



AFRICA
NATURE
INVESTORS

**REQUEST FOR QUOTATION (RFQ) FOR THE DESIGN, SUPPLY, INSTALLATION,
TESTING AND COMMISSIONING OF A SURFACE WATER ABSTRACTION &
RETICULATION SYSTEM
(MECHANICAL AND ASSOCIATED CIVIL WORKS)**

Project: GAO New Outpost

Client: Africa Nature Investors (ANI) Foundation

Location: Gashaka-Gumti National Park, Taraba State

Date: 04 May 2026



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1. INTRODUCTION AND BACKGROUND

Africa Nature Investors (ANI) Foundation invites suitably qualified and experienced contractors to submit a Quotation for the design, supply, installation, testing and commissioning of a complete surface water abstraction, pumping, treatment and reticulation system for the proposed Gao New Outpost within Gashaka-Gumti National Park (GGNP).

This document has been prepared following a detailed site visit and technical assessment undertaken in April 2026. It defines the scope of works, technical requirements, site constraints and performance expectations for the project. Contractor is expected to familiarise themselves fully with the site conditions and allow for all work required to deliver a reliable, safe and maintainable water supply system suitable for long-term operation in a remote national park environment.

2. DEFINITIONS AND INTERPRETATION

- **Employer:** Africa Nature Investors (ANI) Foundation
- **Engineer:** The Employer's appointed representative
- **GGNP:** Gashaka-Gumti National Park
- **Works:** All activities, services, materials, equipment and obligations required to deliver the complete system
- **IFC Drawings:** Issued-for-Construction drawings

The word "*shall*" indicates a mandatory requirement.

3. EMPLOYER'S OBJECTIVES AND KEY DESIGN REQUIREMENTS

The objective of the project is to provide a dependable potable water supply for the Gao New Outpost, serving an initial population of approximately 160 people, with provision for modest future expansion.

Key requirements include:

- Year-round water availability from a perennial surface water source.
- Minimum three (3) days' raw water storage at both the river abstraction point and the camp.
- A simple, robust system with low operational complexity.
- High resistance to vandalism, theft and environmental exposure.
- Solar power as the primary energy source, supported by a diesel generator.
- A single uninterrupted rising main between the river and camp, without intermediate pumping or storage.



- All components shall be maintainable using locally available skills and tools, or with clearly defined support arrangements.

The following design parameters shall be adopted:

- Approximate static lift: 285 m
- Design pumping head (inclusive of losses): not less than 350 m
- Nominal flow rate: approximately 10 m³/hr (continuous duty)
- Pipeline length: approximately 3.4–3.5 km

4. SITE CONDITIONS AND PROJECT CONSTRAINTS

The project site is remote and physically demanding. Contractor shall make full allowance for:

- Restricted vehicular access beyond the lower section of the pipeline route.
- Predominantly rocky ground conditions require limited trenching and extensive manual handling.
- Seasonal flooding of the Mayo Kam River and high turbidity during the wet season.
- Security considerations associated with working within a protected national park.
- Environmental sensitivity and compliance with park regulations.

Contractor is strongly encouraged to undertake a site visit prior to submission.

5. PRELIMINARIES AND GENERAL REQUIREMENTS

The quotation price shall include all preliminaries necessary for proper execution of the works, including but not limited to:

- Mobilisation and demobilisation of personnel, plant and materials.
- Temporary construction camps, storage areas and workshops.
- Temporary access works, footpaths and manual handling arrangements.
- Temporary power, water supply and sanitation for construction activities.
- Security arrangements for personnel, equipment and materials.
- Compliance with statutory requirements, permits and park regulations.
- Insurance, duties, taxes and bonds.
- Continuous on-site supervision by suitably qualified personnel.

6. SCOPE OF WORKS

The Contractor shall execute the Works as a complete and integrated system. The scope described below is indicative and shall be deemed to include all materials, fittings, labour, supervision, coordination, and ancillary activities necessary to deliver a fully functional and operational system.

The Contractor shall visit and familiarize itself with the Site and existing conditions. Where, following such Site visit, any additional scope, materials, works, or activities are identified as necessary for the proper, safe, and complete functioning of the system, such items shall be included in the Contractor's obligations. The Contractor's submitted quotation shall clearly reflect and include all such necessary scope to achieve full system completion, commissioning, and functionality,

6.1 Surveys, Investigations and Setting Out

The Contractor shall:

- Confirm Mayo Kam River abstraction elevation of **~331 m AMSL**.
- Confirm camp raw water storage tank elevation of **~611 m AMSL**.
- Confirm camp head tank elevation of **~624 m AMSL**, ensuring gravity supply.
- Verify total vertical pumping differential of **~285 m** between abstraction and camp.
- Confirm total pipeline route length of **~3.4–3.5 km**.
- Identify and mark:

Approximately **1.2 km** of lower route suitable for trenching.

- Remaining ridge sections requiring above-ground installation.
- Identify all valve locations, ensuring:
 - No low points that would trap air.
 - Concealment from vandalism.
 - Access for maintenance.
- Confirm absence of dips in pipeline profile (constant rising slope).



6.2 Detailed Design and Engineering

The Contractor shall carry out comprehensive detailed design and engineering for the Works, covering all hydraulic, mechanical, civil, and structural components required to deliver a complete and functional system. The detailed design shall explicitly demonstrate the following:

Hydraulic and Mechanical Design

- Continuous system delivery of approximately 10 m³/hr under all defined operating conditions.
- Total developed head of not less than 350 m, inclusive of:
 - Static lift
 - Pipeline friction losses
 - Valve and fittings losses
 - Minor losses
 - Appropriate safety margin
- System operation without intermediate pumps or intermediate storage, due to security and operational risk considerations.
- Design robustness for high turbidity raw water conditions experienced during the approximately 7-month wet season, including appropriate intake protection, filtration, and materials selection.
- Pump duty point selection close to the Best Efficiency Point (**BEP**) for the specified operating range.
- Selection of pumps, valves, fittings, and mechanical components that are maintainable within Nigeria, or provision of a documented and feasible import and spares strategy.
- Submission of full hydraulic profiles, pump curves, pressure envelopes, and transient (surge) considerations where applicable.

The Contractor shall carry out surge (water hammer) analysis for the complete pipeline system and shall incorporate appropriate mitigation measures where required. Such measures may include, but shall not be limited to, surge vessels, air valves, pressure relief valves, or other protective devices necessary to ensure safe operation under transient conditions.



Civil, Structural, and Layout Design

- Detailed design of all water storage tanks, including:
 - Tank sizing and configuration
 - Structural design calculations
 - Internal linings and corrosion protection
 - Access, overflow, drainage, and safety features
- **Design of all tank plinths and foundations, including:**
 - Geotechnical assumptions
 - Load calculations (empty, operating, and full conditions)
 - Stability, settlement, and seismic/wind considerations where applicable
- **Detailed routing and layout of all pipelines, including:**
 - Plan and profile drawings
 - Pipe supports, anchors, thrust blocks, and protection at high-pressure sections
 - Road, stream, and utility crossings
- **Design of all associated civil works, including:**
 - Pump house structures
 - Equipment foundations
 - Valve chambers, drainage, access roads, and fencing as required
- **Integration of civil and structural works with mechanical and hydraulic systems to ensure safe operation, maintainability, and long-term durability.**

General Design Requirements

- All designs shall comply with applicable Nigerian standards and relevant international codes where local standards are unavailable.
- Design deliverables shall include drawings, calculations, specifications, and design reports sufficient to demonstrate compliance and enable construction without ambiguity.

Where specific materials, sizes, equipment types, or reference models are indicated within this document, these shall be considered as minimum or indicative requirements only. The Contractor shall remain fully responsible for verifying the adequacy of all such selections and for ensuring that the final design meets all specified performance, operational, and durability requirements.

6.3 Mobilisation, Logistics and Temporary Works

The Contractor shall allow for:

- Establishment of a temporary secured storage camp for:
 - Pipes
 - Pumps
 - Generator
- Manual transport of pipelines and fittings along ridge sections.
- Theft-resistant storage and overnight protection of materials.
- Temporary anchoring of pipeline sections prior to final fixing.
- Temporary access paths where terrain prevents vehicle movement.

6.4 River Abstraction System

The river abstraction system shall be designed and supplied as a complete, robust, and operational package suitable for seasonal variability, remote operation, and harsh site conditions.

The abstraction system shall include, as a minimum:

Pump Unit

- **Mobile agricultural diesel pump** trailer-mounted or skid-mounted, suitable for frequent repositioning.
- Nominal power: **~10 HP (7.5 kW)** minimum.
- Hydraulic performance:
 - Minimum flow capacity: **90–96 m³/hr** at duty point.
 - Minimum total dynamic head: **30–31 m**, inclusive of:
 - Static lift
 - Friction losses
 - Minor losses
- Pump to be capable of continuous operation under high ambient temperatures.
- Heavy-duty centrifugal pump suitable for raw river water abstraction.

Engine and Drive

- Diesel engine to be:
 - Air-cooled or water-cooled, suitable for rural operation.
 - Equipped with recoil and/or electric start.
 - Provided with engine protection including low-oil shutdown.
- Fuel tank sized for minimum **8–10 hours continuous operation**.
- All belts, couplings, and rotating parts to be fully guarded.

Intake System

- **4-inch (100 mm) screened intake**, complete with:
 - Removable stainless steel or galvanised strainer.
 - Mesh size suitable to prevent ingress of debris, vegetation, and aquatic life.
- Intake arrangement to allow:
 - Submerged operation during low river levels.

- Rapid removal during flash flood events.
- Intake to be weighted or anchored to prevent flotation and movement during operation.

Suction and Discharge Pipework

- High-pressure, ribbed **flexible suction and discharge hoses**, minimum internal diameter **~110 mm**.
- Hoses to be:
 - Reinforced, collapse-resistant, and abrasion-resistant.
 - Rated for the full operating pressure and vacuum conditions.
- All those connections to be via:
 - Heavy-duty flanged or camlock couplings.
 - Galvanised steel fittings (plastic fittings not acceptable).

Suction Performance

- Pump system to have a minimum suction lift capability of **7–11 m**.
- Suction line to include:
 - Foot valve where required.
 - Air-tight connections to prevent loss of prime.

Installation and Mobility

- System to be configured for **manual repositioning** to accommodate:
 - Seasonal river level fluctuations.
 - Channel migration and bank erosion.
- Pump location and intake arrangement to allow:
 - Rapid removal or securing in the event of rising water levels.
- Contractor to make explicit allowance for **flash flooding risk in the gorge during the wet season**.

Connection to Fixed Infrastructure

- Secure and leak-free connection to **80 mm galvanised steel inlet pipe**.
- Transition fittings, reducers, and valves to be included in the contractor's scope.
- Non-return valve and isolation valve to be provided where necessary to protect downstream infrastructure.

Protection, Spares, and Accessories

- System to include:
 - Basic spares kit (filters, belts, seals).
 - Tools required for routine maintenance.
- All exposed steelwork to be corrosion-protected.
- Pump and accessories to be clearly labelled.

Documentation and Testing

- Contractor to provide:
 - Manufacturer datasheets for pump and engine.
 - Performance curves demonstrating compliance with duty requirements.
- System to be tested on site to confirm:
 - Flow rate
 - Head performance
 - Leak-free operation

6.5 Riverside Settling & Raw Water Storage Tank

The riverside settling and raw water storage system shall be designed and constructed as a durable, secure, and flood-resilient installation suitable for continuous raw water abstraction and pre-treatment.

The system shall include, as a minimum:

Storage Capacity and Function

- **Enclosed settling and raw water storage tank** with a minimum effective capacity of **40,000 litres**.
- Tank to function as:
 - Initial sediment settlement basin
 - Buffer storage to decouple abstraction from downstream pumping

Tank Construction and Materials

- Tank material:
 - **Aluzinc AZ150 coated steel (preferred)**, suitable for aggressive outdoor environments, or
 - **Ni Aluminium steel or approved equivalent** if AZ150 is unavailable.
- Tank panels to be factory-coated and corrosion-protected.
- All bolts, fasteners, and fittings to be **stainless steel or hot-dip galvanised**.
- Tank to be fully enclosed to prevent:
 - Contamination
 - Algal growth
 - Ingress of animals or debris

Tank Geometry and Internal Arrangement

- Tank base to be designed with a slight internal fall towards the scour point.
- **Raw water offtake positioned approximately 300 mm above the tank base** to:
 - Avoid withdrawal of settled sediments
 - Improve raw water quality downstream
- Offtake pipework to include isolation valve and removable connection for maintenance.

Scour and Drainage

- **Bottom scour / purge valve** provided at the lowest point of the tank.
- Scour pipework to:
 - Allow rapid draining and sediment removal
 - Discharge to a safe, erosion-protected location
- Scour valve to be accessible and lockable.

Access, Safety, and Security

- Tank to be fully enclosed and fitted with:
 - **Lockable inspection hatch**
 - Weather-sealed access cover
- **Permanent ladder access** provided, complete with:
 - Anti-slip rungs
 - Safety cage where required
- All access points to be lockable to prevent unauthorised entry or tampering.

Foundation and Civil Works

- Tank to be installed on a **reinforced concrete plinth** designed by the contractor.

- Plinth design to account for:
 - Full tank load
 - Wind loads
 - Seismic considerations (where applicable)
 - **Flood exposure**
- Plinth to be located approximately **10–15 m above mean river level**.
- Plinth to include:
 - Anchor bolts for tank fixing
 - Raised edge or plinth upstand where required to prevent undermining
- Surrounding ground to be stabilised and protected against erosion.

Flood Resilience and Site Conditions

- System design to explicitly account for:
 - Seasonal flooding
 - High sediment loads during wet season
 - Debris impact risk
- Contractor to ensure:
 - Tank and pipework are securely anchored
 - No buoyancy or flotation risk during flood events

Pipework and Connections

- Inlet, outlet, overflow, and scour pipework to be:
 - Galvanised steel or approved equivalent
 - Adequately supported and restrained
- Overflow pipe to be provided and sized to safely pass excess inflows without overtopping the tank.
- All penetrations through tank walls to be factory-sealed or properly flanged.

Testing and Handover

- Tank to be:
 - Filled and leak-tested on site
 - Inspected for structural integrity
- Contractor to provide:
 - Manufacturer datasheets
 - Installation drawings
 - As-built information at handover

6.6 High Lift Pumping System

The high lift pumping system is a critical component and shall be designed, supplied, installed, and commissioned as a complete and fully operational package suitable for continuous high-pressure service.

The system shall include, as a minimum:

Pump and Hydraulic Duty

- **Single multistage high-head centrifugal pump**, suitable for clean raw or clarified water.
- Nominal duty point:
 - **~10 m³/hr at ~350 m total dynamic head (TDH)**.
- Pump selection to ensure:

- Operation within the preferred efficiency range at duty point.
- Stable operation across expected operating envelope.
- Minimum permissible working pressure:
 - **≥ 40 bar** for all pump casings and wetted components.

Pump Type and Reference

- Reference pump:
 - **KSB MultiTech D 50/9C 3.1 or approved equivalent.**
- Any proposed alternative must:
 - Demonstrate equivalent or superior pressure rating, efficiency, and service record.
 - Provide full manufacturer performance curves.

Motor and Drive

- Electric motor:
 - Indicative rating **~30 kW (40 HP)** minimum.
 - Three-phase, suitable for inverter or generator operation.
- Motor protection to include:
 - Overload protection
 - Phase failure protection
 - Thermal protection
- Flexible coupling with full coupling guard.

Valves and Fittings

- Full complement of heavy-duty, high-pressure rated:
 - **Non-return (check) valve** on pump discharge
 - **Isolation valves** on suction and discharge
- All valves and fittings to be:
 - Flanged
 - Rated for **minimum 40 bar working pressure**
 - Suitable for frequent operation and maintenance
- No threaded fittings permitted on the high-pressure side.

A compulsory pressure relief valve shall be installed on the pump discharge side. The relief system shall be appropriately sized and set to protect the pump, pipeline, and fittings from over-pressure, and shall discharge safely to a suitable drain or return line.

Civil Works and Protection

- Pump to be installed on a **reinforced concrete plinth**, designed to:
 - Support static and dynamic loads
 - Resist vibration
- **Steel protective cage** to prevent unauthorised access.
- **Weather roof** to provide protection from sun and rain while maintaining ventilation.



- Pump layout to allow:
 - Safe access for maintenance
 - Removal and replacement of pump and motor.

Provision must be made for future integration of a standby/backup pump. All piping arrangements, spacing, and civil works (including plinth sizing and layout) shall be designed to accommodate installation and operation of an additional pump without major modification.

Instrumentation and Commissioning

- Provision for:
 - Pressure gauge on discharge
 - Isolation points for testing
- System to be fully commissioned and tested on site to confirm:
 - Flow
 - Pressure
 - Leak-free operation
- Contractor to provide:
 - Manufacturer datasheets
 - Performance curves
 - Commissioning records

6.7 Rising Main / Transmission Pipeline

The rising main shall convey water from the high lift pump to the upper system and shall be designed for long-term, high-pressure operation under rugged terrain conditions.

The pipeline system shall include, as a minimum:

Pipeline Extent and Alignment

- Total length:
 - Approximately **3.4–3.5 km**.
- Contractor to allow for:
 - Vertical and horizontal alignment changes
 - Local topographic constraints
- Final routing subject to site conditions and approval.



Pipe Material and Specification

- Pipe material:
 - **Hot-dip galvanised carbon steel**
- Specification:
 - **ASTM A53 Grade B**
 - **Schedule 80**
 - **80 mm nominal diameter**
- Pipes to be suitable for:
 - Continuous operation at high internal pressure
 - External exposure and corrosion risk

Alternative pipeline materials may be proposed by the Contractor, provided that such materials meet or exceed the specified pressure rating, durability, security, and environmental performance requirements.

All alternatives shall be clearly identified, technically justified, and subject to approval by the Employer.

Joints and Connections

- **Flanged joints throughout** the entire pipeline.
- Flanges to be:
 - Properly aligned and bolted
 - Supplied with suitable gaskets
- No welded or threaded joints unless expressly approved.

Pressure Control and Appurtenances

- Minimum of **six (6) non-return valves**, each provided with:
 - Adjacent isolation valves
- **Air release valves** at all high points as required.
- **Washout / scour valves** at low points to allow drainage and flushing.
- All valves to be:
 - Pressure-rated to suit system operating conditions
 - Accessible for operation and maintenance

Installation Method

- Installation to comprise:
 - First **~1.2 km installed in trench**, with:



- Proper bedding
- Backfilling and compaction
- Remaining pipeline installed **above ground on reinforced concrete plinths or steel brackets.**
- Above-ground supports to:
 - Be spaced to limit deflection and vibration
 - Allow for thermal expansion where necessary

Thermal expansion and contraction of above ground pipeline sections shall be fully considered in the design.

The Contractor shall provide appropriate measures such as expansion allowances, sliding supports, flexible joints, or other approved solutions to prevent overstressing, deformation, or failure of the pipeline system.

Anchorage and Thrust Restraint

- Concrete thrust blocks, anchors, or restraints to be provided at:
 - Direction changes
 - Valve locations
 - High-stress points
- Design to account for:
 - Internal pressure
 - Surge effects
 - Terrain slope

Protection and Security

- **Valves and fittings shall be protected** using a combination of the following as appropriate:
 - Steel cages
 - Concrete protection
 - Rock camouflage, where required
- **All protective enclosures shall be securely locked and designed to be tamper-proof** to prevent unauthorized access.
- **Protection measures shall be implemented to prevent:**
 - Vandalism
 - Accidental damage

- UV degradation and adverse weather exposure

Testing and Handover

- Rising main to be:
 - Pressure tested to an agreed test pressure above operating pressure
 - Inspected for leaks and joint integrity
- Contractor to provide:
 - Test results
 - As-built drawings
 - Valve schedules

6.8 Camp-Side Raw Water Storage

The camp raw water system shall be identical to river side tank:

- One **40,000 L enclosed tank**.
- Minimum **3 days raw water storage** at camp.
- Reinforced concrete plinth.
- Overflow, scour, and secure access fittings.

6.9 Booster Pumping System

The booster pumping system shall provide reliable pressure to drive the downstream filtration and disinfection system under all normal operating conditions.

The system shall include, as a minimum:

Pump Type and Duty

- **Solar-powered centrifugal booster pump**, suitable for clean raw water.
- Nominal motor power:
 - **0.75–1.0 kW** minimum.
- Pump duty to be sufficient to:
 - Overcome filtration head losses
 - Maintain stable operating pressure through the treatment system
- Reference pump:
 - **DAB K35/40T or approved equivalent**.
- Any alternative pump must demonstrate:



- Equivalent hydraulic performance
- Proven compatibility with solar power systems

Electrical and Control Requirements

- Pump to be compatible with:
 - Solar inverter supply
 - Variable power availability
- Pump controller to include:
 - Soft start where applicable
 - Automatic restart after power interruption

Protection and Safeguards

- Pump to be fully protected against:
 - **Dry running**, via pressure switch, flow switch, or level interlock
 - **Over-pressure**, via pressure relief or control logic
- Pump materials and seals to be suitable for chlorinated water downstream of dosing point where applicable.

Installation and Accessories

- Pump to be installed on a firm base or plinth.
- Isolation valves to be provided on suction and discharge.
- Flexible connectors or vibration isolation to be included where necessary.
- System to allow safe access for maintenance and replacement.

6.10 Filtration & Disinfection System

The filtration and disinfection system shall be designed to provide reliable primary treatment and disinfection of abstracted water, using a simple, robust, and low-maintenance configuration suitable for remote operation.

The system shall include, as a minimum:

Disinfection

- **Inline calcium hypochlorite dosing system** with:
 - Adjustable dosing output
 - Manual control capability
- Dosing system to be:
 - Flow-proportional or manually adjustable based on operating conditions



- Constructed from corrosion-resistant materials
- Safe chemical storage provision to be included, with:
 - Secure enclosure
 - Protection from moisture and direct sunlight

Filtration System

- **FRP pressure vessels**, rated for operating pressure with suitable safety margin.
- Filter media:
 - **Glass Filter Media (GFM)** graded as required for effective turbidity removal.
- Filtration system designed for:
 - Continuous operation using **motive water pressure**
 - Minimal reliance on electrical power

Backwashing

- **Manual backwash valves** provided for each pressure vessel.
- Backwash arrangement to:
 - Allow effective media cleaning
 - Discharge to a safe drainage location
- Contractor to clearly indicate:
 - Backwash flow requirements
 - Operational procedure

Final Filtration

- **5-micron cartridge filtration** provided as the final treatment barrier.
- Cartridge housings to be:
 - Pressure-rated
 - Easily accessible for cartridge replacement
- Contractor to allow for:
 - Initial supply of cartridges
 - Ready availability of replacements

Pipework and Valves

- All treatment pipework to include:
 - Isolation valves

- Pressure gauges upstream and downstream of filters
- Materials to be compatible with treated water and chlorine exposure.

6.11 Treated Water Storage

The treated water storage and distribution system shall be designed and constructed using **rotationally moulded plastic potable-water tanks (recommended tank type) or approved equivalent** to provide adequate buffering, safe storage, and reliable gravity-fed distribution of treated water to the camp under all normal operating conditions.

Storage Capacity and Operational Requirement

- Treated water storage shall comprise:
 - **3 × 10,000 litre plastic treated water tanks.**
- Combined effective storage capacity shall provide:
 - **Minimum 3 days treated water demand**, based on agreed daily consumption rates.
- Tanks shall be arranged to allow:
 - 2 Duty and 1 standby operation with full isolation capability.

Treated Water Tanks

- Tanks shall be **rotationally moulded plastic tanks** specifically manufactured for **potable water storage**.
- Tank material to be:
 - UV-stabilised, food-grade polyethylene (PE) or approved equivalent.
- Tanks shall be:
 - Fully enclosed
 - Opaque or dark-coloured to inhibit algal growth
 - Suitable for long-term outdoor installation
- Tanks shall be rated for:
 - Full static water load
 - Elevated installation where required

Each tank shall be fitted, as a minimum, with:

- Inlet connection with isolation valve
- Outlet connection with isolation valve
- Overflow connection sized to safely pass excess inflow
- Drain / scour outlet at lowest practicable point
- Lockable inspection hatch
- Vent fitted with insect-proof screen

All materials in contact with treated water shall be:

- Non-toxic
- Corrosion-free
- Fully compatible with chlorinated water



Tank Location, Support, and Elevation

- Tanks shall be positioned on naturally elevated ground within the camp to enable gravity-fed distribution.
- Tanks shall be mounted on reinforced concrete plinths constructed at the selected elevated locations.
- Concrete plinths shall be designed and constructed by Employer's Appointed Contractor to:
 - Support the full tank mass (tank plus maximum water content) with an adequate factor of safety
 - Resist wind loads, settlement, and site environmental conditions
- The combined ground elevation and plinth height shall be sufficient to:
 - Provide the required gravity pressure at all downstream points of use
- Safe access provisions shall include, where required:
 - Fixed access steps or ladder
 - Fall protection measures and edge protection appropriate to the installation height

Overflow and Drainage Management

- Overflow pipework shall discharge to:
 - A safe location away from foundations
 - An erosion-protected outlet
- Drain and scour connections shall allow:
 - Complete emptying of tanks for cleaning and maintenance

Testing, Commissioning, and Handover

- Treated water tanks and associated distribution pipework shall be:
 - Leak-tested
 - Cleaned, disinfected, and flushed prior to commissioning
- Contractor shall demonstrate:
 - Adequate gravity pressure at points of use
 - Correct operation of isolation, overflow, and drain valves
- Contractor to provide at handover:
 - As-built drawings
 - Tank specifications and stand design details
 - Operation and maintenance instructions

6.12 Civil & Structural Works

Civil and structural works shall be designed and constructed to provide safe, durable, and long-term support to all mechanical, electrical, and hydraulic components of the water supply system, considering site conditions, operational loads, and environmental exposure.

NOTE:

The Employer shall have the right to select, approve, or nominate one or more qualified subcontractors to perform the civil and structural works associated. The Contractor shall incorporate such subcontractor(s) into the Works without adjustment to the overall responsibility, risk allocation, programme, or warranties under the Contract.



General Requirements

- Structures shall be designed to withstand:
 - Dead loads (equipment, water-filled tanks, structures)
 - Live loads (maintenance access)
 - Environmental loads (wind, rainfall, erosion)
- Concrete works shall use reinforced concrete of appropriate strength and durability for the site conditions.

Reinforced Concrete Plinths and Foundations

Reinforced concrete plinths and foundations shall be provided for, but not limited to, the following items:

- Raw water, treated water, and settling tanks
- River abstraction pumps
- High-lift pumps
- Booster pumps
- Major valves and valve chambers

Plinths and foundations shall:

- Be sized to support full operational loads with suitable safety factors
- Include holding-down bolts or anchors where required
- Provide level, stable, and vibration-resistant bases for equipment
- Be raised above surrounding ground where necessary to prevent flooding or water ingress

Pipeline Supports, Brackets, and Anchor Blocks

- Pipeline support brackets shall be provided where pipelines are installed above ground.
- Supports shall:
 - Maintain correct pipe alignment and gradient
 - Limit deflection and vibration
- Concrete anchor blocks and thrust restraints shall be provided at:
 - Changes in direction



- Valve locations
- High-pressure points
- Anchor blocks shall be sized to resist internal pipe thrust forces.

Drainage and Erosion Protection

- Drainage measures shall be provided around civil structures to prevent ponding and undermining of foundations.
- Erosion protection shall be provided where required, including:
 - Stone pitching
 - Concrete aprons
 - Controlled drainage channels
- Special attention shall be given to areas near:
 - River abstraction works
 - Tank foundations
 - Steep or sloping ground

Finishes, Protection, and Handover

- Exposed concrete surfaces shall be finished to shed water and minimise cracking.
- Embedded steelwork shall be protected against corrosion.
- Contractor shall provide at handover:
 - As-built drawings for all civil and structural works
 - Structural details for tank stand and major plinths

Civil and structural works shall form an integral part of the overall system and shall be completed to ensure safe operation, ease of maintenance, and long-term durability of the water supply infrastructure.

6.13 Security & Asset Protection

Security and asset-protection measures shall be implemented to safeguard all critical water-supply infrastructure against vandalism, theft, unauthorised access, and accidental damage. Measures shall be appropriate to the remote operating environment and aligned with the overall system layout and operational philosophy.

General Security Principles

- Security design shall prioritise **deterrence, visibility, and controlled access** rather than reliance on a single protective measure.
- Critical assets shall be protected without restricting safe operation, inspection, or maintenance activities.
- All security measures shall be permanent, robust, and suitable for long-term outdoor exposure.

Asset Location and Layout

- Where practicable, critical infrastructure shall be:
 - Located **within or adjacent to the Ranger Outpost**, or
 - Positioned in areas with routine staff presence and natural surveillance.

Protection of Exposed Assets

- Exposed assets such as valves, pipework fittings and air valves, shall be protected using a combination of:
 - Steel cages or guards
 - Concrete collars or plinth extensions
 - Rock or terrain camouflage where appropriate
- Protection measures shall not impede:
 - Valve operation
 - Routine inspection
 - Emergency access

Signage and Access Control

- Clear signage shall be provided to:
 - Identify restricted areas
 - Warn of electrical and mechanical hazards
- Access to critical infrastructure shall be limited to authorised personnel only.

Integration with Operations

- Security measures shall be designed to integrate with routine operations, ensuring:
 - No reliance on frequent unlocking or dismantling of protective measures
 - Safe access for authorised maintenance staff
- Any proposed deviations from the specified security approach shall require approval.

Security and asset-protection measures shall be treated as an integral part of the system design and shall not be considered optional. All critical infrastructure shall be adequately protected to ensure uninterrupted operation, asset longevity, and personnel safety.



6.14 Environmental, Health & Safety

The Contractor shall:

Prevent contamination of river by fuel, oil or chemicals

- Ensure that no fuel, oil, lubricants, cement slurry, chemicals, wastewater, or hazardous substances are discharged, leaked, or washed into rivers, streams, drains, groundwater, or adjoining land.
- Store all fuels, oils, and chemicals in sealed, clearly labelled containers placed within bunded areas capable of containing at least 110% of the stored volume.
- Carry out refuelling, servicing, and maintenance of equipment only in designated areas approved by the Engineer and located away from watercourses.
- Always provide spill prevention and response materials on site and immediately contain, clean up, and remediate any spill at the Contractor's cost.
- Report any pollution incident to the Engineer within 24 hours, including details of the cause, extent, corrective actions taken, and measures to prevent recurrence.
- Bear full responsibility and cost for environmental damage, penalties, remediation, and third-party claims resulting from contamination.

Implement safe working procedures in steep terrain

- Prepare and submit site-specific risk assessments and method statements addressing hazards related to steep slopes, unstable ground, height exposure, and adverse weather.
- Obtain the Engineer's approval of all safety procedures before commencing work in steep or hazardous areas.
- Provide and enforce the use of appropriate personal protective equipment (PPE), including safety harnesses, helmets, non-slip footwear, and fall-protection systems where required.
- Design, construct, maintain, and regularly inspect temporary access roads, walkways, scaffolds, and working platforms to prevent slips, falls, or collapse.
- Ensure that only trained, competent, and medically fit personnel work in steep or high-risk locations, with continuous supervision.
- Suspend work immediately where conditions become unsafe due to rainfall, slope instability, or other hazards.

Remove all construction waste off site

- Implement a waste management system covering segregation, temporary storage, collection, transport, reuse, and disposal of waste.
- Remove all construction waste, surplus excavated material not approved for reuse, packaging, scrap, and domestic waste from the site on a regular basis.

- Dispose of waste only at approved and authorized disposal or recycling facilities.
- Prohibit burning, burying, or uncontrolled dumping of waste on site or in surrounding areas.
- Maintain the site in a clean, orderly, and safe condition always.
- Allow the Engineer to arrange waste removal at the Contractor's cost in cases of persistent non-compliance.

Reinstate disturbed ground

- Reinstate all disturbed or damaged areas progressively and upon completion of the Works to their original condition or to a standard approved by the Engineer.
- Carry out re-grading, compaction, erosion control, replacement of topsoil, and re-vegetation where required.
- Stabilize exposed slopes and disturbed ground to prevent erosion, sediment runoff, or landslides, particularly near waterways.
- Restore natural drainage patterns and remove all temporary works, debris, surplus materials, and equipment from site.
- Rectify, at the Contractor's cost, any settlement, erosion, or failure occurring during the Defects Liability Period.
- Reinstatement shall not be considered complete until formally approved by the Engineer.

6.15 Testing, Commissioning & Verification

Commissioning shall include, but not be limited to, the following activities, all of which shall be carried out by the Contractor in the presence of the Engineer or the Engineer's representative:

Hydrostatic pipeline pressure testing

- Subject all transmission, distribution, and rising main pipelines to hydrostatic pressure testing prior to backfilling or final reinstatement.
- Conduct tests in accordance with relevant standards and design specifications, using potable water unless otherwise approved.
- Test pressure shall not be less than 1.5 times the maximum operating pressure or as specified in the design.
- Maintain test pressure for the specified duration and verify that there is no leakage, pressure drop, visible deformation, or joint failure.
- Rectify all leaks, defects, or failures and repeat testing until satisfactory results are achieved at the Contractor's cost.



- Submit signed test records and pressure charts as part of the commissioning documentation.

Pump testing under full load

- Test all installed pumps under operating conditions equivalent to full design load.
- Verify pump capacity, discharge rate, total dynamic head, pressure, power consumption, vibration, noise levels, and temperature rise.
- Confirm proper operation of valves, non-return valves, pressure gauges, flow meters, and associated control systems.
- Run pumps continuously for a minimum period specified in the design to demonstrate stability and reliability.
- Rectify any mechanical, electrical, or hydraulic defects discovered during testing and retest until compliance is achieved.
- Provide documented pump test results, including manufacturer's performance curves compared against actual performance.

Water quality testing prior to handover

- Flush the entire pipeline, storage, and pumping system thoroughly prior to water quality testing.
- Collect water samples from representative points in the system, including storage tanks and delivery points.
- Carry out water quality testing by a recognized laboratory to confirm compliance with applicable national drinking water standards.
- Test for physical, chemical, and bacteriological parameters relevant to the system and location.
- Repeat flushing, disinfection, and testing where results fail to meet required standards until compliant results are obtained.
- Submit certified water quality test reports as a condition for provisional acceptance and handover.

6.16 Training, Documentation & Handover

Handover shall include:

- On-site operator training.
- As-built drawings.
- Pump curves, datasheets and warranties.



- Maintenance schedules and spares list.
- Supply of an initial set of critical spare parts sufficient for a minimum of 12 months operation, including but not limited to pump seals, gaskets, valve components, and other recommended consumables.

The Contractor shall coordinate fully with the Electrical Works Contractor and ensure that all mechanical equipment, including pumps and control interfaces, are fully compatible with the electrical power systems provided.

All interface requirements, including starting methods, protection, and control integration, shall be clearly defined.

7. TECHNICAL STANDARDS AND PERFORMANCE CRITERIA

- All works and materials shall comply with relevant Nigerian standards, applicable ISO standards and recognised international practice for water supply systems.
- The Contractor shall guarantee the performance of the complete system, including flow rate, pressure, and operational reliability, for a minimum period of 12 months from the date of commissioning.
- Any failure to meet the specified performance criteria shall be rectified by the Contractor at no additional cost to the Employer.

8. MATERIALS, EQUIPMENT AND QUALITY REQUIREMENTS

All materials and equipment shall be new, fit for purpose and suitable for tropical outdoor conditions. The Employer reserves the right to review and approve key components prior to installation.

9. ALTERNATIVES AND VALUE ENGINEERING

Contractor may propose alternatives if performance, durability, operational simplicity and security are not compromised. All alternatives shall be clearly identified and justified.

10. PROGRAMME, METHODOLOGY AND RISK MANAGEMENT

Contractor shall submit a realistic programme, a brief construction methodology and a register identifying principal project risks and proposed mitigation measures.



11. PRICING AND BASIS OF PAYMENT

11.1 Detailed Pricing Breakdown

- The Contractor shall submit, together, a **detailed pricing breakdown** clearly itemizing the lump sum price into logical cost components.
- The breakdown shall be provided for transparency and evaluation purposes only and shall not alter the lump sum nature of the Contract.
- The detailed price shall be deemed to include all costs arising from compliance with the Specifications, Drawings, Standards, applicable regulations, and good engineering practice.
- No additional payment shall be made for any work, material, or service not explicitly identified but which is reasonably necessary for the proper execution, completion, testing, commissioning, and handover of the Works.
- As a minimum, the pricing breakdown shall include the following indicative categories:
 - Mobilization, preliminaries, site establishment, and demobilization
 - Engineering, surveys, setting-out, and temporary works
 - Supply and installation of pipelines, fittings, valves, and accessories
 - Pump supply, installation, and associated mechanical works
 - Civil works, structures, foundations, tanks, and reinstatement
 - Environmental, Health & Safety (EHS) compliance measures
 - Testing, commissioning, verification, and operator training
 - Documentation, as-built drawings, and handover requirements
 - Overheads, profit, contingencies, and applicable taxes (if any)

The detailed pricing breakdown is provided for evaluation and transparency purposes only and shall not form the basis for remeasurement, claims, or adjustment of the lump sum Contract Price, except where expressly instructed by the Employer.

11.2 Pricing Responsibilities

- The Contractor shall be deemed to have examined the site conditions, scope requirements, and all information provided prior to tender submission.
- Errors, omissions, or misinterpretations in the pricing breakdown shall not entitle the Contractor to additional payment.



- The lump sum price shall remain fixed and shall not be subject to adjustment due to changes in quantities, construction methodology, sequencing, or market conditions, except as expressly provided for under the Contract.

11.3 Measurement and Payment

- Payment shall be made based on **milestones or stages of completion** as defined in the Contract, not on individual item quantities.
- The pricing breakdown shall not be used as a schedule of rates or for re-measurement unless specifically instructed in writing by the Employer.
- Completion of each milestone shall be subject to certification by the Engineer.

Payment Milestones

- A proposed **payment milestone breakdown** linked to measurable project stages.
- Milestones shall be realistic and aligned with actual progress on site.
- Each milestone shall clearly state the percentage or amount of the lump sum associated with it.
- Final payment shall be tied to successful commissioning and formal acceptance of the Works.

12. SUBMISSION REQUIREMENTS

Contractors shall submit a complete quotation covering all technical and commercial aspects of the Works. Submissions must be clear, detailed, and fully compliant with this document.

All quotations shall be submitted electronically to: **ba@ani-nigeria.org**

Submission shall include:

Technical Information

- Company profile and relevant project experience
- Proposed methodology and execution plan
- Design approach confirming compliance with specifications
- Datasheets for key equipment (pumps, solar system, generator, pipes, filtration)
- Project program and delivery timeline
- Risk assessment and mitigation measures
- HSE and quality control approach

Commercial Information

- Total lump sum price (clearly stated currency)
- Detailed cost breakdown (civil, mechanical, electrical, pipeline, etc.)
- Proposed payment schedule
- Assumptions and exclusions
- Quotation validity (minimum 60–90 days)

Other Requirements

- Confirmation that a site visit and detailed site assessment has been completed by the Contractor
- Compliance statement confirming adherence to this document (with any deviations clearly stated)
- Submission format: PDF (signed)

13. APPENDICES

- Appendix 1 – Site Investigation Report (April 2026)