Solar Powered Borehole – The Gambia

For rural Gambia, a solar borehole + 2000L tank is the gold standard. No fuel costs, minimal maintenance, lasts 15-20 years.

Here's the full process + what £/Dalasi it looks like:

THE PROCESS: 8 STEPS

1. **SITE SURVEY & HYDROGEOLOGICAL STUDY - 2-3 days**

Why: Gambia has shallow groundwater 15-60m down, but you need to find it first.

What happens:

Hydrogeologist uses resistivity meter to find water table + depth

Check water quality: salinity, iron, bacteria. Gambian groundwater can be salty near coast

Community meeting: pick location central to school/village, 30m away from latrines

Cost: £400 - £700

Rule: Don't drill blind. 1 in 5 wells fail without this.

2. **DRILLING THE BOREHOLE - 1-2 days**

Depth: Usually 25m - 45m. Budget for 40m to be safe

Diameter: 6 inch bore

Casing: PVC casing to stop collapse + contamination

Gravel pack + cement seal: Keeps sand and surface water out

Yield test: Pump for 4 hours to confirm it can do 2000L+/day

Cost: £25 - £35 per meter drilled = £1,000 - £1,400 for 40m

Total with casing: £1,800 - £2,500

3. **WATER QUALITY TEST - 3-5 days**

Send sample to Water Resources Dept in Banjul or MRC Lab. Test for: Ntrates, Iron, Salinity, pH

Cost: £50 - £100

If bad: Add filtration. If very salty, you may need to move site.

4. SOLAR PUMP SYSTEM INSTALLATION - 1 day

What you need for 2000L/day:

Pump: Submersible solar DC pump, 24V-48V. Brands: Grundfos SQFlex, Lorentz. Lifts from 40m

Solar Panels: 2 x 320W panels = 640W total. Mounted on frame

Controller: MPPT controller to run pump direct from sun. No batteries needed

Pipes: 32mm HDPE rising main from borehole to tank

Output: 1,500L - 3,000L per sunny day

Cost: £1,800 - £2,800

5. 2000L TANK + TOWER - 1 day

Tank: 2000L black UV-stabilized plastic tank. Black stops algae

Tower: 4m - 6m high steel/galvanized tower. Gives gravity pressure for taps

Foundation: Concrete base 1.2m x 1.2m

Cost: £650 - £950 for tank + tower + base

6. DISTRIBUTION - TAPS + FENCING - 1 day

2-4 Taps: 1 for drinking, 1 for washing, 1 for school, 1 for garden

Concrete apron + soakaway: Stops mud

Fencing: Chain link around borehole + panels to stop animals/theft

Cost: £400 - £700

7. TRAINING + HANDOVER - 1 day

Train 3 community members:

How to clean panels

Check controller lights

Report faults

Give them a logbook + contact number

Cost: £50

8. MAINTENANCE PLAN

Every 3 months: Wash panels

Every 2 years: Check pump, replace tap washers

Every 5-7 years: Pump service

Cost: Annual Budget £100 - £150

TOTAL COST BREAKDOWN - GAMBIA 2026

| **Item** | **£** |

| Survey + Water Test | 600 |

| Drilling 40m + Casing | 2,200 |

| Solar Pump + 2 Panels + Controller | 2,300 |

| 2000L Tank + 5m Tower + Base | 800 |

| Taps, Apron, Fencing | 550 |

| Training + Contingency 10% | 545 |

| **GRAND TOTAL** | **£5,995** |

Donors: £6,000 sponsors 1 Solar Borehole (That's £2 per person for 3000 people over 15 years).

9. KEY GAMBIA-SPECIFIC TIPS

Dry season: Drill Nov-May. Hard to access sites in rainy season

Theft: Weld panels to frame. Add tamper-proof bolts

Community: Get Alkalo + VDC to sign MOU. They must contribute labour + guard it

Approvals: Inform Dept of Water Resources. They keep national database

No batteries: Direct solar is cheaper and less to steal than battery systems

10. TIMELINE

From survey to first water: 3-4 weeks

Sheet 1: Cost Sheet,

Sheet 2: BOQ,

Sheet 3: Contractor comparison,

Sheet 4: QC checklist

Sheet 5: Soakaway

£1 = GMD 85.40 | Oct 2026 | Output: 2,000L - 3,000L per day

Sheet 1: COST SHEET / BOQ

| **Section** | **Total GMD** | **£** | **Notes** |

| 1. Survey + Hydrogeology | 51,240 | 600 | Find water + test quality |

| 2. Drilling 40m + PVC Casing | 187,880 | 2,200 | 6" bore, gravel pack |

| 3. Solar Pump System | 196,420 | 2,300 | 2x320W panels + Lorentz pump + Controller |

| 4. 2000L Tank + 5m Tower | 68,320 | 800 | UV tank + steel tower + concrete base |

| 5. Distribution | 46,970 | 550 | 4 taps, concrete apron, soakaway, fencing |

| 6. Training + Contingency 10% | 46,575 | 545 | Community training + 10% |

| **GRAND TOTAL** | **597,405** | **£5,995** | **Round to £6,000** |

Sheet 2: TECHNICAL SPEC CHECK MAX ALLOWED / MUST HAVE

Depth: 25m - 45m | Yield Test: ≥2000L/day for 4 hours | Rule: <1500L/day = REJECT

Panels: 2 x 320W Monocrystalline | Rule: <600W total = REJECT

Pump: Solar submersible, lifts 40m, no batteries | Brands: Lorentz, Grundfos

Tank: 2000L Black UV Tank | Tower: 5m min for pressure

Distance: ≥30m from latrine, ≥10m from road

Sheet 3: CONTRACTOR COMPARISON

Send to 3 water contractors in Banjul/Kanifing

|**Item** |**Your BOQ £** | **Contractor A** | **Contractor B** | **Contractor C** |

| Grand Total £ | 5,995 | | | |

| Drilling £/meter | 55 | | | |

| Pump Brand | Lorentz/Grundfos | | | |

| Warranty Pump | 2 Years | | | |

| Warranty Panels | 10 Years | | | |

| Timeline Weeks | 3-4 | | | |

Sheet 4: SITE Quality Control CHECKLIST - Before Final Payment

| **Check** | **How to Test** | **Pass/Fail** |

| **DRILLING** | Depth log signed. Yield test video ≥2000L | |

| **WATER** | Lab test: No Salinity <1000ppm | |

| **SOLAR** | 2 panels 320W each. Serial numbers recorded | |

| **PUMP** | Runs 10am-3pm on sun only. No batteries | |

| **TANK** | 2000L filled in <3 hours. No leaks | |

| **TAPS** | 4 taps working. Apron + soakaway built | |

| **SECURITY** | Panels welded. Fence locked. Keys with VDC | |

| **PHOTOS** | Drilling, Panels, Tank, Community Training | |

| **SIGN OFF** | Alkalo + Water Committee + Project Lead sign | |

No Tick = No Final 20% Payment

THE PROBLEM: Women walk 2km for dirty well water. Children miss school sick.

THE SOLUTION: 1 Solar Borehole + 2000L Tank = Clean water for 300+ people daily.

THE COST: £6,000 = £20 per person for 15 years of water.

This £6,000 borehole pairs perfectly with the £5,088 classroom.

Together = £11,088 for a complete village school.

"How deep should the soakaway be?" + "How deep should we drill the borehole?"

A. HOW DEEP SHOULD THE SOAKAWAY BE:

This is the pit under the taps to drain wastewater so it doesn't turn to mud.

Gambia Standard:

Size: 1.2m x 1.2m x 1.2m deep = 1.2m depth minimum

Lining: Brick or concrete rings with holes. Don't use solid concrete or it blocks

Fill: 50% large stones at bottom, 50% gravel on top

Distance: Must be ≥2m away from borehole and ≥15m away from any latrine

Why 1.2m?

Gambian topsoil gets waterlogged in rainy season. 1.2m gets you below the mud layer so water soaks away even in August.

Cost: £80 - £120

B. HOW DEEP SHOULD THE BOREHOLE BE DRILLED

This depends on location in Gambia. There's no "one size fits all".

| **Area in Gambia** | **Typical Water Depth** | **Budget Drill Depth** |

| **West Coast: Banjul, Kombo** | 15m - 25m | 30m |

| **Central: NBR, CRR, URR** | 25m - 40m | 45m |

| **East: Basse** | 35m - 60m | 60m |

Rule for donors/BOQ: Budget for 40m and use the survey to confirm.

Key points:

Minimum casing: First 6m MUST be cased with PVC + cement seal. Stops surface contamination

Yield test: Doesn't matter if it's 25m or 50m. If it can't pump 2000L/day for 4hrs = bad borehole

Salt water: If you're <10km from coast/river, drill deeper. Shallow wells go brackish in dry season

Drilling cost: £25 - £35 per meter. So 40m = £1,000 - £1,400

QUICK SUMMARY FOR YOUR BILL OF QUANTITY

Sheet 5: SOAKAWAY DETAIL + BOQ added to your Borehole Pack

Sheet 5: SOAKAWAY DETAIL | 2000L Borehole

Purpose: Drain wastewater from 4 taps. Stops mud + mosquitoes

SPEC

| **Item** | **Spec** | **Notes** |

| **Size** | 1.2m x 1.2m x 1.2m Deep | 1.73 cubic meters |

| **Distance** | ≥2m from borehole, ≥15m from latrine | Dept of Water rule |

| **Lining** | Brick or concrete rings | Must have holes for water to soak out |

| **Cover**| Reinforced concrete slab 1.4m x 1.4m | With 300mm manhole for cleaning|

| **Fill** | Bottom 0.6m: Large stones 50-100mm | Top 0.6m: Gravel 20mm |

BOQ + COST

£1 = GMD 85.40 | Labour included

| **Item** | **Qty** | **Unit** | **Rate GMD** | **Total GMD** | **£** |

| Excavation 1.2x1.2x1.2m | 1.73 | m3 | 1,710 | 2,958 | 35 |

| Burnt Bricks for lining | 300 | pcs | 43 | 12,900 | 151 |

| Cement 50kg | 3 | bag | 3,840 | 11,520 | 135 |

| Sand | 0.5 | m3 | 2,560 | 1,280 | 15 |

| Gravel 20mm | 0.8 | m3 | 4,270 | 3,416 | 40 |

| Large Stones | 0.8 | m3 | 2,135 | 1,708 | 20 |

| Steel rebar Y10 for slab | 12 | m | 598 | 7,176 | 84 |

| Labour - Mason | 3 | days | 1,880 | 5,640 | 66 |

| Labour - Labourer | 3 | days | 1,280 | 3,840 | 45 |

| **SOAKAWAY TOTAL** | **50,438** | **£591** |

Round for donors: £600 per soakaway

BUILD STEPS FOR CONTRACTOR

Dig 1.2m x 1.2m x 1.2m pit, 2m from tank tower

Build brick wall with gaps every 3rd brick for water to escape

Fill bottom 60cm with big stones

Fill top 60cm with gravel

Cast 100mm thick concrete slab with Y10 bars. Leave 300mm hole

Connect 50mm PVC waste pipe from tap apron to soakaway

QC CHECK

| **Check** | **Pass/Fail** |

| Depth 1.2m verified with tape | |

| 2m from borehole, 15m from latrine | |

| Water poured in drains in <30 seconds | |

| Slab can take weight of 2 adults | |

No Tick = No Payment

UPDATED BOREHOLE TOTAL

Old Total: £5,995

Soakaway: £591

New Grand Total: £6,586

Round for fundraising: £6,600

This gives you a proper, safe system that won’t flood in rainy season.