: Sudan **Location:** Red Sea State

Value of the contract:**Project Description (Part One):****1. Water Treatment Part**

- The water treatment part of the project is about the design of two desalination plants each is of a capacity of 250-300 m³/Day (ONE AT MARAFEIT TO DESALT SEA WATER AND THE OTHER AT GEBEIT TO DESALT BRACKISH WATER).
- The process selected is the reverse osmosis process. This system has been designed to operate on feed water having a TDS of 45,000 mg/l. For sea water and 170000mg/L for brackish water
- Water from Borehole is pumped with the help of the Well Pumps to Raw Water Storage Tank. The raw water shall be pumped by Filter Feed/Backwash Pumps to Manual Dual Media Filter, which contains sand and anthracite media for suspended solids removal.
- Prior to filtration, hypochlorite solution is dosed to ensure water disinfection.
- During back washing, water is drawn from the Raw Water Storage Tank and fed through the filter via the same Filter Feed/ Backwash Pumps.
- After filtration, the water shall be dosed with chlorine depleting solution.
- The SWRO feed water will then pass through 5 Micron Cartridge Filter and boosted by high pressure pump to Reverse Osmosis Plant.
- Post Chlorination and Lime shall be added to keep residual chlorine and to increase product water pH & alkalinity respectively. The product water will be fed under remaining pressure to the Product Water Storage Tank (identical to raw water tank).
- Flushing of SWRO membranes is performed upon plant shutdown. Clean water is pumped from a flushing tank to the RO membranes.

Consultancy Services:

Bannaga Consult staff identified the conceptual design and accordingly prepared the specifications indicating the unit capacities and type of equipment to be used, produced the tender document and selected the contractor and later supervised the erection of the containerized plant

Project Description (Part Two):**2. Boreholes Part**

Vertical groundwater production wells were drilled to supply water for domestic, municipal for serving four villages (Garoara, Sinkat, Gabait Maadin and Marafeet) in the Red Sea area. Each of the drilled well was constructed: (a)

straight, and (b) vertical. Each consists of a bottom sump, well screen, and permanent well casing (pipe) surrounded by a gravel pack.

Consultancy Services:

Bannaga Consult employed a knowledgeable and experienced geohydrological expert who conducted the hydrogeological assessment to determine whether and where to locate each within the designated locality. Each well was properly designed and constructed to prevent contaminants entering the well from the ground surface or from the soil. The supervising personnel ensured that:

- Good quality materials for casing and well screen, and of suitable sizes were used, carefully installed in the well to the appropriate depths.
- Grouting of the well around the casing was applied to prevent ingress of contaminated water from the ground surface or from shallow depths.

Start Date: 2005**Completion Date: 2006****Duration**

Project Name:Study and design of *Al Sada* Dam**Client:** UNDP/Higher Council for Environment –Khartoum**Country:** Sudan **Location:** Khartoum State**Value of the contract:** 150,000 SG**Project Description:**

The project is for retaining water to be used for irrigation to improve the local environment. The project components are mainly the earth body, drainage structures and a spillway to pass the surplus water downstream. The body is constructed in clay and protected by stone riprap and a three cells box culvert was constructed in reinforced concrete

Start Date: 2012**Completion Date:** Complete**Duration:** 3 month**Consultancy Services:**

Study and Design.

Project Name:

Design and Supervision of Drainage structures (Culverts and Channels) for *Kassala Wager Highway road*

Client: National Roads and Bridges Corporation

Country: *Sudan* **Location:** *Kassala State*

Value of the contract:**Project Description:**

Kassla Wager Road extends more than 100 km and runs parallel for a sizeable length to Gash River and therefore crosses many irrigation canals that irrigate Gash Agriculture Scheme. Many culverts and canals were redesigned and constructed throughout the road length.

Start Date:

Completion Date: 2008

Duration:

Consultancy Services:

Design and supervision of construction

Project Name:Design and Supervision of Box and Pipe Culverts for *Omdurman Salha* road**Client:** National Roads and Bridges Corporation**Country:** Sudan **Location:** South Omdurman City, Khartoum State**Value of the contract:****Project Description:**

- It is a two cells reinforced concrete culvert constructed to pass the Geaa watershed runoff together with pipe culverts distributed along Alreef Omdurman Salha Rural Road
- The work included physical surveys, detailed topographic survey, soil investigations and a detailed hydrological survey.

Start Date: 2013**Completion Date:** 2014**Duration:** 12 Month**Consultancy Services:**

Bannaga Consult designed and Supervised the construction of the Box and Pipe Culverts after conducting a hydrologic study

Project Name:

Study, Design and Supervision of Kassala Seven Earth Excavated Ponds- as part of the large water harvesting project throughout Sudan

Client: Ministry of Electricity and Dams, Sudan

Country: Sudan **Location:** Kassala State

Value of the contract:**Project Description:**

The project comprises seven ponds distributed throughout Kassala State for harvesting rainwater in water-crisis areas. The ponds or (Hafeers) are artificial hydraulic structures located outside the channels of the water courses and they are totally or partially closed by a retention dykes.

Start Date: 2012

Completion Date: 2012

Duration: 2 Months

Consultancy Services:

Bannaga Consult conducted a hydrologic study to locate the ponds and performed the design, bid documents and supervision construction works of each.

Project Name:

Supervision of Culverts and drainage Channels approaches for *Khartoum Jabel Al Awliya* Highway

Client: National Roads and Bridges Corporation

Country: Sudan **Location:** Khartoum State

Value of the contract: Part of a design review contract of *Jabel Al Awliya* Highway

**Project Description:**

Culverts design review is part of the rehabilitation of *Jabel Al Awliya* Highway and this necessitated a hydrologic study to check the drainage capacity of the highway culverts and to certify whether a redesign is needed to widen the culverts. His why a number of the old road culverts were redigned

Start Date: 2011

Completion Date: 2013

Duration: 18 Months for all works

Consultancy Services:

Design review, preparing bid documents and supervision of construction

Project Name:Design and Supervision of Culverts and Channels for *Karkon Hamashkoreb* highway**Client:** National Roads and Bridges Corporation**Country:** Sudan **Location:** Kassala State**Value of the contract:** This is part of *Karkon Hamashkoreb* highway**Project Description:**

Part of the highway design and supervision of construction was to design and supervise construction of the highway drainage structures, A number of culverts and bridges were designed for draining *Karkon Hamashkoreb* highway after conduction of hydrologic studies

Start Date:**Completion Date:** 2011**Duration:** not completed on time**Consultancy Services:**

Design, preparing bid documents and supervision.

Project Name:

Design and Supervision of Culverts and Channels for *Almaraym Awil* Highway

Client: National Roads and Bridges Corporation

Country: Republic of South Sudan (after Separation) **Location:** South Sudan

Value of the contract: Part of *Almaraym Awil* Highway Contract

**Project Description:**

- It is for the design and supervision of construction of reinforced concrete culverts constructed to pass the local watershed runoffs together with pipe culverts distributed along *Almaraym Awil* Highway.
- The work included physical surveys, detailed topographic surveys, soil investigations and a detailed hydrological survey for each of the local watersheds.

Consultancy Services:

Design, preparing bid documents and supervision of construction.

Project Name:

Study, Design and Supervision of *Musran* Dam , / kassala State

Client: Ministry of Electricity and Dams

Country: Sudan **Location:** *New Halfa Locality* , kassala State

Value of the contract: 525,000 SDG



Project Description:

- Musran Dam is a dam which was constructed in a remote area and its main purpose is to harvest rainwater. The project improved the ecological environments in the state as well as it provided irrigation for small-scale farming, for supply of food to farmers and would be increased if various water-saving agriculture techniques are applied. An underestimated benefit of water harvesting is the improvement of soil fertility. Silt, manure and other organic matter is "harvested" or kept in place together with the water thus, decreasing areas subjected to soil erosion. Recharging of ground water for raising the water table or supplementing its storage is evident in a number of places.

Start Date: 2012 Completion Date:**Duration: 11 month****Consultancy Services:**

Study, Design, preparing bid documents and supervision

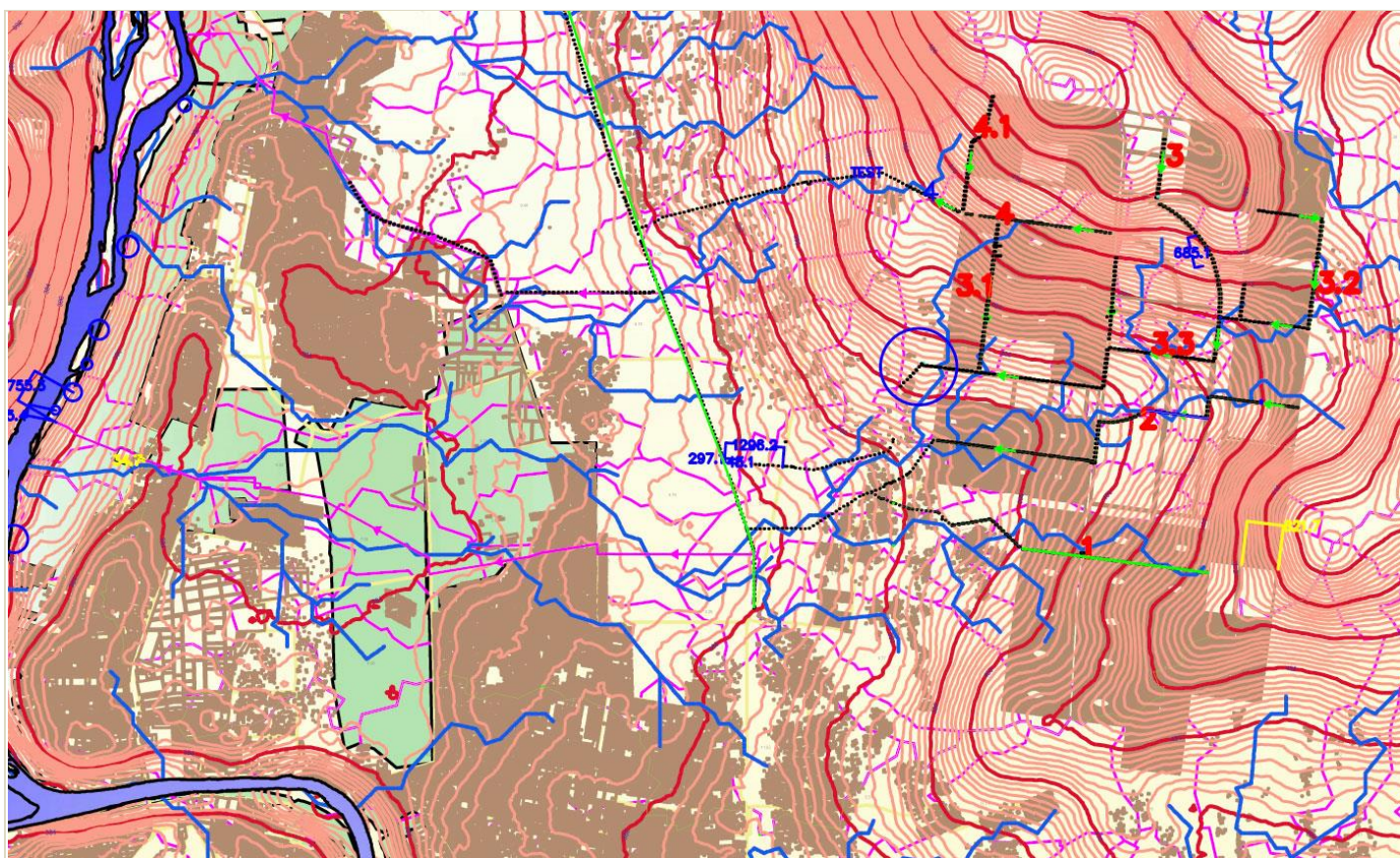
Project Name:

Study and Design of Stormwater Drainage Network and Protection against Rain storms and Floods of *Alwady Alakhdar Township*

Client: Ministry of Physical Planning- Khartoum

Country: Sudan **Location:** Khartoum State

Value of the contract: 425,000 SDG

**Project Description:**

The project is meant to drain the stormwater from the Journalist Township where Alwady Alakhdar seasonal water course runs through the township causing damage, The project comprises design of a detailed stormwater drainage network that discharges into three large canals transporting water to the River Nile which is about 10 km west of the township

Start Date: 2010

Completion Date: Complete

Duration: 5 month

Consultancy Services:

Study and Design of the Drainage network

Project Name:Design and supervision of *Al Wadi Albiad* Earth Dam**Client:** Ministry of Physical Planning- Khartoum**Country:** Sudan **Location:** Khartoum North, Khartoum State**Value of the contract:** 318,000 SG**Project Description:**

Al Wadi Albiad Earth Dam consists of the dam body (earth embankment), the spillway, the inlet and outlet and the drainage structures, which are made of large size pipe culverts in addition to the protection layer and the channel receiving the overspill water.

Start Date: 2008**Completion Date:** 2009**Duration:** 9 month**Consultancy Services:**

Design, preparing bid documents and supervision

It is about the design of the earth dam as well as the supervision of the construction works. As for the supervision work, Bannaga Consult task was like all supervision tasks: witnessing construction of the dam layers and the associated structures and certify that the execution is as per the design and specifications

Project Name:Design and supervision of *Shambat* Earth Dam**Client:** Ministry of Infrastructure- Khartoum State**Country:** Sudan**Location:** Khartoum State**Value of the contract:** 150,000 SG**Project Description:**

SHAMBAT DAM which is located north-west of Al Thowra, Omdurman. The storage capacity of SHAMBAT dam is 5 million cubic metres. The dam retains the rainwater carried by Shambat transient water course which used to devastate north of Althowra informal settlements.

Start Date: 2008**Completion Date:** 2009**Duration:** 7 month**Consultancy Services:**

Design, preparing bid documents and supervision

Project Name:Design and supervision of *Wadi Seidna Earth Dam and Abu Laa'ot Wadi***Client:** Dam Implementation Unit, Ministry of Electricity and dams**Country:** Sudan **Location:** Omdurman, Khartoum State**Value of the contract:** 540,000 SG**Project Description:**

- Wadi Seidna Earth Dam and Wadi Abu Laa'ot Dam which are located adjacent to the Nile West Road running parallel to the River Nile
- The first dam, WADI SEIDNA is adjacent to the Military College while the second, Abu Laa'ot is located west of Gazeera Slanj village. WADI SEIDNA dam capacity is 4 million cubic metres, while that of Abu Laa'ot is more than 2 million cubic metres. Wadi Seidna Earth Dam was constructed but after its completion informal settlers occupied the watershed just upstream the dam.

Start Date: 2011**Completion Date:** 2012**Duration:** 9 month**Consultancy Services:**

Design, preparing bid documents and supervision

(Wadi Seidna Earth Dam was designed and constructed while Abu Laa'ot dam is not constructed yet)

Project Name:supervision of *Al Kanjar* Earth Dam,**Client:** Ministry of Physical Planning and Infrastructures**Country:** *Sudan* **Location:** *Khartoum North Locality, Khartoum State***Project Description:**

Al KANJAR is one of the constructed dams that are supervised by Bannaga Consult. It is located east of Al Kabbashi village, in the mid-way between Khartoum North and Gaili. The storage capacity of Al KANGER dam is 10 million cubic metres.

Start Date: **2003****Completion Date:** **2003****Duration:****Consultancy Services:**

Design, preparing bid documents and supervision

Project Name:

Study, Design and Supervision of many urban roads throughout Khartoum State that include stormwater drainage structures

Client: Ministry of Infrastructure- Khartoum State, National Roads & Bridges Cor.

Country: Sudan **Location:** Khartoum State

Value of the contract:



Project Description:

Start Date:

Completion Date: 2008

Duration:

Consultancy Services:

Study, Design, preparing bid documents and supervision

Waste Water Projects

The following projects are samples of BANNAGA CONSULT assignments in wastewater. It is about the design of sewage treatment plants as well as the supervision of the construction works. It includes selection of the treatment process, design of the treatment units and their capacities, the structural design of the treatment units, design of the channels, piping and the drainage and distribution structures, design of pumping sets, design of aeration reactors and air blowers, design of filtration system, electromechanical control and panel board, design of operators building, etc. As for the supervision work, our task is to witness construction of STP as described and advice on the execution as per the design and specifications.

Project Name:Industrial Wastewater Treatment Plant and Pipelines for *Sinnar* Sugar Factory**Client:** Qinwan Environmental Improvement and Protection Co. Ltd.**Country:** Sudan **Location:** Sinnar State**Value of the contract:****Project Description:**

The Project is located west of Sinnar, Sudan and adjacent to the Blue Nile. It comprises a large reinforced concrete holding tank, sewer lines as waterborne systems which collect wastewater from different factory sources and from the factory staff village and discharge it into the contact stabilization pond. The sewer lines were made of GRP and the wastewater treatment plant comprises three ponds – anaerobic, facultative and maturation. The designed waste stabilization ponds (WSP) are large shallow basins enclosed by an earth embankment in which raw wastewater is treated by entirely natural processes involving both algae and bacteria. The rate of oxidation to supplement dissolved oxygen in water is slower, and as a result ponds' hydraulic retention times considered were longer than in conventional wastewater treatment processes. The design data was as follows:

Design flow =	10000 m ³ /day
Design load =	2400 mg COD/L or more
Total load =	24000 kg COD/day



Waste Water Projects

Start Date: 2010

Completion Date: 2010

Duration: 2 month

Consultancy Services:

The tasks assigned to Bannaga Consult are the design and supervision of construction which include carrying out of the topographic survey and soil testing and designing the drainage lines together with the ponds which are located further away in low depression area. After receiving approval from the Client Bannaga Consult staff provided the Contractor with the detailed design and supervised the works.

Project Name:Industrial sewage Treatment Plant and Pipelines for *Asalayiah* Sugar Factory**Client:** Qinwan Environmental Improvement and Protection Co. Ltd.**Country:** Sudan **Location:** White Nile State**Value of the contract:****Project Description:**

The Project is located at Asalayiah, Sudan and adjacent to the White Nile. It comprises a large reinforced concrete holding tank, sewer lines as waterborne systems which collect wastewater from different factory sources and from the factory staff village and discharge it into the contact stabilization pond. The sewer lines were made of GRP and the wastewater treatment plant comprises three ponds – anaerobic, facultative and maturation. The designed waste stabilization ponds (WSP) are large shallow basins enclosed by an earth embankment in which raw wastewater is treated by entirely natural processes involving both algae and bacteria. The rate of oxidation to supplement dissolved oxygen in water is slower, and as a result ponds' hydraulic retention times considered were longer than in conventional wastewater treatment processes. The design data was as follows:

Design flow = 10000 m³/day
Design load = 2400 mg COD/L or more
Total load = 24000 kg COD/day



Waste Water Projects

Start Date: 2011

Completion Date: 2010

Duration: 2 month

Consultancy Services:

The tasks assigned to Bannaga Consult are the design and supervision of construction which include carrying out of the topographic survey and soil testing and designing the drainage lines together with the ponds which are located further away in low depression area. After receiving approval from the Client Bannaga Consult staff provided the Contractor with the detailed design and supervised the works.

Waste Water Projects

Project Name:

Design and Supervision of a sewage treatment package plant for UN-HABITAT

Client: Qinwan Environmental Improvement and Protection Co. Ltd.

Country: Sudan **Location:** South of Khartoum Town, Khartoum State

Value of the contract:

**Project Description:**

A small containerized steel wastewater treatment plant for a neighbourhood of Nasr subdivision, south of Khartoum

Start Date:

Completion Date: 2010

Duration:

Consultancy Services:

Bannaga Consult staff assignments include:

- Design of tanks and their capacities & functionalities.
- Design of the pumps, filters, panels of the plant.

Waste Water Projects

Project Name:

Design and Supervision of Omdurman Islamic University (_Mohammed Salih Omer Complex)
Wastewater Treatment Plant and wastewater network

Client: Qinwan Environmental Improvement and Protection Co. Ltd.

Country: Sudan **Location:** Omdurman, Khartoum State

Value of the contract:**Project Description:**

This is a domestic wastewater treatment plant for student hostel of 600CUMD capacity using MBR technology, with collecting sewers and irrigation lines.

Start Date:

Completion Date: 2009

Duration:

Consultancy Services:

Bannaga Consult staff undertook:

- Designing and construction of concrete tanks and other structures
- Installation of pumps, devices, control panel, etc.
- Supervision during the construction period.
- Designing for and construction of collecting sewer lines.
- Designing for and construction of collecting sewer lines.
- Designing for and construction of irrigation lines.

Waste Water Projects

Project Name:

Design and Supervision of Sewerage Network and Sewerage Treatment Plant for *Rebat* Police University

Client: Ministry of Interior

Contractor: Qinwan for Environmental Improvement and Protection Co. Ltd.

Country: Sudan **Location:** Khartoum State

Value of the contract:**Project Description:**

Rehabilitation and Supervision of a Sewage Plant & Construction of Sewage Network for Rebat University, Soba. It was a rehabilitation and completion of unfinished wastewater treatment plant using the extended aeration technology, including lift stations, irrigation tank, sewer and irrigation networks, the capacity of the plant is 600 metre cube per day.

Start Date:

Completion Date: 2008

Duration:

Consultancy Services:

Design and Supervision

Bannaga Consult performed:

- Review of the old design, identified the gaps in the design and amended it accordingly and produced a document proposing the rehabilitation works and the new units that was required to be incorporated
- Supervision for rehabilitation works of the existing non-working wastewater treatment plant.
- Design and supervision of sewer network and collecting lines.
- Design and supervision of irrigation network for treated water.

Project Name:Design and Supervision of *Ali Abdel Fatah* Complex Wastewater Treatment Plant**Client:** Student Fund**Contractor:** Qinwan Environmental Improvement and Protection Co. Ltd.**Country:** Sudan **Location:** Omdurman, Khartoum State**Value of the contract:****Project Description:**

Ali Abdel Fattah Complex Sewage Treatment Plant is located inside Ali Abdel Fattah Student Complex near the Omdurman Broadcasting Corporation. The STP serves 5000 of the girls' student and treats a wastewater volume of 400 cubic metres/day. The final effluent is specified to be at 10 BOD and 10 SS in mg/l. The treatment process is an extended-aeration process and a pressurised filter is used as a polishing final treatment stage before disinfection.

Start Date: 2005 **Completion Date:** 2005**Duration:****Consultancy Services:**

Design and Supervision

Bannaga Consult staff performed physical surveys, soil sampling and analyses, STP units design, mechanical, electrical and structural design, piping and drainage system design, bill of quantities, specifications, etc. and drawing STP plan layouts, flow diagrammes, longitudinal sections, electro-mechanical and structural details, etc.

