

Secretariat of the South Miladhunmadulu Atoll Council
Boduthakurufaanu Magu, N.Manadhoo 04100, Maldives

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Noonu Atoll GNSS & CORS Surveying System

Terms of Reference

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A. Introduction

Noonu Atoll Local Authority Company Limited a wholly owned by Noonu Atoll Council and was established in 2023 to coordinate, manage, operate and oversee the development and implementation of key projects aligned with the council's strategic priorities, focusing on natural resource conservation, digitalising local governance, building circular economy, supporting micro enterprises and building resilient communities across the Atoll.

B. Project Background

The Company aims to integrate a robust surveying system to GPS, GIS and citizen centric governance system that provides a reliable, sustainable and efficient mechanism for land use planning and infrastructure development in the Atoll. This will help the Company and its stakeholders in more accurate land mapping, data collection, better natural resource management and sustainable infrastructure development. We are seeking proposals from qualified and experienced service providers to provide and maintain a surveying system under a partnership model to support our land use planning and infrastructure development in Noonu Atoll.

For more information on background of this project please refer to Appendix B.

C. Scope of work

The service involves provision, installation, operation and maintenance of a GNSS & CORS-based surveying system at Noonu Atoll Council for a minimum 10 years. This system shall support high precision land mapping, infrastructure planning and environmental monitoring. Below are the key responsibilities:

1. Establish a Continuously Operating Reference Station (CORS) on the council premises.
2. Provide and install a GNSS receiver, including Base + Rover / Net Rover:
 - I. A minimum operational coverage of 25 km from the council office.
 - II. Compliance with the specifications provided in *Appendix B*
 - III. Integration with the Company's GIS, GPS and other relevant applications.
 - IV. Setup of data-sharing mechanisms for the Company's operations and approved external users.
3. System Operation & Maintenance
 - I. Ensure uninterrupted operation, including remote monitoring, firmware updates and troubleshooting as necessary.
 - II. Conduct routine maintenance, calibration and servicing to maintain system accuracy on a regular basis and/or when required.

- III. Provide technical support to the Company when required, train the staff on system operation, utilisation including GIS workflows.
- IV. Provide equipment training and workflow familiarisation, including integration of imagery (satellite, drones etc...), baseline survey maps and CAD files into GIS software.

For detailed technical specifications, refer to *Appendix C*.

D. Deliverables

The contractor must provide:

- 1. A fully installed and operational surveying system with all required equipment at the council premises as per the specification.
- 2. A Handheld GPS system
- 3. Hands-on training and user manuals.
- 4. Support services for the duration of the engagement.

E. Partnership model

The Company and the service provider will share access to the system under an agreed framework. If external entities or third parties pay either the Company or the service provider to use the system, the revenue shall be shared between the Company and the service provider. A separate framework agreement will define the roles and responsibilities, revenue sharing terms and conditions.

The Company will provide the necessary space for the system on the council premises at no rental cost to the service provider. However, the Company shall not bear any costs related to the installation and maintenance of the system. The only payment the Company will make is the service fee which shall include support and training.

The following aspects must be agreed and documented:

- 1. Revenue sharing agreement which specifies the percentage of revenue (equal), mechanism for invoicing, financial reporting, payment timelines and dispute resolution procedures.
- 2. Roles and responsibilities of the Company and the service provider regarding operation, maintenance, access rights and resource allocation.
- 3. Usage and access policy detailing criteria for approving third party usage of the system. *Council is not considered a third party.*
- 4. Operational framework agreement detailing a governance structure, compliance mechanisms, review and amendment procedures.

F. Scoring Criteria

Proposals will be evaluated based on the following criteria:

	Criteria	Weightage
A	Price	70%
B	Experience	30%

A. Price: Price evaluation will follow a competitive benchmarking method where the lowest bid will be used as a reference for scoring all other proposals. The formula to calculate the price score is:

$$\text{Price score} = \left[\frac{\text{lowest bid}}{\text{Bidder's price}} \right] \times 70$$

Bidders must provide an all-inclusive fee, including the total cost and applicable taxes, with an itemised breakdown of fees for the full duration of the engagement:

- Support and training fee
- Service fee

B. Experience: Points will be awarded if the applicant can prove the successful completion of similar projects and/or has necessary experience to undertake the consultancy through reference letters and/or work portfolio. If the applicant has not had undertaken similar contract work in the past, relevant work experience in a similar field will also be considered. Each letter gets 15 points.

Experience letters must be issued by *registered* and *verifiable* organisations that were *operational* at the time of project completion. Reference letters may be rejected if credibility cannot be established or if supporting documents are not sufficient.

The reference letters must include the following information:

- Project name, description and location
- Applicant's role and responsibilities
- Project duration and completion date
- Scope and scale
- Contact details of a referee for verification

G. Documents required

- Bid Submission Form in *Appendix A*
- Evidence of previous work / reference letter(s)
- Tax clearance certificate
- Business registration certificate

The proposal must remain valid for a minimum of 90 days.

H. Submission

#	Activity	Deadline	Details
1	Registration	Opens: 20 th Feb 2025 at 1400 hrs Closes: 24 th February 2025 at 1300 hrs	Interested parties must register for the tender via provided link Only registered parties will be invited to the information session, which is mandatory .
2	Information Session	25 th February 2025, 1400 hrs	Information session will be held via Teams
3	Response to Queries	26 th February 2025, 1400 hrs	All unanswered queries from the information session will be addressed by this deadline.
4	Bid Submission	1 st March 2025, 1400	Bid submissions will take place online
5	Notification of Selection	5 th March 2025, 1400	A score sheet will be sent to all applicants, notifying the selected party.
6	Complaints & Appeals	8 th March 2025, 1400	Deadline for complaints and appeals submission.
7	Awarding of Contract	10 th March 2025	If no complaints are received, the contract will be awarded on or shortly after this date.

I. Appendices

Appendix A – Bid Submission Form

Appendix B – Project Background Information

Appendix C – Technical Specifications

Appendix A

Proposal Submission Form

Project Title	Establishing CORS Surveying System in Noonu Atoll Launch of Noonu Atoll GNSS & CORS Surveying System
Applicant Name	
Contact Number	
Email	

A- Price Breakdown

Applicants must provide a detailed itemized breakdown of costs for each deliverable. The total price should be inclusive of all costs and taxes.

#	Deliverables	Price (MVR)
1	Fully operational GNSS & CORS surveying system with all necessary equipment.	
2	handheld GPS system for local operations	
3	Training sessions and user manuals for staff	
4	Support services including remote monitoring, troubleshooting, and firmware updates.	
	TOTAL	

B- Declaration

I confirm that all the information provided in this submission is accurate and complete. I understand that any misrepresentation may result in disqualification.

Name	Signature	Seal/Official Stamp	Date

APPENDIX B

USE OF CONTINUOUS OPERATING REFERENCE SYSTEM AND ROVERS FOR LAND MANAGEMENT

The CORS (Continuously Operating Reference Station) network is a GPS reference station system that offers precise and dependable positioning data for diverse applications. This network is widely employed by professionals in surveying, mapping, construction, transportation, and other industries. The CORS reference network is a system of GPS reference stations that are strategically placed throughout a specific area. These stations are equipped with high-precision GPS receivers and antennas that continuously collect and process GPS data. The data is then transmitted to a central processing facility where it is used to provide real-time, accurate positioning information for a variety of applications.

The CORS reference network is operated by government agencies and private companies and is typically used to support a wide range of applications, including surveying and mapping, construction, transportation, and other industries. The network functions by collecting and processing GPS data from a network of high-precision GPS receivers and antennas. These receivers and antennas are located at various points throughout a specific area and are used to continuously collect and process GPS data. The data is then transmitted to a central processing facility where it is used to provide real-time, accurate positioning information.

The CORS reference network utilizes a technique called differential correction to provide accurate positioning information. This technique involves comparing the GPS data collected by the reference stations with the data collected by the GPS receiver on the user's device. Any errors or inaccuracies in the data are then corrected, resulting in a more accurate position.

APPLICATIONS

The CORS reference network is utilized by various industries, including surveying and mapping, construction, transportation, and others. Surveying and mapping professionals use the CORS reference network to obtain accurate and reliable positioning data for their projects, which is then used to create maps, topographic surveys, and other types of geospatial data. Construction companies also rely on the CORS reference network to ensure that buildings and other structures are constructed in the correct location and are level and plumb. The transportation industry uses the CORS reference network to provide accurate and reliable positioning data for their vehicles and equipment, which is then used to ensure that they are in the correct location and to provide real-time information about traffic conditions and other essential information. Additionally, other industries, such as agriculture, mining, and utilities, use the CORS reference network to obtain accurate and reliable positioning data for their operations.

The CORS reference network is utilized by various industries, including surveying and mapping, construction, transportation, and other sectors. Surveying and mapping experts use the CORS reference network to obtain precise and dependable positioning data for their projects. This data is employed to generate maps, topographic surveys, and other types of geospatial data. In the construction domain, companies use the CORS reference network to obtain accurate and

reliable positioning data for their projects. This data is employed to ensure that buildings and other structures are erected in the appropriate location and are level and plumb. The transportation industry employs the CORS reference network to obtain precise and dependable positioning data for their vehicles and equipment. This data is used to ensure that vehicles and equipment are in the correct location and to provide real-time information about traffic conditions and other critical information. The CORS reference network is also employed by other industries, such as agriculture, mining, and utilities, to obtain accurate and reliable positioning data for their operations.

ADVANTAGES OF CORS REFERENCE NETWORK

The CORS reference network offers several advantages over traditional GPS systems. One of the main benefits is its high level of accuracy. The CORS reference network employs high-precision GPS receivers and antennas, which can provide accurate positioning information within a few centimeters. This level of accuracy is crucial for many applications, including surveying and mapping, construction, and transportation.

Another advantage of the CORS reference network is its real-time capabilities. The system can provide real-time positioning information, which is essential for applications such as transportation and construction. This enables users to make quick and accurate decisions based on the most current information.

The CORS reference network also provides a wide coverage area. The network of reference stations is strategically placed throughout a specific area, allowing users to access accurate positioning information from almost anywhere within that area. This is particularly useful for industries such as construction, where precise positioning information is necessary for large projects that cover a wide area.

Lastly, the CORS reference network is relatively cost-effective. The system is operated by government agencies and private companies, which means that users do not have to invest in expensive equipment or pay for costly data subscriptions. This makes the CORS reference network an affordable option for many industries.

LIMITATIONS

Despite its many advantages, the CORS reference network does have some challenges and limitations. One of the main challenges is the requirement for a clear line of sight between the GPS receiver and the reference stations, which can be problematic in areas with tall buildings or trees that may obstruct the signal. Another limitation is that the CORS reference network is only available in specific areas, as it is operated by government agencies and private companies, which means that it is not accessible in all regions. This can be a problem for industries operating in remote or rural areas. Finally, the CORS reference network may be affected by interference from other sources, such as radiofrequency interference (RFI) or ionospheric disturbances, which can cause errors in the positioning data and affect the accuracy of the system.

APPENDIX C

CORS Station Specifications

- Establishment of a **Continuously Operating Reference Station (CORS)**, only if a CORS is currently not operated within 50km from the island/site
 - Provide the hardware required for the establishment CORS
 - Maintenance of CORS station and ensuring uninterrupted service.
- Key features
 - GNSS Receiver
 - ⑩ 624 Channels
 - ⑩ GPS, GLONASS, Galileo, BeiDou, SBAS, QZSS
 - ⑩ Network RTK with Horizontal: 10 mm + 0.5 ppm RMS, Vertical: 15 mm + 0.5 ppm RMS
 - ⑩ Less than 10 seconds initialisation time for RTK with greater than 99% reliability
 - ⑩ Capable of operating minimum of 2 casters streams
 - ⑩ Remote connectivity over internet
 - ⑩ Remote maintenance and updates
 - ⑩ Internal battery with greater than 12 hours of operation on battery
 - ⑩ Internal sim card slot with 4G connectivity
 - ⑩ RS-232, USB and LAN ports with simultaneous transmission of multi data streams
 - ⑩ Correction formats: RTCM2.x, RTCM 3.x, APIS
 - ⑩ Internal Storage greater than 20 GB and external storage expansion
 - ⑩ Bluetooth and WI-FI with AP mode
 - ⑩ Internal UHF radio
 - GNSS Antenna
 - Choke ring (Radome)
 - Tracking
 - ⑩ GPS L1 + L2 + L5
 - ⑩ GLONASS L1 + L2 +L3
 - ⑩ BDS B1, B2, B3
 - ⑩ GALILEO E1, E5A, E5B, E6
 - ⑩ SBAS
 - IP67 waterproof and dustproof, protected from temporary immersion to depth of 1 m

GNSS Receiver Specifications:

GNSS Receiver shall include Base + Rover or Net Rover (CORS correction).

- Key features:
 - 1408 channels
 - GPS, Galileo, QZSS, SBAS, GLONASS, BeiDou, NavIC/IRNSS.
 - 8 mm horizontal and 15 mm vertical accuracy on RTK
 - 3 mm horizontal and 5 mm vertical accuracy on PPK
 - 2.5 mm horizontal and 5 mm vertical accuracy on post-processing static
 - Less than 1 second signal re-acquisition
 - Less than 45 seconds time to fix from a cold start
 - 200 Hz IMU with 60-degree tilt
 - 95° wide-angle cameras
 - CAD+AR stakeout
 - 2m drop resistant
 - More than 15 hours of battery life
- Hardware
 - Lightweight- less than 500 g
 - Small physical footprint – smaller than 120 mm x 60 mm
 - Operates at temperature up to 65 Degrees Celsius and 100% humidity
 - IP68 water and dust resistant
 - Protection from temporary immersion to depth of 1 m
 - Survive 2-m pole drop
 - Calibration-free IMU for pole tilt compensation.
 - Immune to magnetic disturbance
 - E-bubble levelling
 - Dual Camera
- Communication
 - sim card with integrated 4G modem
 - Wi-Fi with internet sharing over access point mode
 - Bluetooth
 - UHF antenna support for RTK correction over radio
 - RS-232 port

- USB type-c
- All modern data formats supported
- NMEA out via Bluetooth, Wi-Fi and RS-232

Rugged field Controller Specifications:

- System
 - OS Android 10
 - MicroSD expansion
 - Keypad with touch screen ○ Hardware
 - Light weight less than 500 g
 - IP67 dust and water resistant
 - IPS LTPS LCD capacitive multitouch panel
 - Nano-sim Card with 4G modem
 - Wi-Fi 5 and Bluetooth 5
 - NFC
 - USB type-c with OTG
 - More than 10 h of continuous use
 - Camera, G-sensor, Gyroscope, E-compass, Light sensor, Speaker and microphone

Field Data Collection Software Specifications

- Support Android OS
- Hydrographic survey module must be included in the field data collection software
- License shall include all feature; Setting out, Line setting out, surface setting out, CAD setting out, Point Survey and map viewer. ○ Remote support and cloud services ○ Real time base maps; Google Maps and Bing Maps ○ Supports CAD files for stake out and base Maps
- Supports all hardware and other peripheral instruments such as total station, generic NMEA0183 receivers, pipeline detector and laser rangefinder and Bluetooth echo sounder ○ Supports APIS, NTRIP, UHF protocols