

Employer's requirement

Design and built of a brine effluent monitoring station on the island of B.Dharavandhoo

1. Objective

The objective of design and built of an brine effluent monitoring station on the island of B.Dharavandhoo is to continuously monitor the ocean water quality near the brine discharge (from the operation of desalination plant) point.

2. Minimum Requirement of the instruments

The instrument should have the following requirements as a minimum.

1. Parameters to be measured (minimum required accuracy given within brackets): Salinity (%), conductivity ($\pm 1\%$), temperature ($\pm 1^\circ\text{C}$), PH (± 0.2 PH units), Turbidity ($\pm 5\%$) Depth (0.5%).
2. Monitoring at one geographic location should consist of the following: Salinity measurements at 3 depth levels (near the surface, mid-depth, near the bottom), all other parameters at a single depth (e.g. mid-depth).
3. The equipment shall be able to take continuous measurements of the mentioned parameters for long term period without significant intervention.
4. The instrument should report accurate GPS location with monitoring data.
5. Sensor depth rating at least 100m hydraulic head.
6. Automated data gathering system with storage. ($\pm 1\%$)
7. Data should be transmitted by cellular data connection (frequency once a day at least).
8. Unattended operation for at least three months with a sampling frequency of 5 minutes or less, automatic sensor cleaning (viper) and rechargeable batteries.
9. Waterproofing suitable for oceanography use.
10. Floating and mooring hardware should be included.
11. Warranty and service period of at least 3 years should be included.

Note: Please quote the price for a single location covering all the above requirements.

3. Survey

The following surveys should be completed before commencement of installation of the instrument. The detailed survey should include a map of the sea bed near the brine outfall location.

1. Bathymetric Survey:
 - a. Bathymetric survey (with a minimum resolution of 500mm) for 10 meter radius from the tip of the brine outfall should be taken.
 - b. As-built location of the brine outfall pipeline should be mapped in the drawing.
 - c. All survey files, including editable copies should be provided to the employer along with geo-referenced CAD files for approval.

4. Supply and Installation

Installation of the instrument should be done according to the manufacturer's recommendations. Floating and mooring hardware to support the instrument should be supplied and installed according to the below requirements.

- a. The contractor shall obtain all information regarding variation of tide levels, currents, winds and other relevant information from the appropriate authorities. The contractor shall liaise with the island council, operator prior to propose the exact location for installation.
- b. The final location of the instrument shall be approved by the Client based on the bathymetric survey before commencement of installation.
- c. Instrument should be adequately moored on a buoy or anchored on a stationary structure in the shallow water as recommended by the manufacturer.
- d. The contractor shall submit his detailed method statement for installation of the instrument for approval of the Client prior to commencement of work

5. Training

The contractor should conduct a hands-on training session for a team (not more than 15 persons) of personnel selected by the client covering the following topics.

- a. Operating principles of the monitoring station.
- b. How to deploy the sensors, change batteries, read data.
- c. Operation and maintenance of the entire system

6. Operation Maintenance manual

- a) The contractor shall submit a detailed operation and maintenance manual for the monitoring station. The operation and maintenance manual shall be submitted in both Dhivehi and English Language.
- b) A video clip explaining the full procedure of deploying, maintenance of the sensor and accessing data shall also be submitted. The video should be in Dhivehi language with English subtitles.

7. Deliverables

All works must be completed within a duration of 120 days

Deliverables	Timeline	Documents Required	Remarks
Detailed design report including method statement and surveying results	30 days from the date of commencement	Detailed design Report, Detail Drawings.	Subject to Approval by Client
Mobilization, Site preparation	45 days from the date of commencement	Mobilisation shall take place after the approval of detailed design report and EIA report	
Completion of the works of monitoring station as per employer's	90 days from the date of commencement	-	Subject to Approval by Client

requirements and the approved detailed design			
Provision of training to staffs identified by the client (10 - 15 participants)	120 days from the date of commencement	Training report inclusive of all materials use for training and attendance sheets	Subject to Approval by Client
Providing video clip, operation and maintenance manual as per Employers requirement	90 days from the date of commencement	Operation and maintenance plan Video clip	Subject to Approval by Client

Note:

- Electronic copies of the all deliverables shall be provided to the client in the following formats (where applicable)
 - All the engineering designs should be in CAD formats and GIS shapefiles (e.g. AutoCAD)
 - Documents in editable formats (e.g. Microsoft Word). Final versions should be provided both in editable and PDF formats.
- Two numbers of hardcopies shall be submitted in the form of a book for each deliverable with the following requirement,
 - Front and Back cover – Hard Cover
 - High Quality Color Print

Size: A4 and A3. A3 pages should be folded appropriately