DEVELOPING A STANDARDISED DIAGNOSTIC AND PHYSICAL AUDIT MANUAL FOR HANDPUMPED BOREHOLES

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BACKGROUND & NEED

- 1 in 4 handpumps in Sub-Saharan Africa may be non-functional at any given time, despite serving an estimated 200 million people.
- High rates of non-functionality and underperformance persist, driven by construction quality issues, unsuitable hydrogeology and weak oversight.
- Weak documentation and limited post-construction inspections constrain accountability and evidence-based corrective action.

METHODOLOGY & DEVELOPMENT

Synthesised proven methods and research (BASEflow Borehole Forensics, British Geological Survey's Hidden Crisis, Rural Water Supply Networks's Stop the Rot handpump corrosion studies).

Validated through consultative webinars and expert technical review with practitioners, hydrogeologists and manufacturers.

Refined for clarity, technical rigour and practical field applicability based on reviewer and field-tester feedback
Expected for publication in early 2027.

Consolidated into a coherent 12-step manual with step-by-step guidance, recording templates and scoring tools.

OUR GOAL

Provide a standardised, step-by-step framework for diagnosing, auditing and reporting handpump and borehole issues to improve reliability and sustainability of rural groundwater supplies.

KEY COMPONENTS ASSESSED

INFRASTRUCTURE
Civil works, platform and drainage, handpump components, corrosion and wear.

HYDROGEOLOGY
Aquifer characteristics, static water level, pumping tests to verify sustainable yield.

WATER QUALITY
Field parameters (EC, pH, TDS, Alkalinity, Turbidity, DO, Eh, Total Iron) and laboratory analysis for safe drinking water.

ENVIRONMENTAL CONTEXT
Sanitary risks, land use, climate risks and protection measures.

12-STEP DIAGNOSTIC WORKFLOW

PRE-ASSESSMENT	Design and Planning	Set objectives, scope, sampling, resources and tools.
	Permissions and Engagement	Obtain approvals and engage stakeholders and authorities.
	Desk Study	Review existing data and reports to compare onsite findings.
	Health and Safety Setup	Prepare team, conduct risk assessment with PPE and safety plan.
ASSESSMENT	Site Assessment	Sanitary inspection and site walkover survey.
	Handpump Operation	History of functionality reliability and user experience.
	Handpump Condition	Dismantle and inspect for mechanical, corrosion and structural defects.
	Borehole Inspection	Depth, construction and verticality check/deviation.
	Hydrogeological Assessment	Water level, pumping and recovery test.
	Water Quality Assessment	Sampling and physico-chemical/ microbiological testing.
POST-ASSESSMENT	Pump Reinstatement & Checks	Reassemble, repair faulty parts, disinfect and verify performance.
	Data, Decisions and Reporting	Compile data, make decisions and give feedback and reporting.

HANDPUMP BOREHOLE



FIELD ACTIVITIES



Handpump dismantling



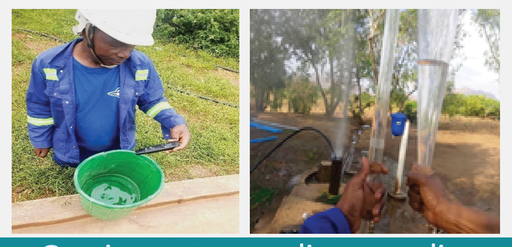
Downhole inspection with a camera



Handpump parts classification



Pumping test in progress



On site water quality sampling and testing

OUTPUTS

- **Comprehensive 12-step Diagnostic Manual**
  Covering the environmental, technical and physical causes of hanpump and borehole failure.
- **Standardised recording templates**
  Checklists and scoring sheets for consistent data capture.
- **Structured reporting framework**; for compiling multi-site data, identifying recurring failure patterns and supporting decisions
- **Decision support tools;** decision trees to guide consistent infrastructure repair and replacement.

BENEFITS & IMPACT

- **Improved Diagnosis**
  Identify true causes of failure and underperformance.
- **Improved Sustainability**
  Targeted, evidence-based decisions enhance reliability and reduce repeated failure.
- **Stronger Accountability**
  Reliable evidence supports learning, oversight and improved professional standards.
- **Safer Water for Communities**
  Improved groundwater supply performance and public health outcomes.

WHO CAN USE MANUAL?

- **Government Agencies**
  Regulators, water boards, district authorities
- **NGOs and Implementers**
  Project staff, WASH teams, programme managers
- **Service Providers - Mechanics**
  Field technicians, area mechanics
- **Researchers and Consultants**
  Hydrogeologists, engineers, evaluators
- **Communities and WPCs**
  Community leaders, water committees

Ask for Water · skat foundation · BASEflow groundwater matters · BGS British Geological Survey · RWSN Rural Water Supply Network