ADDENDUM

BILL OF QUANTITY FOR KIUNGA

SPECIFICATIONS FOR SEA WATER TREATMENT PLANT

1. Requirements

We recommend the following treatment process;

- Filtration.
- Reverse Osmosis treatment
- PH Adjustment

2. Treatment Process

The process involves the following:

Incoming water from the borehole will be first stored in a tank (**Client scope**).

Water from the storage tank will be pumped by a booster pump through a glass media filter to reduce turbidity by removing suspended particles in the water

The filtered water will be dosed with a biocide cleaner to prevent action of bacteria which may be present on the membrane surface.

To prevent scaling of the RO membranes, it will be important to dose an antiscalant into the water before the water goes into the RO. Genesys LF antiscalant will, therefore, be continuously dosed into the pipeline prior to the RO.

"Pre-treated" water will then be passed through a **Reverse Osmosis Unit** to reduce the parameters identified to be outside the limit to acceptable levels.

Treated water from the Reverse Osmosis unit will be passed through a PH adjustment unit to adjust the PH to acceptable limits

Finally, water from the Reverse Osmosis Unit will be stored in a clean water tank for consumption (Client **Scope**)

Reverse Osmosis: The RO system produces purified water (**permeate**) from the feed water via rejection of all organic and inorganic constituents by a semi-permeable membrane system. The RO system separates the incoming feed stream into two effluent streams:

- The **permeate** (treated water) passes through Reverse Osmosis membranes and thus contains greatly reduced quantities of dissolved mineral salts and organics for use (typically ≥ 96% rejection ratio). The designed recovery of the RO machine is **40-45%**
- The **concentrate** (reject water) is the stream which passes tangentially across the membrane surface and thus retains the impurities separated from the permeate stream. A certain minimum flow of 'concentrate' is necessary to keep the RO membranes from 'fouling' due to the removed mineral salts and organic contents.

3. Equipment

For the above scope, the treatment system will include the supply of the following treatment stages and equipment;

COMPONENTS INCLUDED

WATER TREATMENT COMPONENTS & INSTALLATION		
1	DAYLIFF SWRO 5M3/HR	1
2	FEED PUMP(S) SET	1
3	CHEMICAL DOSAGE PUMPS & CHEMICAL TANKS SYSTEMS	3
4	CLEAN IN PLACE (CIP) SYSTEM WITH TANK & PUMP	1
5	FILTER (S) COMPLETE WITH GLASS MEDIA (SET)	1
6	DELIVERY & POSITIONING OF EQUIPMENT	1
7	INSTALLATION MATERIALS & SUNDRIES	1
8	INSTALLATION LABOUR CHARGES	1
9	TESTING, TRAINING & COMMISSIONING	1
10	PROVIDE PLASTIC STORAGE TANKS 10,000LTS	2

4. COST

A) 5000LPH COMPLETE TREATMENT SYSTEM OPERATING 7HRS

DESCRIPTION	QTY	RATE
Supply and installation of complete Water Treatment System	**1**	
Provision for power connection by KPLC	**1**	
Project Management Fee	**1**	
Branding & Commissioning	**1**	
TOTAL		

4. Scope Of Work

The positioning of the plant and components as specified on a plant room (prepared by the client). Electrical connections of the plant to power point within the plant room area. Testing and commissioning of the plant. Training of the plant operators both at the site and also at our workshops.

The Client will undertake the following works;

Provide plant room to accommodate all the equipment to be installed to protect against weather conditions.