

Noakhali Greentech Solar Energy Ltd  
Solar PV Plant  
Noakhali, Bangladesh

Hydrology Study  
Request for Proposal (RFP)

September 2024



**Report Details**

<b>Prepared for:</b>	Noakhali Greentech Solar Energy Ltd
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### Amendment Records

Revision Number	Date	Purpose of Revision	Summary of Amendments
A1	29 August 2024	Internal Draft	Draft for internal review
B1	30 August 2024	Client Submission	-
B2	05 September 2024	Client Comments	
B3	10 September 2024	Client Comments	Final Submission

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## 1 Introduction

Noakhali Greentech Solar Energy Ltd (the Client) intends to develop a Solar PV plant (the Project) in Noakhali district in south-eastern part of Chittagong division in Bangladesh. The site lies around the coordinate 22°46'26.85"N latitude, 91°0'9.82"E longitude.

SgurrEnergy has been appointed by "Noakhali Greentech Solar Energy Ltd as a technical consultant for the project.

The Noakhali district in Bangladesh, where the proposed solar PV plant is located, is prone to seasonal flooding during the monsoon months and faces risks from cyclonic storms. Effective drainage solutions, wind-resistant design features, and emergency preparedness measures are crucial to ensure the resilience of the solar PV plant against these natural hazards. This document herein presents the technical specification for hydrology study.

## 2 Scope

The general specifications intend to define the minimum requirements for the hydrological analysis and flood risk assessment for the identified site. The service provider is required to submit a detailed hydrology & flood risk assessment study report for the land parcel.

The scope shall include mobilization of onsite manpower and technical supervision as required for completing the investigation. This shall also include collection of meteorological data, topographical data, Oceanographic data, ground water levels, river flood data, historical flood data at project site, desktop study, analysis and interpretation of collected data as required for completing a professional hydrology study. Topographical data within the plot will be provided by the client. Topo sheet beyond the surveyed area may be procured from relevant sources or topography data may be obtained from Shuttle radar topography mission (SRTM) or any other satellite Digital Elevation Model (DEM) sources. BNBC (Bangladesh National Building Code) standard or guideline provided by WMO (World Meteorological Organization) shall be referred for hydrology study.

There are some natural streams inside as well as outside the plot boundary.

Present hydrology study is to be conducted for assessing flood risk like fluvial flood, pluvial flood, flash flood, groundwater flood etc. in the project site.

## 3 Experience Benchmarks

- The Bidder must have completed at least three hydrology studies in Bangladesh within the last five years for utility-scale solar PV plants or other large infrastructure projects.
- Experience in dealing with hydrological challenges unique to Bangladesh, such as monsoon flooding, riverbank erosion, and high groundwater variability, is essential.
- Demonstrated knowledge of local hydrological conditions, including river systems, floodplains, coastal areas, and groundwater dynamics in Bangladesh.
- Familiarity with hydrological impacts of climate change specific to Bangladesh, including storm surges, and increased rainfall intensity.
- Ability to navigate compliance with Bangladesh Water Development Board (BWDB) guidelines and other relevant authorities.
- The team must include, environmental engineers, and other relevant experts with at least five years of experience in conducting hydrology studies in Bangladesh or similar environments.



- The lead hydrologist should have specific experience in Hydrological and flood risk assessment studies for solar PV plant development.
- Proficiency in using hydrological modelling software such as HEC-RAS, HEC HMS, or other modelling software's, along with GIS tools adapted to Bangladesh's hydrological context
- Bidder should have the necessary tools, equipment, technical personnel, etc. to execute the complete scope of works.
- As evidence of the qualification requirement (QR), the bidder shall submit in his bid, the supporting documents as follows:
  - Name of the project
  - Name of the purchaser/owner
  - Duration of execution
  - Date of completion & order value
  - User certificate/recommendation
  - List of staff to be deployed for the job

#### 4 Evaluation Categories and Weightage

##### Technical Expertise and Team Qualifications (30%)

- Assessment of the qualifications, certifications, and relevant experience of key personnel, particularly in the context of Bangladesh's hydrological challenges.
- Specific experience of the team in addressing issues such as pluvial and fluvial flooding, drainage design etc.

##### Relevant Project Experience in Bangladesh (25%)

- Review of past projects in Bangladesh or similar geographies, highlighting experience in hydrology studies for solar PV plants, infrastructure, or Flood risk assessment.

##### Methodology and Approach (25%)

- Detailed evaluation of the proposed methodology, including data collection plans, hydrological modelling approaches, and site-specific analysis techniques suitable for Bangladesh.
- Assessment of the bidder's understanding of local hydrological challenges, including monsoon impacts, cyclone effects, and river dynamics.

##### Project Management and Timeline (10%)

- Feasibility of the proposed timeline, considering the complexities of hydrological assessments.
- Ability to manage the project within budget and time constraints while coordinating with local authorities and other stakeholders.

##### Cost Proposal (10%):

- Assessment of the cost proposal's competitiveness and alignment with the project scope, considering local market rates and the complexity of the hydrology study.

##### Compliance with RFP Requirements (Pass/Fail)



- Compliance with all RFP submission requirements, including site visits, certifications, and acknowledgments of local site-specific conditions.

## 5 General Requirements

The hydrology & flood risk assessment study shall include but not limited to following:

- Site visit- Site visit shall be conducted to understand existing site conditions, to see topographical features and understand natural drainage, land use, site soil, ground water table, streams, flooding at the site etc.
- Analysis of available information (reports, literature, satellite imagery, etc.) to understand the area's drainage plan, such as catchment delineation and drainage characteristics, and to determine catchment hydraulic and geometric parameters.
- Photographs showing the project site and catchment areas shall be captured during site visit. Inputs from local people shall also be taken.
- Collection of surveyed topographical data of the site from the client. Topography data required for hydrology study beyond the surveyed area may be procured from relevant sources or Shuttle radar topography mission (SRTM) data may be used appropriately. Surface inside the project site obtained from ground measured data and surface outside the plot boundary created from SRTM/relevant data shall be appropriately matched at the junction.
- Collection of relevant rainfall data (hourly, daily, yearly, etc.) from Noakhali (CL369) or Basurhat (CL353) nearby rainfall station from whichever station has minimum 30-year data up to the recent year should be collected for the project site. Analyse the rainfall data and estimate maximum rainfall depth for 24 hours and for various short durations including duration of concentration (i.e. time of concentration) for 25, 50 and 100 year return-period. The rainfall data and analysis shall be included in the report. Client can also provide available rainfall data in this regard.
- Develop hydraulic models based on climate change scenarios for SSP 4.5 and SSP 8.5, covering two time periods: the near future (2024-2050) and the far future (2050-2100) with recommended measures.
- Collect the details of historical flood data, and the highest historical flood event that happens on site should be represented in the report.
- Analysis of runoff coefficient and manning's coefficient, time of concentration.
- Estimate the maximum rainfall intensities for various return periods & durations including concentration times and prepare Intensity-Duration-Frequency (IDF) curve.
- Nearby gauge rainfall data and other data that has been used for the analysis should be provided along with the report.
- Analysis of rainfall hyetograph.
- Assessment of all probable source of flooding like flash floods, pluvial flooding, fluvial flooding, groundwater flooding etc.
- Generation of micro streams within the project site.
- Watershed analysis should cover macro watershed based runoff estimation.
- Hydrological and Hydrodynamic studies include
  - a. Watershed based Hydrological model using HEC-HMS software. (If required)



- b. Watershed based Hydrodynamic model using HEC – RAS software.
- c. Hydraulic modelling shall comply 1D (One dimensional river/stream model by using river/stream cross sections), 2D (two dimensional by precipitation application) and Coupled 1D-2D hydraulic modelling as applicable for measured data of catchment area inside the plot boundary and satellite data for catchment area outside the plot boundary.
  - Flood risk assessment within the project site. Prepare flood inundation map indicating the flood levels, inundated area, flow direction scour depth and velocity in and around the plant area.
  - Flood risk at the access of the plant areas.
  - High flood level impact assessment at the drainage outlet point in project site area.
  - The report should include recommendations required for the analysis of safe grade elevation (SGE) of electrical equipment and plant infrastructure.
  - The clear elevation to be recommended for the all the infrastructure and electrical equipment considering the freeboard that required as per site conditions. Evaluating the vulnerability of proposed on-Site infrastructure and utilities to flooding with respect to HFL, if any
  - Various types of remedial measures (e.g., mounting height of the solar modules, embankment around plant, forces of floodwater including any potential debris loading for the design of the mounting structure) with drainage patterns and discharge point locations described with detailed feasibility for the site flooding.

## 6 Bid Timelines

Noakhali Greentech Solar Energy Ltd is seeking proposals from qualified firms/organizations to conduct a comprehensive hydrological study for a proposed solar PV plant in Noakhali district, Bangladesh. The study aims to assess the site's vulnerability to flooding, cyclones, and other natural hazards, and provide recommendations for mitigating potential risks. The selected firm will be responsible for data collection, analysis, and the preparation of a detailed report outlining the hydrological conditions and design considerations for the solar PV plant.

The bidding process will follow a specific timeline and tasks, as outlined in the table below:

Code	Task	Working Days
A	Release of the RfP	0
B	Bid Submission	A+5
C	Bid Evaluation	B+4
D	Issue of Letter of Award	C+3
E	Deliverable as per RfP	D+21

The bid timeline and task details provide a clear structure for the bidding process, ensuring transparency and fairness for all interested firms/organizations. The evaluation process and right to cancel clauses protect the interests of Noakhali Greentech Solar Energy Ltd in the procurement.



## 7 Submission Address

The proposal should be submitted by e-mail and related file transfer (as necessary) to the following address:

Towhidul Haque

Director & CEO

Noakhali Greentech Solar Energy Ltd

Address: Tower- 52, Level- 4, Road- 11, Block- C, Banani, Dhaka- 1213

[towhid@greensolarenergy.com.sg](mailto:towhid@greensolarenergy.com.sg)

[saifur@greensolarenergy.com.sg](mailto:saifur@greensolarenergy.com.sg)

Printed copies of the proposal are not required.

**Attachment – 1****Form of Proposal Letter**

[*letterhead of the contracting firm*]

**Towhidul Haque**

Director & CEO

Noakhali Greentech Solar Energy Ltd

Address: Tower- 52, Level- 4, Road- 11, Block- C, Banani, Dhaka- 1213

Dear Sir,

**Subject:** [Abstract]

**Proposal for:** [Category]

Having examined the Request for Proposal (RfP) received for the provision of the Services for the above named Project, we, the undersigned, offer to perform and complete the whole of the Services in conformity with the said RfP and with all due diligence, efficiency and economy, in accordance with generally accepted techniques and practices commonly recognized by international professional bodies, and will observe sound management, technical and engineering practices and employ appropriate technologies and methodologies, for the total amount of:

Bangladesh Taka (BDT) [Amount numbers] in [Amount in words]

or such other sums as may be determined in accordance with the Contract.

We agree to abide by this proposal for the period of 30 calendar days from the submission date (or otherwise it can be extended upon mutual agreed timeline with the client) and it shall remain valid, open for acceptance and binding upon us and may be accepted at any time before the expiration of that period.

Unless and until the formal Agreement is prepared and executed, this proposal, together with your written acceptance thereof, shall constitute a binding Contract between us.

Name of Consultant

Signature of Consultant's Representative

[Company Stamp]

Name of Signatory

Position/Title of Signatory

Date