

# Climate Resilient Livelihoods

IN SOUTHERN ZIMBABWE



## SCOPE OF WORKS

### CONSTRUCTION OF THE GORORO 2 IRRIGATION SCHEME

*Ward 28, Chivi District, Masvingo Province, Zimbabwe*

Single Contract — Full Scheme (47 ha): Abstraction Tie-In, Mainline, Electrification & Hybrid Solar-Grid Power, Infield Sprinkler and Centre Pivot Systems, and Gully Protection Works

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## SECTION A — PROJECT INFORMATION

### PART A1 — BACKGROUND

Zimbabwe has experienced an overall 5 percent decline in total rainfall over the 20th century, together with an increasing number of hot days. Agriculture is the backbone of Zimbabwe's economy, contributing about 20% of GDP and directly and indirectly sustaining the livelihoods of over 70% of the population, the majority of whom are smallholder farmers practising rain-fed agriculture. Climate change has therefore had a significant negative impact on the livelihoods of Zimbabweans.

The Green Climate Fund (GCF) was established to support developing countries in responding to the negative impacts of climate change. Zimbabwe received GCF funding for the project "Building Climate Resilience of Vulnerable Livelihoods in Southern Zimbabwe", which aims to strengthen the resilience of agricultural livelihoods of vulnerable communities, particularly women, in southern Zimbabwe in the face of increasing climate risks.

The project is implemented by the Government of Zimbabwe in partnership with UNDP over seven years (June 2020 – May 2027), with the Ministry of Agriculture, Mechanisation and Water Resources Development (MAMWRD) as the Implementing Partner and the Department of Irrigation Development as the Responsible Party. It delivers three interlinked outputs: (i) increased access to water for climate-resilient agriculture through climate-resilient irrigation systems and efficient water resource management; (ii) scaled-up climate-resilient agricultural production, diversification and market linkages; and (iii) improved access to weather, climate and hydrological information. A key project component climate-proofs irrigation infrastructure across 15 districts in Manicaland, Masvingo and Matabeleland South Provinces.

Gororo 2 is a proposed community-managed irrigation scheme in Ward 28, Chivi District, Masvingo Province, identified as an alternative scheme following the exclusion of the original Gororo scheme from a wildlife-restricted area. The scheme abstracts water from Tugwi-Mukosi Dam via the Tugwi River and shares an existing pump station with the adjacent Gororo 1 scheme. The design adopts a hybrid centre-pivot and semi-portable (solid-set) sprinkler approach, selected for lower capital and operating cost, reduced O&M complexity, and suitability to an ageing farmer population with limited youth participation — supported by a hybrid grid/solar power supply for energy security.

Detailed engineering design, a priced Bill of Quantities, drawings and technical specifications have been prepared by the Department of Irrigation Development for the construction of the Gororo 2 Irrigation Scheme (Annexures A–C). This Scope of Works covers the complete construction of the scheme as a single contract package, to be awarded to one Contractor responsible for the full range of civil, mechanical, electrical, instrumentation and protection works described herein.

### PART A2 — GENERAL

Further to the Schedule of Requirements in Section B below, Bidders shall note the following requirements, conditions and related services and shall include the corresponding documents in their offers and/or present them prior to contract award.

|                      |                                                                                                                                                                    |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Delivery Term</b> | All prices for materials and equipment in this ITB shall be understood as supplied, delivered, installed, tested to the required specifications, and commissioned. |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Exact Address of Delivery / Installation Location</b> | <b>Gororo 2 Irrigation Scheme, Ward 28, Chivi District, Masvingo Province, Zimbabwe. Coordinates: 20°46'23.08"S; 30°56'13.12"E. Accessed via 4 km along the Tugwi-Mukosi Dam road, off the Ngundu–Tanganda Highway at the 16 km mark from Ngundu.</b>                                                                                                                                                                                                                                                                                           |
| <b>Customs</b>                                           | The Contractor is responsible for all duties and customs clearance associated with the importation of goods and equipment required for the supply and execution of the Works and related services.                                                                                                                                                                                                                                                                                                                                              |
| <b>Commissioning</b>                                     | The Contractor is responsible for testing and commissioning of all equipment supplied and installed under this ITB, including the pumping units, VSDs, transformers, solar PV array, pivot, and sprinkler blocks. Costs shall be factored into the Contractor's rates.                                                                                                                                                                                                                                                                          |
| <b>Performance Security</b>                              | The successful Contractor shall provide a performance security (bank guarantee or equivalent) of an amount and validity to be confirmed in the contract, valid until the end of the Defects Liability Period, together with an advance payment guarantee if any advance payment is made.                                                                                                                                                                                                                                                        |
| <b>Warranty / Guarantee</b>                              | The successful Contractor shall provide a warranty of 365 days from the date of the Certificate of Substantial Completion, running concurrently with the Defects Liability Period. Warranty excludes malicious damage or third-party/end-user damage. Manufacturer warranties for pumps, VSDs, transformers, solar modules/inverters and pivot equipment shall be assigned to the Employer at handover.                                                                                                                                         |
| <b>Liability Insurance</b>                               | The successful Contractor shall hold All Risks Insurance, Public Liability Insurance (third party) and Workers' Compensation Insurance, in compliance with applicable Zimbabwean labour law, international standards, and the General Conditions of Contract.                                                                                                                                                                                                                                                                                   |
| <b>Defects Liability</b>                                 | Defects arising from the Contractor's execution during the Defects Liability Period (12 months) shall be repaired by the Contractor at its own expense within one week of written notice. If the Contractor fails to do so, UNDP may effect the repairs and recover the cost from the Maintenance/Performance Guarantee.                                                                                                                                                                                                                        |
| <b>Safety, Health &amp; Welfare Plan</b>                 | Upon award, the Contractor shall submit a detailed Safety, Health & Welfare Plan, forming part of the programme of works and subject to the Engineer's approval, at the Contractor's own cost. The Plan shall be based on the ILO manual "Safety, health and welfare on construction sites — A Training Manual" (1999) — Annexure E — and shall comply with the project Environmental and Social Management Plan (ESMP, Annexure D). Applicable safety measures shall be implemented in full from mobilisation, before physical works commence. |
| <b>Special Requirements</b>                              | <p><b>1. Miscellaneous</b></p> <p><b>a) Time Schedule</b></p> <p>The Contractor is required to submit a detailed time schedule (Gantt chart / MS-Project or equivalent) for all activities and deliverables of the Works, sequenced by Bill of Quantities section, prior to the start of construction. The programme shall show the critical path, including the interface with the</p>                                                                                                                                                         |

shared Gororo 1/Gororo 2 pump station, and shall be reviewed and approved by the Engineer before mobilisation. The Contractor shall update the programme monthly and adjust it as instructed by the Engineer.

The Contractor shall carry out a joint quantity/measurement verification with the Engineer before commencement of works on site. Written approval of the verified scope shall be obtained before implementation proceeds.

**b) Schedule of Material Supply**

No delays will be accepted due to late or insufficient supply of materials (including imported items such as pumps, VSDs, solar modules, and SWA cable). The Contractor's time schedule shall include procurement lead times, delivery dates and quantities of critical materials and equipment to demonstrate realistic sequencing of the works.

**c) Work Plan / Method Statement**

The Contractor shall submit a written method statement for each major work section (pump station tie-in, mainline installation including the river crossing, electrification and solar PV installation, and infield/pivot installation), describing the construction methodology, plant, and sequencing to be used.

**d) Samples and Catalogues**

The Contractor shall submit samples and/or manufacturer's catalogues/datasheets for all key materials and equipment (pumps, motors, VSDs, transformers, solar modules and inverter, SWA cables, PVC/MPVC and steel pipe, valves, sprinklers, gabion mesh) for verification of compliance with the Technical Specifications, at least one week before the corresponding order is placed. Where a physical sample cannot reasonably be provided, the catalogue/datasheet may be accepted subject to the Engineer's approval.

**e) Cash Flow**

The Contractor shall submit a cumulative cash-flow forecast (S-curve) aligned with the approved programme and shall update it monthly against actual expenditure.

**f) Monthly Reports and Photographs**

The Contractor shall submit monthly progress reports (three copies, plus one electronic copy) showing percentage physical progress against programme, activities executed, any obstacles encountered, health & safety incidents, and dated photographs of progress, including of works that will subsequently be buried or concealed (pipe trenches, cable trenches, thrust blocks, foundations).

**g) Contract Documents**

All tender documents shall be submitted signed and stamped. Everything described in the Technical Specifications, drawings, Bill of Quantities, pre-bid clarifications and any addenda is deemed included in the unit rates and no additional payment will be made in this respect.

**2) Workmanship**

The Contractor shall engage competent, appropriately qualified workers to achieve the workmanship stated in the tender documents. Where a specific workmanship standard is not identified, current Zimbabwean and/or international good practice shall apply.

### **3) Drawings**

- The Contractor shall comply with any additional detail or general arrangement drawings issued by the Engineer, which shall be considered part of the Contract.
- The Contractor shall prepare and submit line/working drawings for all works (pump station modifications, mainline setting-out, electrification/solar layout, infield and pivot layout) for the Engineer's approval. No activity may commence without prior approval of the relevant working drawings.
- Working drawings shall be submitted in triplicate at least one week ahead of the required approval date. Where revisions are required, the Contractor shall resubmit and obtain approval before proceeding with the affected works.

### **4) As-Built Drawings**

The Contractor shall submit as-built drawings prior to substantial completion, in two hard copies (A0/A3 as directed) and electronic format (PDF and editable CAD), covering civil, mechanical, and electrical works, including pipe routes, cable routes, trench depths, invert/crown levels and coordinates of all buried infrastructure, the abstraction and pump station, and the solar PV/electrification layout.

### **5) Discrepancies and Errors in Tender Documents**

- In the event of a discrepancy, the Engineer will determine the correct specification of any item during the tendering stage.
- Missing information, discrepancies, or imprecise item descriptions do not relieve the Contractor of the obligation to execute the item correctly and completely, as would be expected had it been fully and properly described.
- The Contractor shall notify the Engineer in writing of any omissions, discrepancies or errors identified during tendering, and shall price in accordance with the Engineer's clarification.

### **Inspection of Site**

The Contractor is deemed to have visited and inspected the site, including the shared abstraction/pump station, the gully area between Gororo 1 and Gororo 2, and the command area, and to have satisfied itself as to ground conditions, access, availability of water and power, the river crossing, and all other factors affecting execution of the works, before submitting its offer. All such factors are deemed to have been taken into account in the rates and prices.

### **Subcontractors**

Subcontracting shall be governed by the General Conditions of Contract. The Contractor shall submit to the Engineer, prior to commencement of the relevant works, the certified agreement between the Contractor and any subcontractor, together with evidence of the subcontractor's competence (e.g., for electrical/solar PV installation, borehole drilling, or specialised welding).

#### **Equivalence and Engineer's Instructions**

Wherever 'equivalence' or an 'Engineer's instruction' is referred to in the contract documents, it shall be interpreted and executed subject to the prior written consent of the Engineer.

#### **6) Site Meetings**

Periodic (at minimum weekly, or as directed by the Engineer) site progress meetings shall be held. The Contractor or a duly authorised representative shall attend.

#### **7) Testing**

The Contractor shall, at its own expense, carry out all tests requested by the Engineer on materials supplied, installed or stored on site, and shall provide the necessary testing equipment or engage an accredited laboratory.

- Concrete, gabion stone and mesh, and backfill/compaction testing for the pump station, valve chambers, thrust blocks and gabion structure.
- Factory (where applicable) and site acceptance testing of the three 45 kW centrifugal pumps and VSDs, confirming duty point performance (150 m<sup>3</sup>/hr at 85 m TDH per duty pump), before and after installation.
- Hydrostatic pressure testing of all steel, MPVC/UPVC pipelines, and infield reticulation prior to backfilling and commissioning, in accordance with the Technical Specifications.
- Electrical testing and commissioning of the transformers (200 kVA and 25 kVA), switchgear, VSDs, SWA cabling, earthing/lightning protection, and the automatic grid/solar changeover switch.
- Performance verification of the solar PV array (minimum 155 kWp, 590 Wp-class monocrystalline modules) including string testing, inverter commissioning, and confirmation of rated output under the hybrid control scheme.
- Field performance/uniformity testing of the centre pivot and the semi-portable sprinkler blocks (A–E) at the design operating pressure of 3.0 bar at the sprinkler/pivot inlet.

Failure of any equipment to pass factory or site testing shall require replacement at the Contractor's own expense. UNDP/the Engineer reserves the right to change the testing laboratory.

#### **8) Specifications**

Applicable specifications are approved international and/or Zimbabwean standards, or as stated in this ITB and its Technical Specifications (Annexure

A). Where a specification is missing or unclear, the Contractor is deemed to have priced on the basis of high-quality materials and current best practice.

#### **9) Take-Off Quantities and Pricing**

The tender documents are complementary and self-explanatory; what is required by one document is deemed required by all. Item specification is therefore not limited to the wording of the Bill of Quantities but extends to the tender documents as a whole.

- The Works shall be priced on an item-rate (measure and value) basis against the priced Bill of Quantities (Annexure B), which forms the Contractor's financial offer.
- Prices shall be exclusive of VAT. The Contractor shall include all overheads, profit, and incidental costs in its unit rates; no separate claims will be entertained in this respect.
- Rates shall include the cost of all specified testing and commissioning, in accordance with the Technical Specifications and the Engineer's instructions.

#### **10) Project Signboards**

The Contractor shall supply and erect one project signboard before commencement of works. Content and branding (GCF/UNDP/Government of Zimbabwe/Department of Irrigation) will be provided by the Engineer during mobilisation.

#### **11) Assistance to the Engineer**

The Contractor shall promptly raise with the Engineer any aspect of the design that, in the Contractor's professional judgement, appears to be in error, before executing the corresponding works.

#### **12) Temporary Installations**

All temporary works and installations required to execute and complete the Works (site offices, stores, workshops, temporary power/water, security fencing) shall be provided and subsequently removed by the Contractor at its own cost. Should the Contractor delay in establishing or removing temporary installations, the Engineer may do so and recover the cost from amounts otherwise due to the Contractor. The Contractor shall safeguard the site, works, materials and plant from damage and theft and take reasonable precautions against unauthorised access, including to the pump station and the electrical/solar installation.

#### **13) Warehousing and Storage**

The Contractor shall establish secure stores/warehouses for all materials, particularly cement, electrical equipment, solar modules, and pipe/fittings, and shall protect stored materials from damage caused by exposure, theft, or vandalism.

#### **14) Farmer/Operator Training and Operation & Maintenance (O&M)**

Given the site socio-cultural assessment indicating an ageing farmer population and limited youth participation, the Contractor shall provide

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>structured, hands-on O&amp;M training to the Irrigation Management Committee and designated scheme operators, covering pump and VSD operation, hybrid grid/solar switching, pivot and sprinkler set operation, routine maintenance, fault-finding and basic troubleshooting, and safety procedures. Training shall be delivered before handover and reinforced during the O&amp;M period referred to below, and shall be documented in an operator training record signed off by the Engineer.</p> <p>The Contractor shall carry out Operation and Maintenance of the complete irrigation scheme and associated facilities for a period of one (1) year following handover of the constructed works, running concurrently with (or immediately following, as directed) the Defects Liability Period.</p> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## PART A3 — PHASING, COMMISSIONING AND OVERSIGHT

### 3.1 Phasing

The project shall be implemented as a single phase and awarded to a single Contractor responsible for the complete scope of works. To manage interface risk with the shared Gororo 1 pump station and to protect the critical path, the Contractor's programme shall reflect the following indicative sequence, subject to the Engineer's approval:

1. Mobilisation, establishment of Engineer's and Contractor's site facilities, and submission of the Safety, Health & Welfare Plan and working drawings.
2. Pump station tie-in works (suction/discharge manifolds, pump installation, superstructure modifications) coordinated to avoid disruption to Gororo 1 abstraction.
3. Mainline installation, including the river crossing, progressing from the pump station to the command area.
4. Electrification and solar PV installation at both the abstraction point (200 kVA transformer) and the pivot (25 kVA transformer / 10 kVA solar with automatic changeover), completed and tested ahead of pump/pivot commissioning.
5. Infield reticulation (Blocks A–E) and centre-pivot installation.
6. Gully-control gabion structure and erosion-protection works, sequenced to avoid the peak rainy season where practicable.
7. Integrated testing, commissioning, performance verification, farmer/operator training, and handover.

### 3.2 Commissioning and Hand Over

The Contractor is responsible for verifying that all works, systems, equipment and other project elements have been installed, tested, fit for purpose, and in good operating condition. Any defects identified shall be corrected by the Contractor. The Contractor shall hand over all structures and systems to UNDP/the Department of Irrigation Development upon completion of the Works and issuance of the Certificate of Substantial Completion (Letter of Acceptance) by the Engineer, accompanied by as-built drawings, O&M manuals, equipment warranties, and the operator training record.

### 3.3 Construction Oversight

The GCF Irrigation Expert Engineer is the UNDP appointed Engineer to manage and administer the contract. The Department of Irrigation Development, Government of Zimbabwe, will support UNDP appointed Engineer through supervisory responsibility for the project and oversight support at provincial and national level to ensure compliance with national regulations and Government standards.

## SECTION B — PROJECT DETAILS

### PART B1 — PROJECT OVERVIEW

#### 1.1 Existing Conditions

The Gororo 2 site lies in Ward 28, Chivi District, Masvingo Province, approximately 4 km along the Tugwi-Mukosi Dam road off the Ngundu–Triangle Highway (16 km mark from Ngundu). It is located adjacent to the existing Gororo 1 scheme, with which it will share the abstraction/pump station on the Tugwi River (fed by Tugwi-Mukosi Dam). No irrigation infrastructure currently exists on the Gororo 2 site itself. The design has been informed by topographic survey, soil evaluation (7–15 mm/hr infiltration, clay loam), water resource assessment and stakeholder consultation, including a socio-cultural assessment noting an ageing irrigator population and limited youth participation, which has informed the choice of a less labour-intensive hybrid pivot/sprinkler system. A gully actively degrading through head-ward erosion has been identified between the Gororo 1 and Gororo 2 sites, on expanding clay to slightly sodic soils, and requires protection works as part of this contract.

#### 1.2 Project Goals

The overarching goal of the Gororo 2 Irrigation Scheme is to strengthen the climate change adaptation and resilience of vulnerable agricultural livelihoods in Ward 28, Chivi District, in line with the GCF project's objective of building the climate resilience of vulnerable communities in southern Zimbabwe. In support of this overarching goal, the scheme aims to: contribute to food security and improved nutrition for the Gororo 2 community and the nation through reliable, climate-resilient irrigation; provide irrigating farmers — particularly women — with access to sustainable and remunerative markets for their produce, in line with the project's market-linkage objectives; and build sustainable, community-managed farming practices, supported by training and capacity-building of the Irrigation Management Committee.

Water will be abstracted from Tugwi-Mukosi Dam via the Tugwi River and delivered through an upgraded shared pump station and a new steel/MPVC/UPVC mainline to a 47 ha command area, comprising a 30 ha centre-pivot block and 17 ha of semi-portable sprinkler blocks (A–E), powered by a hybrid grid/solar electrical supply.

#### 1.3 Project Bidding / Contract Procedures

The UNDP General Conditions of Contract for Civil Works shall apply. This is a single-lot procurement: the entire Gororo 2 scope of works described in this document and priced in the Bill of Quantities (Annexure B) shall be awarded to one Contractor, who shall be fully responsible for all civil, mechanical, electrical and protection works and their interfaces.

#### 1.4 Scope of Works

The Scope of Works covers mobilisation to site; establishment of the Engineer's and Contractor's facilities; tie-in and upgrading of the shared Gororo 1/Gororo 2 pump station, including supply, installation, testing and commissioning of three 45 kW centrifugal pumps (150 m<sup>3</sup>/hr @ TDH 85 m each; two duty, one standby) with Variable Speed Drives; supply and laying of the steel and MPVC/UPVC mainline (500 mm down to 160 mm across various classes) from the pump station to the command area, including a river/stream crossing; hybrid grid-and-solar electrification comprising a 200 kVA transformer and switchgear at the abstraction point and a 25 kVA transformer with a 10 kVA solar PV system and automatic changeover switch at the pivot, together with a minimum 155 kWp solar PV plant; infield reticulation and installation of the semi-portable sprinkler system across Blocks A–E (17 ha) and the centre-pivot system (30 ha); and construction of a gabion structure and associated

conservation works to arrest gully erosion between the Gororo 1 and Gororo 2 sites. This scope is for the proposed Gororo 2 Irrigation Scheme, Chivi District, Masvingo Province, Zimbabwe, on an Item-Rate basis, and shall be awarded to a single Contractor.

- The Contractor shall prepare detailed construction (good-for-construction) drawings based on the proposed technology, submit them for the Engineer's vetting, and obtain final UNDP Engineer approval before commencing the corresponding work, so as to meet the overall programme.
- The Contractor shall carry out all necessary surveys and investigations, including any further geotechnical investigation required (e.g., at the pump station, valve chambers, river crossing and gabion foundation), and shall price these in its offer.
- The Contractor shall carry out all material testing and testing required during execution, in the presence of the Engineer, and shall price this in its offer in accordance with prevailing norms and regulations.
- The Contractor shall procure all electro-mechanical and hydro-mechanical equipment (pumps, VSDs, transformers, solar PV equipment, valves) with the required warranties/guarantees, from an approved Vendor/Make list issued by the UNDP Engineer, and shall hand over all such equipment in working condition, with warranty documentation, to the Irrigation Management Committee at the end of the O&M period.

### 1.5 System Design Summary

The following table summarises the key design parameters against which the Works described in this Scope of Works and the Bill of Quantities (Annexure B) shall be executed. Full design detail is provided in the Engineering Design Report (Annexure F) and the Technical Specifications (Annexure A).

| Parameter                             | Design Value                                                                                                                                                                       |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Scheme command area</b>            | 47 ha total (30 ha centre pivot + 17 ha semi-portable sprinkler, Blocks A–E)                                                                                                       |
| <b>Water source</b>                   | Tugwi-Mukosi Dam, via diversion structure on the Tugwi River (perennial, ZINWA seasonal permit required)                                                                           |
| <b>Abstraction / pump station</b>     | Shared existing pump station with Gororo 1; existing 500 mm steel suction line; flooded suction (no priming)                                                                       |
| <b>Pumping arrangement</b>            | 3 no. centrifugal pumps, 150 m <sup>3</sup> /hr @ TDH 85 m each (2 duty + 1 standby), 45 kW motors, VSD-controlled                                                                 |
| <b>Combined peak demand</b>           | 256.25 m <sup>3</sup> /hr (150 m <sup>3</sup> /hr pivot; 106.25 m <sup>3</sup> /hr semi-portable sprinkler)                                                                        |
| <b>Design crop / peak ETC</b>         | Maize; 7.5 mm/day                                                                                                                                                                  |
| <b>Mainline materials</b>             | Steel (pump station and river crossing) and MPVC/UPVC Class 6–10, 500 mm down to 160 mm, including a stream crossing                                                               |
| <b>Pivot power supply</b>             | 900 m HT line extension, 25 kVA transformer at the pivot, coupled via automatic switch to a 10 kVA solar PV system; 330 m 4-core 10 mm <sup>2</sup> SWA cable laid 1 m underground |
| <b>Abstraction point power supply</b> | 200 kVA transformer; combined pump duty draw approximately 90 kW, VSD-regulated                                                                                                    |
| <b>Solar PV plant</b>                 | Minimum 155 kWp, monocrystalline modules rated ≥590 Wp (approx. 262 panels), sized to a 1.72 oversizing factor                                                                     |

| Parameter               | Design Value                                                                                                                              |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Protection works</b> | Gabion structure to arrest head-ward gully erosion between the Gororo 1 and Gororo 2 sites (top width 4 m, bottom width 2.5 m, depth 1 m) |
| <b>Operating regime</b> | 15 hours/day operation; 6-day practical irrigation frequency; dual-shift (2 sets per rotation) for the sprinkler blocks                   |

### 1.6 Technical Specifications

The Technical Specifications describe the standards for materials, acceptability tests and workmanship required for the Works. The full Technical Specifications are provided in Annexure A.

## BILL OF QUANTITIES

The Bill of Quantities sets out the schedule of materials and works to be executed by the Contractor for the complete Gororo 2 Irrigation Scheme, comprising eight bills: (1) Preliminary and General; (2) Electrification; (3) Pumping Units and Connections; (4) Pump Station Superstructure; (5) Mainline; (6) Infield System; (7) Pivots; and (8) Conservation Works. The Bill of Quantities is to be priced by the Bidder and, once completed, forms the Bidder's price schedule/financial offer for the Works, on an item-rate basis, exclusive of VAT. The unpriced Bill of Quantities (item, description, unit and quantity, with rate and amount columns for the Bidder to complete) is attached as Annexure B and shall govern in the event of any inconsistency with the item list below.

| Item     | Description                                                                                                                                                                                                                                                                                                                             | Unit | Qty |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|
| <b>1</b> | <b>Preliminary and General</b>                                                                                                                                                                                                                                                                                                          |      |     |
| 1.1      | Provision of Guarantees and Insurances                                                                                                                                                                                                                                                                                                  | Sum  | 1   |
|          | <i>Facilities on site for the Engineer</i>                                                                                                                                                                                                                                                                                              |      |     |
| 1.2      | Living accommodation (three-roomed cottage per drawing, cement brick on mortar, tiled, plastered, painted, incl. double bed, 180 L upright fridge and standing fan; kitchen c/w 2-plate gas stove on stand with filled 9 kg tank, foldable table and 2 chairs, kitchen utensils), supplied with electricity — 3 kVA solar system        | Sum  | 1   |
| 1.3      | Offices equipped with table and six chairs, 3-in-1 inkjet colour printer, 4 box files, stapler, puncher, staples, 1 box bond paper                                                                                                                                                                                                      | Sum  | 1   |
| 1.4      | Data and communication for the duration of the contract                                                                                                                                                                                                                                                                                 | Sum  | 1   |
| 1.5      | Site, drill, full case (140 mm bore), 6-hour capacity testing, equip solar pumping unit (hybrid) c/w solar panels on 5 m high stand — wet hole contract, 2 500 lph minimum. Erect 5 000 L tank on a 5 m high tank stand (per technical specification) and all connections to the RE offices and ablution as per Engineer's instructions | No   | 1   |
|          | <i>Facilities for the Contractor (as directed by the Engineer)</i>                                                                                                                                                                                                                                                                      |      |     |
| 1.6      | Offices and storage sheds                                                                                                                                                                                                                                                                                                               | Sum  | 1   |
| 1.7      | Workshops                                                                                                                                                                                                                                                                                                                               | Sum  | 1   |
| 1.8      | Living accommodation                                                                                                                                                                                                                                                                                                                    | Sum  | 1   |
| 1.9      | Ablution facilities                                                                                                                                                                                                                                                                                                                     | Sum  | 1   |
| 1.10     | Water supply                                                                                                                                                                                                                                                                                                                            | Sum  | 1   |
| 1.11     | Electrical supply                                                                                                                                                                                                                                                                                                                       | Sum  | 1   |
| 1.12     | Operation and maintenance manuals, as-built drawings on A0 (5 hardcopies each)                                                                                                                                                                                                                                                          | Sum  | 1   |
| 1.13     | Access roads to worksites and to establishment (as per specification)                                                                                                                                                                                                                                                                   | Sum  | 1   |
|          | Allow for ESMP obligations (Bidder to provide details)                                                                                                                                                                                                                                                                                  | Sum  | 1   |
| <b>2</b> | <b>Electrification</b>                                                                                                                                                                                                                                                                                                                  |      |     |
|          | <i>Supply, deliver, install, test and commission:</i>                                                                                                                                                                                                                                                                                   |      |     |

| Item     | Description                                                                                                                                                                                                         | Unit | Qty |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|
| 2.1      | Supply and install transformer 200 kVA c/w main incomer, DB, cables. Cost also includes supply of metering and connection fees. Install steel cage on transformer for protection                                    | Lump | 1   |
| 2.2      | Mains incomer DB (pump house) c/w breakers and cables to connect to 3 pumping units                                                                                                                                 | No   | 1   |
| 2.3      | Supply and install 90 mm <sup>2</sup> 4-core SWA cable c/w accessories to connect from transformer and solar panels to the main incomer DB and breakers in the pump station                                         | m    | 150 |
| 2.4      | Install adequate internal pump house lighting and double 3-pin round plug sockets as directed by the Engineer. Install 200 W AC flood lights on all sides of the external walls                                     | Sum  | 1   |
| 2.5      | 55 kW Delta VSDs c/w protection unit and meter boards with cooling fans                                                                                                                                             | No   | 3   |
| 2.6      | 25 kVA transformer c/w metering unit and connection fees with all accessories included. Install steel cage on transformer                                                                                           | No   | 1   |
| 2.7      | 10 mm <sup>2</sup> 4-core SWA cable c/w accessories to connect pivot to mains. Include free-standing boxes with breakers and complete connections                                                                   | m    | 350 |
| <b>3</b> | <b>Pumping Units and Connections</b>                                                                                                                                                                                |      |     |
|          | <i>Supply, deliver, install, test and commission:</i>                                                                                                                                                               |      |     |
| 3.1      | 45 kW KSB Etanorm centrifugal pumps c/w motor (total discharge/unit = 150 m <sup>3</sup> /hr @ TDH 85 m) mounted on a base frame (2 duty point and 1 standby)                                                       | No.  | 3   |
| 3.2      | Supply and fit 500 mm steel suction/manifold (5 mm thickness) to connect to existing 500 mm steel outlet c/w gasket, bolts and nuts — refer to drawing                                                              | m    | 6   |
| 3.3      | Supply 300 mm steel pipe to be welded on the suction manifold c/w gate valve, eccentric reducer, bolts, nuts and gaskets                                                                                            | No   | 3   |
| 3.4      | Supply and fit 150 mm steel discharge pipes and fittings (NRV, concentric reducer, gate valves, 16-bar water pressure gauges, 1" air release valve and brass stop valve, bends) to connect to 300 mm discharge line | No   | 3   |
| 3.5      | Supply and fit 300 mm steel delivery manifold and fittings (bolts, nuts, gaskets)                                                                                                                                   | m    | 5   |
| 3.6      | Dewatering submersible pump with Q = 3 m <sup>3</sup> /hr and TDH = 40 m c/w control box, cables, 6 mm 4-core SWA electrical cable and connections, 90 mm C6 HDPE to discharge water out of the pump station        | No   | 1   |
| 3.7      | 75×75×5 mm angle iron supports for discharge pipes bolted into the ground and walls c/w 300 mm braces made of flat bar                                                                                              | Sum  | 1   |
| <b>4</b> | <b>Pump Station — Superstructure</b>                                                                                                                                                                                |      |     |
|          | <i>Supply, deliver, install, test and commission:</i>                                                                                                                                                               |      |     |
| 4.1      | Dewatering pump c/w fittings and flexible hose                                                                                                                                                                      | No   | 1   |
| 4.2      | 1.5 t chainblock to retrofit on existing gantry c/w chains and accessories                                                                                                                                          | No   | 3   |
| 4.3      | Excavate (widen) the intake sump and provide rip-rap as per Engineer's instruction (haulage within 5 km radius)                                                                                                     | Lump | 1   |
| 4.4      | Extractor fan as shown in drawing c/w accessories and cables                                                                                                                                                        | No   | 1   |

| Item     | Description                                                                                                                                                                                                       | Unit           | Qty |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|
| <b>5</b> | <b>Mainline</b>                                                                                                                                                                                                   |                |     |
|          | <i>Supply, install and commission (include trenching, levelling, backfilling):</i>                                                                                                                                |                |     |
| 5.1      | 300 mm steel 90° bend with 0.5 m flanged extensions c/w bolts and nuts to connect to existing 300 mm steel flange in pump station                                                                                 | No             | 1   |
| 5.2      | 300 mm steel pipe flanged c/w bolts and nuts                                                                                                                                                                      | m              | 18  |
| 5.3      | 100 mm scour valve on 300 mm steel pipe c/w accessories                                                                                                                                                           | No             | 2   |
| 5.4      | Thrust blocks to support 300 mm steel pipes as per Engineer's instruction                                                                                                                                         | m <sup>3</sup> | 1   |
| 5.5      | 300 mm VJ coupling c/w accessories                                                                                                                                                                                | No             | 1   |
| 5.6      | MPVC/UPVC pipe 315 mm, Class 10, from pump station to river crossing                                                                                                                                              | m              | 912 |
| 5.7      | 315 mm PVC bend, 22.5 degree, PN 10                                                                                                                                                                               | No             | 1   |
| 5.8      | 250 mm VJ coupling (river crossing)                                                                                                                                                                               | No             | 2   |
| 5.9      | 315/250 mm moulded PVC reducer                                                                                                                                                                                    | No             | 1   |
| 5.10     | 10-inch galvanised steel pipe, 5 mm thickness                                                                                                                                                                     | m              | 12  |
| 5.11     | MPVC/UPVC pipe 250 mm, Class 9, from river crossing to command area as pumping/rising main                                                                                                                        | m              | 324 |
| 5.12     | 250 mm C6 PVC pipe                                                                                                                                                                                                | m              | 424 |
| 5.13     | 250/200 mm PVC reducing tee, plain                                                                                                                                                                                | No             | 1   |
| 5.14     | 250/200 mm PVC moulded reducer                                                                                                                                                                                    | No             | 1   |
| 5.15     | 200 mm PVC 45° bend                                                                                                                                                                                               | No             | 1   |
| 5.16     | 200 mm PVC C6 pipe                                                                                                                                                                                                | m              | 410 |
| 5.17     | 200 mm PVC tee, plain                                                                                                                                                                                             | No             | 3   |
| 5.18     | Thrust blocks as per Engineer's instructions                                                                                                                                                                      | m <sup>3</sup> | 6   |
| 5.19     | 250 mm PVC tee                                                                                                                                                                                                    | No             | 1   |
| 5.20     | 250 mm VJ couplings                                                                                                                                                                                               | No             | 2   |
| 5.21     | 250 mm × 1.0 m steel short piece, flanged one end                                                                                                                                                                 | No             | 2   |
| 5.22     | 250 mm gate valve c/w accessories                                                                                                                                                                                 | No             | 1   |
| 5.23     | 1.5 × 1.5 × 1.5 m valve box with cover (valve box to be constructed as 9" cement brick wall, plastered, with concrete (M20) split cover, 50 mm reinforced concrete with mesh wire c/w handles) — refer to drawing | No             | 2   |
| 5.24     | 250×200 PVC reducer                                                                                                                                                                                               | No             | 1   |
| 5.25     | 200 mm VJ couplings                                                                                                                                                                                               | No             | 2   |

| Item     | Description                                                                                     | Unit | Qty  |
|----------|-------------------------------------------------------------------------------------------------|------|------|
| 5.26     | 200 mm × 1 m steel pipes, flanged on one side                                                   | No   | 2    |
| 5.27     | 200 mm gate valve c/w accessories                                                               | No   | 1    |
| 5.28     | MPVC/UPVC pipe 200 mm, Class 6, from T1                                                         | m    | 500  |
| 5.29     | 200 mm long-radius moulded elbow                                                                | No   | 3    |
| 5.30     | 200×4" clamp saddles                                                                            | No   | 4    |
| 5.31     | 200×160 mm moulded reducer, PVC                                                                 | No   | 1    |
| 5.32     | 160 mm PVC C6 pipe                                                                              | m    | 220  |
| 5.33     | 160×125 PVC moulded reducer                                                                     | No   | 1    |
| 5.34     | 2" ARV c/w riser, saddles 315/250/200 and valve chamber                                         | No   | 4    |
| <b>6</b> | <b>Infield System</b>                                                                           |      |      |
|          | <i>Supply, install and commission all fittings (include trenching, levelling, backfilling):</i> |      |      |
| 6.1      | 200×3" clamp saddles                                                                            | No   | 6    |
| 6.2      | 125 mm×3" male PVC VSP                                                                          | No   | 6    |
| 6.3      | 125 mm butterfly valve c/w fittings to connect on 125 mm PVC pipe                               | No   | 6    |
| 6.4      | 125 mm PVC end cap                                                                              | No   | 8    |
| 6.5      | 125 mm×2.5" clamp saddles                                                                       | No   | 40   |
| 6.6      | 125 mm C6 PVC pipe                                                                              | m    | 1100 |
| 6.7      | 2.5" × 1.2 m GI riser pipe                                                                      | No   | 40   |
| 6.8      | 2.5" screw-on valve tops                                                                        | No   | 40   |
| 6.9      | 2.5" VCE                                                                                        | No   | 20   |
| 6.10     | 63 mm QC elbows                                                                                 | No   | 30   |
| 6.11     | 63 mm QC stop ends                                                                              | No   | 50   |
| 6.12     | 63 mm QC tee                                                                                    | No   | 30   |
| 6.13     | 63 mm × 1" QC saddle                                                                            | No   | 750  |
| 6.14     | 63 mm QC plain pipes                                                                            | No   | 1500 |
| 6.15     | 33 mm C16 1" × 1.2 m PVC riser pipe                                                             | No   | 750  |
| 6.16     | 1 × ¾" nylon reducer socket                                                                     | No   | 750  |
| 6.17     | ¾" sprinkler, 4 mm single nozzle, 5035 nozzle                                                   | No   | 750  |
| 6.18     | Thread tape and solvent cement etc.                                                             | Lump | 1    |

| Item     | Description                                                                                                                                                                                                                                          | Unit           | Qty |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|
| 6.19     | 0.6×0.6×0.8 m valve box (to be constructed as 4.5" cement brick wall, plastered, with 50 mm cover of reinforced concrete (M20) c/w handles) — refer to drawing                                                                                       | No             | 8   |
| 6.20     | 160×2.5" clamp saddles                                                                                                                                                                                                                               | No             | 3   |
| <b>7</b> | <b>Pivots (Supply and Fit)</b>                                                                                                                                                                                                                       |                |     |
| 7.1      | P1 — 30 ha complete centre pad, connections, ARV, butterfly valve, 2.5-bar pressure regulator. Control box to be secured in lockable steel cage made with 30×30×3 mm angle iron bars. 200 W flood light to be installed on centre pivot for security | No             | 1   |
| 7.2      | 160 mm end hydrant and steel manifold to connect centre pivot from mainline                                                                                                                                                                          | Lump           | 1   |
| <b>8</b> | <b>Conservation Works</b>                                                                                                                                                                                                                            |                |     |
| 8.1      | Gabion wire mesh, 2.4 m × 5.6 m × 200 mm × 200 mm                                                                                                                                                                                                    | Sheets         | 30  |
| 8.2      | Tying wire, 2.5 mm                                                                                                                                                                                                                                   | kg             | 20  |
| 8.3      | Deformed bars, 6 m × 16 mm                                                                                                                                                                                                                           | No             | 5   |
| 8.4      | Volume of stones/boulders (haulage within 10 km radius)                                                                                                                                                                                              | m <sup>3</sup> | 30  |

In addition to pricing and executing the BOQ above, the Contractor shall implement the Environmental and Social Management Plan (ESMP) activities for the project. The cost of ESMP implementation is fixed and reimbursable, and shall be itemised separately from the item-rate BOQ.

## CONSTRUCTION DRAWINGS

The following drawings, prepared as part of the Gororo 2 Engineering Design Report, are attached as separate documents and form an integral part of this ITB: the topographic layout showing the pivot circle and Blocks A–E; the pump station and abstraction arrangement drawing; the mainline profile; and the gabion structure design drawing for gully control. See Drawings attached as Annexure C.

## ENGINEERING DESIGN REPORT

The Gororo 2 Irrigation Project Engineering Design Report (Department of Irrigation Development, May 2026) sets out the design basis, hydraulic and power calculations, and system layout summarised in Part B1 above, and shall be read together with this Scope of Works. See Engineering Design Report attached as Annexure F.

## ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Contractor shall comply with the environmental and social safeguards for the project as detailed in the project Environmental and Social Management Plan (ESMP), including measures relevant to the river/stream crossing, the gully-erosion area, and vegetation clearance for the pivot and pipeline route. The Contractor shall implement the ESMP activities for the project; the cost of implementation is fixed and reimbursable. See ESMP attached as Annexure D.

## SAFETY, HEALTH AND WELFARE ON CONSTRUCTION SITES — MANUAL

Refer to the ILO Guidelines on Safety, Health, and Welfare on Construction Sites, attached as Annexure E. Bidders shall not submit a copy of the Safety Manual with their bid. Only the successful bidder shall print and provide UNDP with a hardcopy of the Safety Manual, duly acknowledged (signed/stamped), upon contract signature.