MRC Gambia

Employer's Requirements

1.00 Preamble

MRC Gambia (MRCG) requires a new single storey building/modular building to be constructed as their primary data centre. Once the new data centre is completed, the existing data centre on the site will become a secondary/DR facility. The new facility is to be located at:

Medical Research Council Unit
The Gambia
Atlantic Boulevard
Serrekunda
Gambia

2.00 Key Requirements

Due to the project location and requirement for a resilient data centre solution, our preferred construction method would be for a single storey prefabricated style solution, with minimal site installation works required. The tenders should have demonstrable track record with working on data centres internationally.

Tender should be aware that the local climatic condition includes periods of heavy localised rainfall and this must be accommodated within the facility design to avoid the collection of rain water during partially heavy rainfall in rainy seasons.

The external finish of the facility shall be smooth to blend in with the existing surrounding buildings with options for a variation of finishes. The main entrance to the facility shall be level or provided with a ramp to allow equipment to be wheeled to its final location within the data centre.

The data centre facility shall provide construction with the following internal areas:

Separate Data Centre IT Cabinet Room
Separate UPS and Battery Location

Please Note: we expect the bidder to propose the most cost efficient solution.

The facility shall be provided with the minimum room sized as detailed above with the equipment layout in accordance with the Data Centre Code of Conduct. Your design must allow for $\geq$ 1200mm clearance to the front of the IT equipment racks and all associated UPS equipment, the rear of all IT rack locations shall have a minimum of $\geq$ 1100mm. All maintenance and access routes shall have a full 1200mm of clearance for access, with all doors having a minimum 2.2mtr height clearance and minimum clear opening of 900mm.

Power and data supplied to each rack shall be installed within separate zones i.e. power under floor and data cabling overhead.

Power and Cooling shall be provided to each rack position to support up to 10kW any one rack.

For the avoidance of doubt, it is proposed that the tender for the works and the implementation contract will be let on a full Design and Build basis. The appointed Principal Contractor will be expected to carry out all elements of the design, approval, health & safety, management, implementation, testing, commissioning and handover processes, required to deliver a current best practice data centre containing all the elements referred to hereinafter, suitable for the installation location.

The MRC requires that the design will include for use of energy saving technologies, wherever possible, and requires a demonstrable PUE of below 1.6, with an aspirational PUE of between 1.20 and 1.45. Within their submission, tenders should include predictive calculations showing the expected PUE for their design at 50% IT load and 100% IT load.

Note MRC Gambia will not accept a cooling solution based on direct external fresh air unless suitable external air filtration and air attemperation is provided to deliver air quality humidity control. Filtration shall consist of a minimum of G2 cleanable pre-filters with replaceable final G4 filtration.

The facility resilience should be provided as follows:

IT Cabinet Power	N+N
Cooling	N+1
UPS	N+1

As part of their submission, tenders should submit a detailed proposal document that describes each element of their design, which will be as a minimum of each element of the contract sum analysis.

Proposed Data Centre Location

3.00 Construction & Building Works

3.01 The proposed area available for construction for the data centre is pictured above.

3.02 Tender submissions should include a 2d space plan layout drawing showing how the tendering contractor will allocate space to the following elements:

- IT enclosure area to include the following requirement:
  - Day 1 - 4 x 600 wide x 1200 deep x 42u high IT enclosures, 2 x 800 wide x 1200 deep x 42u high IT enclosures
  - Day 2 - IT enclosures expansion to accept an additional 2 IT enclosures, size 600 wide x 1200 deep x 42u high
  - 8 Rack Positions in total
- The IT enclosure space should show any climate control elements required
- Space(s) for UPS, electrical switch gear, fire suppression bottles and the like
- Any external plant areas
- Access doors configuration
- Fire escape strategy

3.03 The IT enclosure area and electrical switch area should have a minimum fire resistance of 60min for both fire egress and ingress.

3.04 The floor finish to all technical areas should be anti-slip and anti-static.

3.05 Inclusions should be made within your proposal for the production of detailed design for any ground works, civil engineering, ducts and any associated external builders' works required to complete the project. These works will be carried out by the MRC local contractors, in accordance with the tender's design.

3.06 Access to the new structure should be step free.

3.07 The IT enclosure area and electrical switch area should be constructed to provide a clean room environment, wall surfaces should be "easy clean" and require no future decoration.

4.00 Electrical

4.01 The tenderer will be responsible for the detailed design of the electrical services installation, in accordance with UK IEE regulations BS7671 and MRC facility specifications.

4.02 A new dedicated power supply for the data centre facility and associated areas shall be derived from the existing main LV switch panel within the main building - we currently anticipate the size to be at 300A TPN 230/400v 50Hz. The MRC will lay this cable between the two locations for the successful contractor to make final terminations and testing.

4.03 The Day 1 requirement is for the support of 40kW of IT load, with the ability to expand the facility to 80kW of IT load without any disruption, or disconnection of the IT equipment deployed after the delivery of the Day 1 facility.

4.04 All electrical distribution panels shall be provided with a three phase power metre to allow for the calculation of the total facility load and IT load. Each panel shall be provided with transient voltage surge suppression.

4.05 IT enclosures will be supported with 2 x separate 32A TPN power supplies - one fed via UPS and generator and the other generator protected only, allowing the deployment of IT equipment load up to 10kW per rack.

4.06 The UPS should be of a modular design providing N+1 redundancy, the batteries shall have a minimum autonomy to allow a generator to start and switch to on load, the UPS system shall be provided with a facility to maintain the UPS without disruption to the IT load. A minimum of 10min battery is required.

4.07 The whole of the tender's Day 2 design (IT load and facilities load) is to be supported by a suitably sized prime power diesel generator solution to be provided by MRCG. An auto transfer switch is to be provided by the tenderer within the data centre to switch the facility to automatic generator support should the mains power supply fail.

4.08 The tenderer should allow for all sub-circuits necessary to support any other equipment (other than IT enclosures) within their submission to include, but not limited to: cooling systems, 4 x 13amp double switched socket outlets (for cleaner's/sundry use), access control, fire suppression, fire alarms, intruder alarms, CCTV cameras and the like.

4.09 The tender submission should include for all electrical equipment main earth bonding, cross bonding and equipotential earth bonding, which will include a separate earth bond to each of the Day 1&2 IT enclosures.

4.10 Tenderers should include within their submission an electrical schematic of their proposed design.

4.11 All elements of the electrical system must be clearly labelled for identification.

4.12 The tenderer should allow for all builders' work and making good necessary in connection with the electrical system installation.

5.00 Lighting

5.01 The tender submission should include for the design of a general lighting and emergency lighting installation in accordance with BS5266-1 19910.

The general lighting should provide a minimum of 400LUX at 1m from the floor finish and must be based on LED technology.

Any separate emergency lighting luminaires should be LED with directional pictograms, where required.

The lighting should be controlled as follows:

Proximity switches
Manual override for maintenance

5.02 Local emergency lighting test key switches shall be provided within each location to carry out emergency lighting testing without affecting any other services.

5.03 External LED flood lighting shall be provided to the entrance elevation, operated by a dusk dawn control along with programmable off time and PIR switching.

5.04 Tenderers should include within their submission 2d layout drawing of their proposed lighting and emergency lighting design.

5.05 The tenderer should allow for all builders' work and making good necessary in connection with the lighting installation

6.00 Cooling

6.01 The tender should allow to fully design and install a climate control solution to support the Day 1 IT load of 45kW with the ability to support Day 2 IT of 70kW at N+1 redundancy. The design should be highly resilient and provide full N+1 redundancy for all items, but include for as much 'free' cooling as possible. This should be either air to air, air to liquid or direct 'fresh' air cooling solution.

For the avoidance of doubt the whole of the cooling solution Day 2 load should be installed at Day 1.

6.02 **Note** MRC Gambia will not accept a cooling solution based on direct external fresh air, unless suitable external air filtration and air attemperation is provided to ensure air quality and humidity. Filtration shall consist of G2 cleanable pre-filters with replaceable final G4 filtration. At project handover, two full sets of replacement filters are to be provided.

6.03 The tender submission should show the cooling elements on a 2d layout drawing and be described in detail within the submission, including cooling for the UPS equipment.

6.04 Filtered fresh air ventilation should be provided to the IT enclosure area, electrical switch area. Any fresh air system must be linked to the fire suppression system and close on first detection of fire.

6.06 All elements of the cooling system must be clearly labelled for identification.

6.07 The tenderer should allow for all electrical and builders' work and making good necessary in connection with the cooling system installation.

7.00 Fire Detection and Suppression

7.01 The following areas should be covered by a double knock fire detection and alarm system which will be connected to an inert gas fire suppression system. Each area should be fitted with a 'hold off' button at the exit door. Good practice should be used when designing the location of the gas cylinder store. The installation will be in accordance with BS5839, BS6266 and BS7273

IT enclosure area
Electrical services area

7.02 All elements of the fire alarm and gas suppression system must be clearly labelled for identification, bells, sounders, panels, cylinders, hold off buttons and the like.

7.03 The tenderer should allow for all electrical and builders' work and making good necessary in connection with the cooling system installation.

7.04 Allow for a mechanical means to extract the suppression gas following activation and ventilate the suppression gas to the atmosphere.

7.05 The tenderer should allow to install a high sensitivity smoke detection system such as VESDA to the IT enclosure room, in addition to the double knock fire detection system.

Note: Any smoke detection system will not be able to activate the gas fire suppression system.

8.00 Access Control

8.01 Entrance doors to the main entrance, IT enclosure area, electrical services area, are to be controlled via Paxton Net 2 access control system as installed within the rest of the MRC Gambia site complete with Card and Pin entry readers.

8.02 20no. access control key fobs shall be provided with the security solution.

8.03 The tenderer should allow for all electrical and builders' work and making good necessary in connection with the access control system installation.

9.00 Security & Environmental Monitoring

9.01 Allow for the design and installation of 2 x IPCCTV cameras to be strategically located within the enclosure in consultation with MRC Gambia.

9.02 Allow for the design and installation of an environmental monitoring system (EMS) to provide remote monitoring and alerting via a LAN connection to provide email alerts. The system shall monitor 6 temperature sensors and humidity sensors within the Data Centre and UPS room. Fault signals of all major plant items shall be monitored.

9.03 Leak detection system should also be included at each cooling unit outlet.

9.04 The tenderer should allow for all electrical and builders' work and making good necessary in connection with the IPCCTV and EMS system installation.

9.05 OPTIONAL COST: Supply and installation of a data centre infrastructure monitoring system to provide a single point web based monitoring solution for all native SNMP devices, Modbus, non-native SNMP devices and volt free relay outputs. The following equipment shall be monitored:

- Cooling and Ventilation Equipment
- UPS Systems
- Mains Power Distribution
- IT Enclosure iPDUs
- Fire Detection System
- Smoke Detection System
- Environmental Monitoring
- Generator

10.00 IT Enclosures & PDUs

10.01 The following IT enclosures are to be supplied and fully installed within the designated area, including side panels as required, any aisle containments, as required by the design, cable management trays, baying kits and the like.

Note: IT enclosures should be fitted with full U space blanking for Level 4 commissioning and Level 5 IST and fitted with single U space blanking on completion of IST and removal of load emulators.

IT enclosures are to be by a recognised manufacturer, who should be named in the tenderer's submission.

10.02 The IT enclosure is to be arranged in a hot and cold aisle configuration and designed to ensure the two air temperatures are physically separated by an air containment system.

10.03 Data cabling containment shall be provided to allow sufficient cable interconnection between each rack location, with space for future expansion.

10.04 6x 600 wide x 1200 deep x 42u high IT Server enclosures.
2 x 800 wide x 1200 deep x 42u high IT Network enclosures.

10.05 The tenderer should allow for 2 x 32A rated power distribution units per IT enclosure (16no. in total). These should be configured with 18 x C13 and 6 x C19 outlets. Each PDU should be fitted with a digital ammeter for local power reading per rack and capable for remote strip level power monitoring via SNMP including any necessary software.

10.06 An optional cost (outside of the contract sum analysis) to install 'intelligent' IT enclosure power distribution units, including any software necessary, to provide strip and socket monitoring and switching.

11.00 Data Cabling

11.01 Tenderers should include for the following copper data cable interconnects between data centre IT enclosures:

- From each server rack. 24no. Cat 6 cables to each Network. Rack 48 cables in total per server rack. Terminating each end to a RJ45 Patch Panel.

11.02 Tenderers should include for the following fibre data cable interconnects between data centre IT enclosures:

- From each server rack. 1 x 12 core OM3 fibre to each network Rack. 2no. 12 core fibres in total per server rack. Termination of fibre cables to the fibre patch panels with termination type TBC.
- Between each of the 2 x network cabinets, 2 x 24 core OM2 fibre cables. Termination of fibre cables are to be to fire patch panels with termination type TBC.

11.03 Tenderers should include for the following fibre data cable containment for two room entry points for future interconnects between the new data centre and the existing data centre locations.

12.00 Start Up, Commissioning and IST

12.01 The data centre solution facility shall be provided with full equipment testing and IST testing carried out as detailed below.

12.02 Prior to any equipment start up, the IT facility shall be fully cleaned to ensure any construction debris does not contaminate the operation equipment, with a final deep clean of the facility prior to project handover.

12.03 No equipment start-ups shall be carried out before the full facility has been technically cleaned.

12.04 All levels of testing shall be suitably documented.

12.03 Allowance should be made for Level 3 component testing, manufacturer's start-up of all installed equipment, including, but not exclusively, cooling system(s), LV distribution, UPS, generator, lighting, small power, access control, security systems and the like.

12.04 Allowance should be made for Level 4 systems testing and commissioning with IT load emulation installed to the IT enclosures, all installed equipment including, but not exclusively, cooling system(s), UPS, generator, access control, security systems and the like.

12.05 Allowance should be made for Level 5 integrated system testing (IST) with IT load emulation installed to the IT enclosures, all installed equipment including, but not exclusively, cooling system(s), UPS, generator, access control, security systems and the like, with complete testing of full facility operation together and one system and testing of all failure scenarios.

12.06 Onsite training shall be carried out for the MRC IT and Facilities staff to provide education on the facilities systems operation, redundancy, maintenance and housekeeping.

Levels of Data Centre Test & Commissioning Principles		
Level One	Planning Level	This level deals with the preparation for commissioning and includes: safety, teams, resources, existence of sequence of operations, scripts for commissioning, and the overall adequacy of tests to various components.
Level Two	Factory Test	This level deals with the preparation for commissioning and includes: safety, teams, resources, existence of sequence of operations, scripts for commissioning, and the overall adequacy of tests to various components.
Level Three	Component Testing	This level focuses on: system installation and completion of work in accordance with all specifications, availability of utilities' inspections, completion of site acceptance tests (SAT) and the overall readiness for functional testing.
Level Four	Systems Testing	This level is where commissioning ends for most data centres advertising their ability for "phased expansion" and deals with: testing to spec performance per component and related/redundant components, and calibration and metrics verification.
Level Five	IST Testing	This level is the ultimate "Reality Check" test for mission critical data centres. At this level, all systems are operated at full load to ensure that all components work together as required and also that all systems operate as intended in all possible failure scenarios. Only by completing this level of commissioning can a customer be assured that their facility operates as intended in all of its functional modes.

13.00 Contract Management and Preliminary Costs

13.01 Tenderers should allow for the following contract management and preliminary costs:

- All design and design drawings
- Approvals and approval costs, including any Building Control and/or Local Authority approvals
- Site set up
- Specifications, schedules, project plans and registers
- Small tools, plant and access plant
- Hutting and welfare facilities
- Temporary works
- Protection of existing/new works and the building fabric
- Site management including site registers, inductions and supervision
- Project management, generally including cost control and variation management
- Minimum 1 x weekly site meeting with MRC
- Minimum 1 x weekly project report by the Principal Contractor's Project Manager

14.00 Health & Safety and O&M Manuals

14.01 Tenderers should allow for the following costs associated with health & safety:

- Provision of a Pre-Construction Phase Plan, Construction Phase Plan, Planning Supervisor function and HSE notification
- Development of site inductions and tool box talks
- RAMS
- Site directional and health & safety signage
- Site audits
- Any near-mis reports
- Maintenance of the Health & Safety file
- Full operating and maintenance manuals on completion

15.00 Ongoing maintenance

15.01 Tenderers should submit their proposals and costs for ongoing planned preventative maintenance of the facility and after care fully supported by the equipment manufacturers as an option. This should be provided separately and be broken down as follows:

- Year 1
- Year 2

15.02 Maintenance costs shall form a separate contract, to be agreed during the construction phase.

15.03 Items covered by the PPM scheduled maintenance shall consist of the following, but not limited to:

- Electrical inspection and thermal imaging inspection
- UPS System
- Cooling System
- EMS System
- Fire Suppression System

15.04 Within their proposal, the tenderer should include a proposal for emergency call out and details of costs and response times for emergency callout for the data centre operation's critical equipment.