



TERMS OF REFERENCE (TOR)

FOR ESTABLISHMENT OF A SOLAR-POWERED DESALINATION SYSTEM FOR WATER SUPPLY AT BORA ANA CONSERVANCY

1. Introduction

These Terms of Reference (TOR) provide the framework for the planning, design, installation, commissioning, operation, and management of a Solar-Powered Desalination Water Supply System at Bora ana Conservancy.

The proposed intervention is primarily intended to secure a sustainable supply of safe water for communities, livestock and wildlife within the conservancy.

2. Project Location

Item	Description
Conservancy	Bora'ana Conservancy
Village	Bor Ano Village
Sub-location	Goreale
Location	Gorale
Ward	Gorale Ward
Sub-county	SHANTA-AB AQ
County	Garissa County
Coordinates	0°25'12.33"N, 39°37'4.66"E

3. About Bora'ana Conservancy and the Water Project

Bora Ana Conservancy experiences recurrent droughts, erratic rainfall patterns, and increasing impacts of climate change, resulting in a decline in the availability of natural water sources that traditionally supported both communities and wildlife. Consequently, wildlife increasingly competes with livestock and surrounding communities for the limited water resources available within the conservancy, leading to increased pressure on the ecosystem and heightened risks of human-wildlife conflict.

The conservancy is served by an existing borehole drilled to a depth of approximately 250 metres below ground level, with a sustainable yield estimated at about 10,000 litres per hour. Existing infrastructure at the site includes a hybrid solar-powered borehole system, a 20 kVA standby generator, an elevated storage tank system, an old and dilapidated water kiosk, three livestock

troughs requiring rehabilitation, and associated solar pumping facilities.

However, water quality analysis undertaken by Davis & Shirtliff revealed that the groundwater is highly saline and unsuitable for direct human consumption. The analysis indicated elevated levels of Total Dissolved Solids (TDS), Electrical Conductivity, Sodium, Chlorides, Sulphates, and other parameters that exceed the World Health Organization (WHO) drinking water guidelines, thereby necessitating the treatment of the water through desalination before it can be safely utilized for domestic purposes

The borehole water has the following characteristics;

- TDS: 11,100 mg/l.
- Electrical Conductivity: 15,634 μ S/cm.
- Chlorides: 3,385 mg/l.
- Sodium: 3,149 mg/l.
- Sulphates: 970 mg/l.

The report concluded that the water does not comply with WHO drinking water standards and requires desalination treatment before use as potable water.

4. Existing Infrastructure

The project area is currently served by an existing borehole infrastructure developed to support water supply within Bora'ana Conservancy. The existing facilities include a hybrid solar-powered borehole system with a sustainable yield of approximately 10,000 litres per hour, a 20 kVA standby generator, an elevated twin plastic water storage tank system mounted on a 10-metre steel tower, an old water kiosk, and three livestock watering troughs. Although the borehole and associated infrastructure remain functional, some of the facilities have deteriorated and require rehabilitation and upgrading to adequately support the growing water demand for wildlife, the surrounding community, and institutions within the conservancy.

Facility	Status
Borehole	Functional
Solar system	Functional
Generator	Functional
Elevated tank	Old
Water kiosk	Dilapidated
Livestock troughs	Dilapidated
Distribution system	Requires rehabilitation

5. Project Components

Component i: Solar-Powered Desalination Plant

The project shall involve the design, supply, installation, testing, and commissioning of a solar-powered reverse osmosis (RO) desalination plant with a raw water capacity of 10 m³/hr and treated water production of 1–1.5 m³/hr. The system shall comprise feed pumps, pre-treatment filters, high-pressure pumps, RO membranes, pressure vessels, control panels, flow meters, and monitoring equipment.

Component ii: Desalination Plant Enclosure

A desalination plant house shall be established to accommodate the RO system, control equipment, pumps, chemical storage, maintenance space, and spare parts.

Component iii: Solar Power System

The contractor shall assess the existing solar infrastructure and install additional solar panels, controllers, inverters, and protection systems required to operate the desalination plant while integrating the system with the existing hybrid solar installation and standby generator.

Component iv: Storage Tanks

The project shall provide two storage tanks, each with a capacity of 10000 liters.

Component v: Rehabilitation of Existing Infrastructure

The project shall rehabilitate the existing water kiosk, associated piping, and existing water storage structures where necessary.

Component vi: Wildlife Watering Facilities

The project shall establish wildlife watering points and protected water access areas designed to minimize human-wildlife conflicts, livestock competition, and environmental degradation.

Component vii: Operation and Maintenance

The project will provide training of the water management committee on basic plant operations and maintenance.

6. Site Visits

Applicants are highly encouraged to visit the project site in Bor'ano Village to gather necessary technical information before submitting their proposal. However, any such site visits are undertaken entirely at the applicant's own cost.

7. Eligibility and Bidding Requirements

Interested service providers must meet and submit the following requirements:

1. Valid Certificate of Incorporation and form CR12-not older than 3 months/Business Registration.
2. Valid KRA Tax Compliance Certificate.
3. Evidence of experience in similar projects (attach at least three references).
4. Demonstrated financial capacity to undertake the project.

7: Submission Requirements

Qualified firms are requested to submit:

1. A technical proposal
2. An itemized financial proposal
3. Company profile and standard statutory documents (Business Registration, KRA PIN, etc.).
4. Contacts or reference letters from at least three (3) references for similar assignments.

8: Proposal Submission Details

Application Window: The application call opens on **25th June, 2026** and closes on **17th July, 2026**.

Completed and signed application documents must be sent in PDF format via email to **procurement@bora-ana.org** or via hand delivery to **Garissa National Library** by the latest **17th July, 2026**, with the below subject line:

“ESTABLISHMENT OF A SOLAR-POWERED DESALINATION SYSTEM FOR WATER SUPPLY AT BORA ANA CONSERVANCY IN BORAANO VILLAGE. ”

Late submissions will not be considered.

9. Annex

Water quality rep

		Water Pumps Borehole Service Swimming Pools Water Treatment Generators Solar Equipment Irrigation	
DAVIS & SHIRTLIFF LTD • PO Box 41762-00100, Nairobi, Kenya • Tel: (+254 20) 6968 298, 0711 079298 • watertreatment@davisandshirriff.com			
LABORATORY WATER ANALYSIS REPORT			
Client : Bor Ano Borehole		Reference No : 04/26/RO/1096	Date Received : 29/04/2026
Site Location : Lagdera		Source : Borehole	Analysis Date : 29/04/2026
Type of Test : Reverse Osmosis Water Analysis		Sampling Date : 24/04/2026	Report Date : 30/04/2026
KEY:	PASS	FAIL	NS - No Standard ND - Not Detected TN - Too Numerous
PARAMETERS	METHOD OF ANALYSIS	UNITS	VALUES
PHYSICAL ANALYSIS			
pH	8156	pH Units	7.74
TDS	10256	Mg/l	11100
Total Suspended Solids (TSS)	8006	Mg/l	6
Salinity	8160	ppt	7.82
Electrical Conductivity (EC)	10256	µS/cm	15634
Turbidity	8237	NTU	5.6
Color	8025	PCU	10
CHEMICAL ANALYSIS			
Iron, Fe	8008	Mg/l Fe	0.37
Manganese, Mn	8149	Mg/l Mn	0.04
Copper, Cu	8506	Mg/l Cu	0.13
Fluorides	8323	Mg/l F	1.4
*Ammonical Nitrogen	8155	NH3-N	0.02
*Ammonium	8155	NH4+	0.03
*Ammonia	8155	NH3	0.02
Nitrate N	8039	Mg/l NO3N	8.0
Nitrate	8039	NO3-	8
*Nitrite	8153	Mg/l NO2	0
*Nitrite N	8153	Mg/l NO2-N	0.0
*Potassium	8049	Mg/l K	162
Phosphates	8048	Mg/l PO4 ³⁻	0.46
*Silicon	8185	Mg/l Si	36
*Silica	8185	Mg/l SiO2	78
Calcium	8204	Mg/l Ca2+	78
Magnesium	8213	Mg/l Mg2+	16
Calcium Hardness	8204	Mg/l Ca2+ (CaCO3)	195
Magnesium Hardness	8213	Mg/l Mg2+ (CaCO3)	65
Total Hardness	8213	Mg/l CaCO3	260
Aluminium, Al	8012	Mg/l Al	0.04
Sulphate, SO4	8051	Mg/l SO4	970
Chlorides	8207	Mg/l Cl	3385
Total Alkalinity	8203	Mg/l CaCO3	630
Phenolphthalein Alkalinity	8204	Mg/l CaCO3	ND
Bicarbonates	8205	Mg/l HCO3-	630
Carbonates	8206	Mg/l CO3 ²⁻	0
Barium	8014	Mg/l Ba2+	0
Sodium, Na	8322	Mg/l Na	3149
COMMENTS			
Based on the water analysis, the TDS, TSS, Electrical Conductivity, Turbidity, Iron, Potassium, Sulphates, Chlorides, Sodium and Bicarbonates levels did not conform to WHO drinking water guidelines			
The results relate to the sample(s) submitted. The laboratory will not be held responsible for any sampling errors.			
*The parameter is not accredited. # Parameters is sub contracted to a third party laboratory			
PREPARED BY : RACHEAL KIMANI	APPROVED BY : JOHN WAEMA	Date: 30/04/2026	
SIGN	SIGN	Date: 30/04/2026	
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