

मिति: २०८३/०४/०८

श्री कालिमाटी गाउँपालिका

गाउँकार्यपालिकाको कार्यालय, रामपुर, सल्यान

बिषय: सिलबन्दी दरभाउ पत्र फाराम वितरण तथा संकलन गरी सहयोग गरी दिने बारे ।

उपरोक्त बिषय बारे कालिमाटी गाउँपालिका/ जलवायु परिवर्तन स्थानीय अनुकूलन परियोजनाको सहयोगमा सल्यान जिल्ला अन्तर्गत कालिमाटी गाउँपालिकामा वार्ड नं १ मा सञ्चालन हुने राजिकोट लिष्ट खानेपानी योजनामा को सोलार/विद्युतिय तथा इलेक्ट्रो—मेकानिकल सामग्रीहरू खरिद प्रकृयाको लागि

मिति २०८३ श्रावन ८ गतेका दिन <https://kalimatimun.gov.np> र परियोजना [www.laccp.org.np](http://www.laccp.org.np) वेबसाइटबाट सिलबन्दी दरभाउ पत्र आह्वान सम्बन्धि सुचना प्रकाशन गरिने हुंदा यसै साथ संलग्न सिलबन्दी दरभाउ पत्र आह्वान सम्बन्धि सुचना बमोजिम सिलबन्दी दरभाउ पत्र वितरण तथा संकलन गरी सिलबन्दी दरभाउ पत्र पेश गर्ने अन्तिम दिनको भोली पल्ट दिउसो २ बजे भित्र कालिमाटी गाउँपालिकाको कार्यालय, रामपुरमा पठाई सहयोग गरिदिन हुन अनुरोध गर्दछौं ।

पुनश्च: सिलबन्दी दरभाउ पत्र फारामहरू यसै साथ संलग्न गरिएको व्यहोरा अनुरोध छ । उक्त दरभाउ पत्र कालिमाटी गाउँपालिकाको नबिल बैंकमा रहेको खाता नं. २३४०१०१७५०००२७ ( ग १.१ -आन्तरिक राजस्व खाता) मा जम्मा गरेको रू ३००० (तिन हजार)को बैक भौचरको आधारमा बिक्री गर्नु पर्ने छ ।

खरिद समिति

१) राजिकोट लिष्ट खानेपानी योजना उपभोक्ता समिति, कालिमाटी – १, सल्यान



कालिमाटी गाउँपालिका/जलवायु परिवर्तन स्थानीय अनुकूलन परियोजना द्वारा सञ्चालित तपशिल बमोजिमका लिफ्ट खानेपानी तथा सरसफाई योजनाका लागि परियोजनाको खरिद निर्देशिका बमोजिम लिफ्ट योजना निर्माणमा प्रयोग हुने सोलार/विद्युतिय तथा इलेक्ट्रो—मेकानिकल सामग्रीहरू (पम्प, सोलार प्यानल, कन्ट्रोलर, तार, फिटिङ्ग्स आदि) खरिद, जडान तथा Commissioning & Testing गर्नुपर्ने भएकोले इच्छुक तथा योग्य आपूर्तिकर्ता/कम्पनी/फर्महरूबाट प्रस्ताव पेश गर्नका लागि खरिद समितिले खुला आह्वान गर्दछ। तसर्थ, निम्न सर्तहरू अन्तर्गत रहि दरभाउपत्र फाराममा प्रदान गरिएको परिमाण तथा तोकिएको स्पेसिफिकेशन, गुणस्तर र तौल अनुसार सामग्री आपूर्ति गर्न इच्छुक भ्याटमा दर्ता भएका तथा सम्बन्धित क्षेत्रमा कार्य अनुभव प्राप्त सप्लायर वा कम्पनी वा फर्महरूबाट सिलबन्दी दरभाउपत्र आह्वान गरिएको छ ।

#### शर्तहरू:

- इच्छुक विभिन्न आवश्यक सोलार, विद्युतिय तथा इलेक्ट्रो—मेकानिकल सामग्रीहरू (पम्प, सोलार प्यानल, कन्ट्रोलर, तार, फिटिङ्ग्स आदि) खरिद तथा जडान कार्य सम्बन्धी दरभाउपत्र फारम सम्बन्धित कालिमाटी गाउँपालिकाको कार्यालय, रामपुर, सल्यान बाट वा लक परियोजनाको आधिकारिक वेब साइट [www.laccp.org.np](http://www.laccp.org.np) वा गाउँपालिकाको आधिकारिक वेब साइट <https://kalimatimun.gov.np> बाट प्राप्त गर्न सकिनेछ ।
- सिलबन्दी दरभाउपत्र पेश गर्दा तोकिएको फारम र विभिन्न आवश्यक आवश्यक सोलार, विद्युतिय तथा इलेक्ट्रो—मेकानिकल सामग्रीहरू (पम्प, सोलार प्यानल, कन्ट्रोलर, तार, फिटिङ्ग्स आदि) खरिद तथा जडान कार्य सम्बन्धी दरभाउपत्र फारम प्रति फारामरु. ३००० अक्षरेपी रु. तिन हजार मात्र (पछि फिर्ता नहुने गरी) कालिमाटी गाउँपालिका नाममा रहेको नबिल, बैंक कालिमाटी रामपुर शाखाको राजस्व खाता न. २३४०१०१७५०००२७ (आन्तरिक राजस्व खाता) मा LLRP बाट जम्मा गरेको सक्कलै भौचर वा राजस्व शाखा सुत्रमा जम्मा भएको सिर्जित सक्कल भौचर सहित फारम वा कम्पनी वा सप्लायरको लिखित निवेदनको साथमा मूल्य अभिवृद्धि कर दर्ताको प्रमाणपत्र, यस् आ ब को कर चुक्ताको प्रमाणपत्र तथा कार्य अनुभवको प्रमाणपत्र सहित यो सूचना प्रकाशित भएको मितिले ८औं (आठौं)-(२०८३/०४/१५) दिनको दिउसो १२:०० बजे भित्र कार्यालय समय भित्र सम्बन्धित कालिमाटी गाउँपालिका कार्यालय वा जलवायु परिवर्तन स्थानीय अनुकूलन परियोजना, परियोजना सहयोग एकाई बिरेन्द्रनगर, सुर्खेत वा विकास व्यवस्थापन सस्था (DMI Pvt.Ltd) प्रा.लि. नुससे मार्ग, शान्तिनगर-११, काठमान्डौमा पेश गरि सक्नु पर्नेछ। दरभाउपत्र फाराम सिलबन्दी गरी सम्बन्धित उपभोक्ता समितिको नाम, ठेगाना र विद्युतिय र इलेक्ट्रो मेकानिकल सामग्रीहरू (पम्प, कन्ट्रोलर, तार, फिटिङ्ग्स, आदि) सप्लायर तथा जडान सम्बन्धी दरभाउपत्र भन्ने व्यहोरा उल्लेख गर्नुपर्नेछ।
- सिलबन्दी दरभाउ पत्र पेश गर्दा
  - सप्लायरको आधिकारिक प्रतिनिधि आफै उपस्थित भई वा हुलाक वा कुरियर मार्फत समेत पेश गर्न सक्नेछ ।
  - हुलाक वा कुरियर मार्फत पठाएको सिलबन्दी दरभाउपत्र सूचना प्रकाशित भएको मितिले ८ औं (आठौं) दिनको दिउसो २:०० बजे भित्र प्राप्त भईसक्नु पर्नेछ ।
- सप्लायर हुने सामग्रीहरूको भुक्तानी उपभोक्ता समितिहरूको गोदाममा राजिकोट मा ढुवानी तथा जडानभै प्राविधिक चेकजाँच भएपछि सम्झौता बमोजिम मात्र हुनेछ । यसैले बोलपत्र सम्बन्धि धरौटी तथा बैंक जमानतको आवश्यकता पर्ने छैन।
- उपरोक्त अनुसार प्राप्त भएका दरभाउपत्रहरू संकलन गरी यो सूचना प्रकाशित भएको मितिले ११औं (२०८३/०४/१८) दिन कालिमाटी गाउँपालिका, रामपुर, सल्यान कार्यालयमा दिउसो १२:०० बजे उपभोक्ता



समितिका खरिद समितिका प्रतिनिधिहरू, गाउँपालिका कार्यालयका प्रतिनिधिहरू, जलवायु परिवर्तन स्थानीय अनुकूलन परियोजना प्रतिनिधिहरू र दरभाउपत्र दाताहरू वा निजहरूको प्रतिनिधिको रोहवरमा खोलिनेछ । दरभाउपत्र दाताको प्रतिनिधि उपस्थित नभएमा दरभाउपत्र खोल्न बाधा पुग्ने छैन ।

- दरभाउपत्र दर्ता गर्ने तथा खोल्ने अन्तिम दिनमा सार्वजनिक विदा पर्न गएमा सो को भोलिपल्ट कार्यालय खुलेको दिन तोकिएको समय भित्र दर्ता गरिने वा खोलिनेछ ।
- दरभाउपत्रमा दररेट लेख्दा अंक र अक्षरमा स्पष्ट लेख्नुपर्नेछ । अंक र अक्षरमा फरक परेमा अक्षरमा लेखेकोलाई मान्यता दिइनेछ । अंक र अक्षरमा केरमेट भएकोमा दस्तखत र छाप लगाएको हुनु पर्नेछ । साथै दरभाउपत्रको सबै पेजमा हस्ताक्षर गरि छाप लगाउनु पर्नेछ ।
- दरभाउपत्र फारममा तोकिएका लेखे स्थानहरू बाहेक, अन्यत्र कुनै पनि थप नोट, संकेत तथा कुनै जानकारी लेख्नु हुँदैन ।
- म्याद नाघी वा रीत नपुगी आएको दरभाउपत्र उपर कुनै कारबाही हुने छैन ।
- दरभाउपत्र स्वीकृत गर्ने वा नगर्ने वा आंशिक रूपमा स्वीकृत गर्ने सम्पूर्ण अधिकार उपभोक्ता समितिहरूमा सुरक्षित रहनेछ ।
- अन्य शर्तहरू परियोजनाको सामुदायिक खरिद कार्यविधि २०८२ बमोजिम हुनेछ । थप शर्तहरू दरभाउपत्र फारम साथै संलग्न गरिएको छ ।
- यो सूचनामा केहि संशोधन गर्नु परेमा सो को सूचना गाउँपालिकाको सूचना पाटीमा जानकारी गरिनेछ ।
- थप आवश्यक जानकारीहरू सम्बन्धित योजनाहरूको कोटेशन फारम तथा स्पेसीफिकेशनमा उल्लेख गरिएको छ ।
- अन्य थप जानकारी चाहिएमा कालिमाटी गाउँपालिका वा जलवायु परिवर्तन स्थानीय अनुकूलन परियोजना क्लस्टर प्राविधिक सहयोग एकाई, खलंगा , सल्यान मा सम्पर्क गर्न सकिनेछ ।

## खरिद समिति

- राजिकोट लिफ्ट खानेपानी तथा सरसफाई योजना, कालिमाटी गाउँपालिका, वडा न.१ , सल्यान



**Rajikot Lift WSS**  
**Kalimati Rural Municipality-1**  
**Salyan, District**

**REQUEST FOR QUOTATION (RFQ)**

**For**

**Design, Supply, Delivery, Installation, Testing and Commissioning of Solar PV Water  
Pumping System**

**Issued by:**

**User Committee of Rajikot Lift WSS**

**Kalimati Rural Municipality-1**

**Contract No.: 1/2083/084**

24 July 2026



**Section I. Request for Quotation (RFQ)**

**User Rajikot Lift WSS**

**Kalimati Rural Municipality-1, Salyan**

**Design, Supply, Delivery, Installation, Testing and Commissioning of Solar PV Water Pumping System**

**Date of Notice Publication: July 24, 2026**

- 1. User Committee of Rajikot Lift WSS** invites sealed quotation from registered suppliers for Design, Supply, Delivery, Installation, Testing, Commissioning and After Sales Service of Solar PV Water Pumping System in at **Rajikot Lift WSS** , Kalimati Rural Municipality-1, Salyan, District.
2. The VAT registered suppliers can obtain the signed quotation form from Kalimati Rural Municipality, Salyan or LACC Project PSU, Birendranagar, Surkhet or can be downloaded from official websites of Kalimati RM (<https://www.kalimatimun.gov.np>) and LACC Project ([www.laccp.org.np](http://www.laccp.org.np)) .
3. Sealed quotation must be submitted to Kalimati Rural Municipality Office or Local Adaptation to Climate Change Project, Project Support Unit (PSU), Birendranagar, Surkhet or Liaison office of LACC Project (DMI Nepal Pvt Ltd. Sanokharibot, Shantinagar, Kathmandu-31) before 12:00 hours on 8th day of first publication date. Documents received after this deadline shall not be accepted.
4. Quotations must be valid for a period of 90 days from the day of deadline of submission.
5. If the last date of purchasing and opening falls on a government holiday, then the next working day shall be considered the last day.
6. The contractor must sign and stamp all the copies of submission including all the documents mentioned along with Technical Specification and any other document in the Quotation.
7. User committee reserves the right to accept or reject, wholly or partly any or all the quotations without assigning any reason whatsoever.



## Section II. RFQ Data

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Name of the Purchaser: <b>Rajikot Lift WSS of Kalimati Rural Municipality-01 Salyan District</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2 | Name of Contract: <b>Design, Supply, Delivery, Installation, Testing and Commissioning of Solar PV Water Pumping System</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3 | <b>Contractor's Eligibility Requirements are:</b> <ol style="list-style-type: none"> <li>a) <b>Cover Letter</b> for submission of quotation</li> <li>b) <b>Company Profile and experience</b> in design, supply, and installation of solar pumping schemes.</li> <li>c) <b>Tax Registration/Payment</b> Certificate issued by the <b>Internal Revenue Authority</b> evidencing that the contractor is updated with its tax payment obligations, or <b>Certificate of Tax exemption</b>, if any such privilege is enjoyed by the Bidder</li> <li>d) <b>Certificate of Registration of the business</b>, including Articles of Incorporation, or equivalent document if contractor is not a corporation</li> <li>e) <b>Quality Certificate</b> (e.g., ISO, etc.) and/or other similar certificates, accreditations, awards and citations received by the contractor, if any</li> <li>f) <b>Valid ISO 9001 and ISO 14001 and IEC/IS/NEPQA</b> Quality Assurance Certification of the proposed product especially solar pump &amp; panel.</li> </ol> |
| 4 | Purchaser's Address: Rajikot Lift WSS, Ward no.1 of Kalimati Rural Municipality, Salyan District<br><br><b>Technical Contact Person</b><br>Mobile no: 9869482514<br>Suman Dangi (Technical Person)<br>Email: <a href="mailto:dcsuman29@gmail.com">dcsuman29@gmail.com</a><br>Sub-Engineer<br><br>Contact Person: Khum Bahadur Pun Magar<br>Position: Chairperson of above UC<br>Contact no: 9848159357                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5 | Language of the Bid: <b>English</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 6 | Quote validity period : 90 days counted from the date of bid submission deadline.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 7 | Deadline for RFQ submission :<br>Date : 8th day of notice publication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>Time : 12:00 hours</p> <p>Place : Kalimati Rural Municipality Office, Kalimati- Salyan <b>or</b><br/> Local Adaptation to Climate Change Project, Project Support Unit (PSU),<br/> Simtalichowk, Birendranagar, Surkhet <b>or</b><br/> Liaison office of LACC Project (DMI Nepal Pvt Ltd. Sanokharibot, Shantinagar,<br/> Kathmandu-31)</p>                                                                                                                                                                                                                                                                                                            |
| 8  | Completion of Task as mentioned in the Scope of Work<br>Within 4 Months from the date of Agreement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 9  | <p>Estimated Amount scheme including VAT and Transportation: <b>NPR 3,364,618.83</b></p> <p>In Word Thirty Three Lakh Sixty Four Thousand Six Hundred Eighteen Rupees Eighty Three Paise only.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 10 | <p>Documentary <b>evidence of technical and production capabilities:</b></p> <p>(i) <b>Minimum Three (3) Years</b> experience in solar lifting water supply scheme</p> <p>(ii) <b>At least three water supply lifting schemes</b> (lifting head more than 250 m) design, supply delivery, installation, testing commissioning projects within last five years. Experience letter should submitted with the sealed quotation.</p>                                                                                                                                                                                                                          |
| 11 | <p>Performance Security</p> <p>Amount: Not applicable as payment will be done after material received, verified and technical approval at Road Head.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 12 | <p>Warranty:</p> <p>Minimum 5 years warranty against manufacturing defects of Solar PV Module.</p> <p>3 Years Replacement Warranty of solar pump and standard applicable for other components.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 13 | Defect liability period : Repair or replace any defects found during the Defect Liability Period of One Year.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 14 | <p><b>Payment</b></p> <p>i. Upon Signing of Agreement and submission of Field verification report: Twenty (20) percent of the Contract Price</p> <p>ii. Upon receiving the materials at road head: Fifty (50) percent of contract price</p> <p>iii. Upon Submission of Installation Completion, Testing &amp; -Commissioning report along with handover as per contract: Maximum thirty (30) percent of the Contract Price</p> <p>iv. After Sales Service: The company shall provide regular support and have a field visit atleast once (1) a year up to three years. Thereafter the company shall visit the site atleast once a year on paid basis.</p> |

|    |                                                                                                        |
|----|--------------------------------------------------------------------------------------------------------|
| 15 | Local representative of the company, if any:<br>Name of the representative:<br>Address:<br>Contact no: |
|----|--------------------------------------------------------------------------------------------------------|

1. Design solar PV pumping system based on the minimum criteria as mentioned in Technical Specification: (I. Minimum Design Criteria- mentioned on the below page).
2. Field verification must be completed to assure the design & **submit the detailed design report** by the contractor's responsible Engineer after the award of the contract & **before first installments**.
3. After the verification of design, install solar PV pumping system based on the component recommended at Bills of Quantities (BoQ).
4. Works required for sequential installation of Solar PV Pumping System including necessary civil works (fixing casing pipe, solar frame) for mounting structures of solar module, shall be done by the contractor. All the work related to the proper installation and functioning of the system shall have to be carried out by the contractor with the prices offered in the quotation.
5. The contractor will make all necessary arrangements for satisfactory operation, maintenance and performance of the Pumping System for 2 year's Warranty/ Guarantee period.
6. Warranty/Guarantee will include rectification/replacement of all the defective and consumable components/items. During Warranty/Guarantee period, all the arrangements for keeping the Solar PV Pumping System functional shall be the sole responsibility of the contractor.
7. The contractor shall conduct on-site training of the user committee personnel regarding the assembly, start-up, operation, maintenance and repairs of the Solar PV Pumping System.
8. All necessary Spare parts/Tools should be provided by the contractor.
9. Transport the components to the site till the road head site as per mention in BOQ.
10. Provide After Sales Service for an additional 3 years (after 2 years' warranty period) with a minimum of 1 site visit annually. This visit will be paid by UC.
11. Contractors should have made representative agents at a provincial level with availability of solar pumping components sales for the pumping system and must be made linked with user committee.



## Section IV. Technical Specification

### 4.1 Minimum Design Criteria

| SN | Scheme's name and location                                                                                             | Design Data                                                                                                                                                                                                       |
|----|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. | Rajikot Lift WSS Kalimati-1, Salyan<br><br>Location:<br>Distribution tank GPS<br><br>28.296978333 N,<br>82.136653333 E | System that must be able to lift a minimum of 28160 liters of water per day at 270.9 m dynamic head.<br>Single lift system<br>Stage one-270.9 m dynamic head, Pipe length 745.2 m<br>Solar location distance 50 m |

**Contractor/Firm also need to submit alternative design with more efficient & economic design in single stage lift in different head level than mentioned.** The technical evaluation committee will consider if the proposed system justifies required design & installation as per field requirement.

### 4.2 Solar Submersible Pump Unit

The contractor must design the solar water pump unit and submit the detailed technical specification and the calculation showing the discharge of the pump to meet the **Minimum Design Criteria**. Contractor/Firm should submit the separate design with justification in change of pumping size meeting minimum require specification of technical part.

| SN | Description              | Specification                                                                                                                                                                                                                   | Contractor Proposal | Contractor's Remarks* (Fully Complaint/Nor Complaint) |
|----|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------|
| 1  | Name of the manufacturer | Grundfos or Pedrollo or Lorentz or equivalent                                                                                                                                                                                   |                     |                                                       |
| 2  | Brand/Model              | Grundfos or Pedrollo or Lorentz or equivalent                                                                                                                                                                                   |                     |                                                       |
| 3  | Pump Type                | Submersible borehole pump or equivalent<br>Water filled (Oil must not be used for lubrication),<br>Submersible centrifugal or positive displacement<br>Solar Pump, fully stainless Steel, with necessary casing and protection. |                     |                                                       |

|   |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
|---|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|   |                    | <p>Pump Performance Curve<br/>I.e. Flow Vs Input<br/>Pump Power shall be provided at the Head of Project design.<br/>Warranty on the motor and pump: 2 years</p>                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |
| 4 | Minimum Efficiency | Pump motor efficiency must be at least 60 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |
| 5 | Minimum Standard   | <p>Submersible borehole pump, suitable for pumping clean water. It can be installed vertically or horizontally. Pump carrying drinking water approval.</p> <p><b>The pump and controller must be manufactured by the same company.</b></p> <p>Pumps suitable for applications in groundwater lowering, pressure boosting, fountain applications.</p> <p>The suction interconnector is fitted with a strainer to prevent large particles from entering the pump. The suction interconnector is designed to comply with NEMA standards for motor mounting/dimensions.</p> |  |  |
| 6 | Material           | <p>All steel components made in stainless steel, EN 1.4301 (AISI 304), ensure high corrosive &amp; wear resistance. Rotors and impellers must be made of stainless steel with a minimum grade of AISI 304 or higher.</p>                                                                                                                                                                                                                                                                                                                                                |  |  |
| 7 | Control            | The pump controller must have an MPPT control circuit. The pump or pump set must be capable of stopping operation in the                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |

|   |                     |                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
|---|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|   |                     | <p>event of dry running or insufficient energy supply. Must be equal to or greater than the capacity of the pump.</p> <p>Warranty on the pump controller: 2 years</p> <p>Must be of the same brand of the Pump.</p> <p>The Bidder must submit the technical datasheet.</p> <p>A Manufacturer's Authorization letter provided by principal manufacturer in their letter head.</p> |  |  |
| 8 | Warranty            | At least 2 years                                                                                                                                                                                                                                                                                                                                                                 |  |  |
| 9 | Protection Features | <p><b>Dry run protection,</b></p> <p><b>Over and under voltage protection,</b></p> <p><b>Overload protection,</b></p> <p>Temperature Protection</p>                                                                                                                                                                                                                              |  |  |

### 4.3 Solar PV Array

**Note:** The minimum estimated solar array is 585Watt (0.585 KWp). The contractor must calculate the solar array size based on the pump designed. In both cases, the capacity proposed by the contractor must not be below the minimum estimated capacity of Solar PV capacity. It is the responsibility of the contractor to guarantee the minimum water as mentioned in **Minimum Design Criteria**.



| SN | Description              | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Contractor Proposal | Contractor's Remarks*(Fully Complaint/Nor Complaint) |
|----|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------|
| 1  | Name of the manufacturer |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                                                      |
| 2  | Brand/Model              | Seraphim, Jinko, Trina or Equivalent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                                                      |
| 3  | Minimum Capacity         | 585 Wp (can be redesigned based on the Note above.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                                                      |
| 4  | PV Module Type           | <p>RETS Certified, Mono or Poly Crystalline, should be equal or more/less than 585 Wp. The warranty period for the PV module must be at least first year- <math>\geq 97\%</math> of stc power, 10 years- <math>\geq 90\%</math> of STC power and 25 years- <math>\geq 80\%</math> of STC power.</p> <p>All PV modules offered for the scheme must be of the same type, same model, same power rating and same manufacturer.</p> <p>Minimum 5 years warranty against manufacturing defects.</p> <p>The test certificates must be provided.</p> |                     |                                                      |
|    |                          | The PV Module should have the International Certification, IEC 61215:2005 2nd Edition or IEC 61215-1:2016 and IEC 61215-2:2016 for Terrestrial photovoltaic (PV) modules - Design qualification and type approval – Part 1: Test requirements and Part 2: Test Procedures. IEC 61730 for PV module safety qualification, IEC 62804 for detection of potential induced degradation (PID).                                                                                                                                                      |                     |                                                      |

| SN | Description                                                                                        | Specification                                                                                                                                                                                                                                                                                                   | Contractor Proposal | Contractor's Remarks*(Fully Complaint/Nor Complaint) |
|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------|
| 5  | Certifications                                                                                     | ISO 9001 / ISO 14001/NEPQA 2015<br>OHSAS 18001 certified production facilities.                                                                                                                                                                                                                                 |                     |                                                      |
| 6  | Power degradation                                                                                  | A letter provided by principal PV module manufacturer in their letter head stating the warranty period for their PV module. The warranty period for the PV Module must be at least 10 years against a maximum 10% reduction and 20 years against a maximum 20% reduction of output power at STC.                |                     |                                                      |
| 7  | Minimum Module efficiency                                                                          | $\geq 16\%$                                                                                                                                                                                                                                                                                                     |                     |                                                      |
| 8  | Peak Power Per Module                                                                              | 585 Watts Peak or greater                                                                                                                                                                                                                                                                                       |                     |                                                      |
| 9  | Junction Box                                                                                       | IP 65                                                                                                                                                                                                                                                                                                           |                     |                                                      |
| 10 | Module Mounted Structure                                                                           | noncorrosive support structures to be fixed on the ground                                                                                                                                                                                                                                                       |                     |                                                      |
| 11 | Tilt Angle and direction                                                                           | As per field                                                                                                                                                                                                                                                                                                    |                     |                                                      |
| 12 | Support structure design, distribution poles and foundation mounting arrangements should withstand | Wind Speed up to 180 km/hr                                                                                                                                                                                                                                                                                      |                     |                                                      |
| 13 | Support Structure                                                                                  | Shall be manufactured with Aluminum or stainless-steel angles and channels; deep galvanized. The support frame structure should be able to resist at least 20 years of outdoor exposure without suffering significant damage or corrosion. It shall support solar PV modules at a given orientation, absorb and |                     |                                                      |

| SN | Description                                                                                                                                                                                                                                                          | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Contractor Proposal | Contractor's Remarks*(Fully Complaint/Nor Complaint) |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------|
|    |                                                                                                                                                                                                                                                                      | transfer the mechanical loads to the ground properly.                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |                                                      |
| 14 | Structure Galvanization Requirement                                                                                                                                                                                                                                  | The modules support structure shall be mild steel, hot dipgalvanized (120 micron) iron for holding the PV modules. The size of angle iron should not be less than 50x50x5 mm                                                                                                                                                                                                                                                                                                 |                     |                                                      |
| 15 | Clearance and fixing                                                                                                                                                                                                                                                 | Mounting structures shall have necessary clearance at least 60 cm or more between ground level and bottom edge of PV modules as per the requirements. PCC work of 0.3 cm above the ground level for each foundation                                                                                                                                                                                                                                                          |                     |                                                      |
| 16 | HDPE Dugwell (Casing Pipe) with complete fittings with washout provision at bottom                                                                                                                                                                                   | 3 mtr 200 mm dia or As per Attached drawings                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                                                      |
| 17 | Grounding System of DC surge protector, AC surge protector, DC MCB, AC MCB, Set of Earthing Electrode 2" dia and 2 m length installed in earthing pit with the set of Backfill chemical connected by 16 sqmm copper cable all complete, wire 7/18, junction box etc. | SPD (for voltage limiting) shall have a discharge capacity total of 40 kA (8/20 $\mu$ s).<br>The earth-termination system with bare copper conductors (minimum cross section of 16 mm <sup>2</sup> ) by connection to the earthing electrodes or to the buried bare copper conductor connecting the earthing electrodes.<br>The length of each earthing electrode shall not be less than 1.5 meters and outer diameter less than 48 mm and an inner diameter less than 27mm. |                     |                                                      |



**The following information should be provided by the contractor in regard to solar PV module.**

- The bidder must be submitting the technical datasheet of PV Module.
- A manufacturer's Authorization letter should be provided by the principal manufacturer in their letter head.
- Catalogue and technical specification of solar PV module with I-V curve.
- Inedible labels must be firmly fixed on the solar PV module containing the following information:
  - Name and brand of the manufacturer.
  - Model and type.
  - Manufacturer serial number.
  - Maximum power in watt peak.
  - Open circuit voltage in volt.
  - Short circuit current in ampere.
  - Maximum rated voltage in volt.
  - Maximum rated current in ampere

#### **4.0 Protection**

##### **4.1 Lightning Arrestor**

The lightning protection system shall be of the enhanced type which is designed to attract lightning to a preferred point and safely convey the lightning energy to ground with minimal risk of side flashing via a pre-determined route.

The complete lightning protection system will comprise the following key components.

- a) Lightning Air Terminal
- b) Mounting support
- c) Dedicated down conductor
- d) Dedicated Earthing system

##### **4.1.1 The Lightning Air Terminal**

- The lightning air terminal shall be an Early Streamer Emission terminal which will respond dynamically upon leader activity in the near area.
- The lightning air terminal shall be configured as a spheroid which is comprised of separate electrically isolated panels surrounding an earthed central finial.
- The insulation material used to electrically isolate the panels shall be comprised of a base polymer which provides high ozone and UV resistance with a dielectric strength of 24 – 38 KV/mm.
- The external shape of the advanced lightning rod shall be such that it will limit the development of sharp point corona discharge under static thunderstorm conditions.
- The central finial shall be elevated above the spheroid to a length of 86mm.
- The upper section of the central finals shall be rated to withstand 200KA.
- An air gap shall be provided between the individual electrically isolated panels (4 panels) and the final tip of the central road.
- Arcing shall occur between the panel sections of the spheroid and the finial tip only upon the progression of a lightning leader.

- The lightning air terminal shall have no moving parts and will have no dependence on external power supply or batteries.
- Under a normal atmosphere all components of the advanced lightning terminal shall be non-corroding.

#### **4.1.2 Mounting Support**

- The mounting pole used to support the lightning air terminal shall be a circular mast at a minimum height of 2 meters. The pole will have an outside diameter of 68mm.
- The mounting pole and supports shall be securely fixed with brackets and guy wires where required.
- Mounting structure shall be non-corrosive to be fixed on ground.
- PCC box of 0.3 cm above the ground level for the foundation or as per site.

#### **4.1.3 Down Conductor**

The down conductor shall pass through the center of the pole for the entire length of the pole.

- Each lightning air terminal should be fixed with one down conductor. The down conductor should have a minimum size of 50 mm<sup>2</sup> and can be a bare or insulated round / flat copper conductor. The down conductor should be fixed securely every one meter.
- The main copper conductor shall allow for direct connection to the lightning rod through the use of a compression lug.

#### **4.2 Surge Protector**

- The DC surge protection (SPD for voltage limiting or class C) device shall be installed in TT configuration and in parallel mode compatible with Nepal's electricity supply.
- The Class C arrester used in and neutral side should be single pluggable MOV based and Spark Gap based plug.
- The class C arrester should have visual and remote indication both in phase to neutral and neutral to ground protection module.
- The neutral and phase plugs should have clear marking so that it fits to the respective bases only.
- The Class C arrester should not be less than 40 kA protection level at waveform of 8/20  $\mu$ s.
- The unit shall be compatible in mounting on DIN Rail Channel.
- The degree of protection should be IP20 and inflammability class should be V0.

#### **4.3 Earthing/Grounding for Lightning Arrestor/ For Electrical and Safety Earthing**

- The Earthing electrode shall be constructed in Pipe-in-Pipe technology.
- Chemicals shall be filled in between the electrodes.
- Earthing electrode shall not be less than 48 mm outer diameter and 27 mm inner diameter.
- The length of the Earthing electrode shall not be less than 1500 mm.
- The hot dipped galvanization or plating of earth electrode shall be of copper and shall be 70 microns to 100 microns.



- Backfill material shall be chemical bag having not less than 25 kg for each earthing electrode.
- The earthing shall be installed in delta type consisting of 3 electrodes for one set.
- Earthing inspection pit shall be made of solid concrete with minimum dimension of 320 mm x 320 mm x 200 mm. Cover shall be marked with word EARTH” or acceptable earthing marking.
- The final impedance reading does not exceed 10 Ohms.
- The use of certified chemical ground resistance improvement material (other than salt and charcoal) shall be applied to reduce the resistivity levels of the earthing system.

#### 4.5 Others

The components of the Solar PV Pumping systems must conform to the latest edition of IEC/ equivalent BoS Standards as specified in table below:

| BoS item/component                           | Applicable Standard                                                                                                          |                                                       |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
|                                              | Standard Description                                                                                                         | Standard                                              |
| Transmission Cables                          | NS standard for PVC insulated cables and UV resistant for outdoor installation<br>2 core 10 sqm or as per design             | NS Standard                                           |
| Switches/Circuit Breakers / Connectors       | General Requirements Connectors-safety                                                                                       | NS/ IS standard                                       |
| Junction Boxes/ Enclosures                   | General Requirements                                                                                                         | IP 65 (for outdoor)/ IP 21 (for indoor) or Equivalent |
| SPV System Design and Installation Practices | PV Stand-alone System design, verification and electrical installation of building requirements for SPV power supply systems | NS/ IS Standard                                       |

#### 4.6 Civil Works

The civil works for the solar pumping system will be as under:

1. Solar PV array installation and fixing

**Drawings:** The details, drawings and calculations must be provided.



### Section V. Bill of Quantity (BoQ)

| S.N                  | Component Description                                                                                                                                             | Unit   | Quantity | Rate           |              | Amount | Remarks |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|----------------|--------------|--------|---------|
|                      |                                                                                                                                                                   |        |          | In Figures(Rs) | In Words(Rs) |        |         |
|                      | <b>Electromechanical Cost</b>                                                                                                                                     |        |          |                |              |        |         |
| <b>A</b>             | <b>Non-Vat Applicable Components</b>                                                                                                                              |        |          |                |              |        |         |
| 1                    | Solar Panel in Watt, Minimum 585 Wp (Mono PERC)                                                                                                                   | Nos    | 30       |                |              |        |         |
| <b>Sub Total (A)</b> |                                                                                                                                                                   |        |          |                |              |        |         |
| <b>B</b>             | <b>Vat Applicable Components</b>                                                                                                                                  |        |          |                |              |        |         |
| 1                    | Fully Stainless steel Submersible Pump standard ISO 9001-2008 three phase or equivalent , minimum 15 HP (125LPM/ 28160 LPD @ 322-meter dynamic head)(Three Phase) | Nos    | 1        |                |              |        |         |
| 2                    | Pump Control Drive (Solar Pump Inverter) Minimum 18.5 KW With IP 65 Rated Enclosure                                                                               | Number | 1        |                |              |        |         |
| 3                    | DC String Fuse, 32A with required DC Combiner Box                                                                                                                 | Number | 2        |                |              |        |         |
| 4                    | DC MCB, Double Pole, 63A with Required wire for installation                                                                                                      | Nos    | 1        |                |              |        |         |
| 5                    | AC MCB, Triple Pole, 63A with Required wire for installation                                                                                                      | Nos    | 1        |                |              |        |         |
| 6                    | DC Surge Protection Device SPD, 40kA, 3 Pole with Required wire for installation                                                                                  | Nos    | 1        |                |              |        |         |
| 7                    | AC Surge Protection Device SPD, 40 kA, 3 Pole with Required wire for installation                                                                                 | Nos    | 1        |                |              |        |         |
| 8                    | Dry run Sensor Unit Including sensor connection wire                                                                                                              | Set    | 1        |                |              |        |         |
| 9                    | Copper Lightning Arrestor with insulated mounting rod, Conventional Type                                                                                          | Set    | 1        |                |              |        |         |



| S.N<br>.             | Component Description                                                                                                                                                                  | Unit  | Quantity | Rate              |              | Amount | Remarks |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|-------------------|--------------|--------|---------|
|                      |                                                                                                                                                                                        |       |          | In<br>Figures(Rs) | In Words(Rs) |        |         |
| 10                   | Earthing System with Copper Earthing Rod 50mm, 2.5 m, earthing wire and Chemical Bag 25kg                                                                                              | Set   | 3        |                   |              |        |         |
| 11                   | Earthing conductor for LA, 16mm <sup>2</sup> YG cable                                                                                                                                  | mtr   | 20       |                   |              |        |         |
| 12                   | DC String Cable, MSF, 6 Sq mm                                                                                                                                                          | mtr   | 99       |                   |              |        |         |
| 13                   | DC Cable, 2 x 10 Sq mm with weatherproof conduit                                                                                                                                       | mtr   | 50       |                   |              |        |         |
| 14                   | Submersible armoured flat cable, 3 x 10 Sq mm                                                                                                                                          | mtr   | 30       |                   |              |        |         |
| 15                   | Installation accessories (tapes, nut+bolts Tool Set - Multimeter, Screw Driver, Pliers, Wire Cutter, Testeretc, Pipe Wrench for 2.5" )                                                 | Set   | 1        |                   |              |        |         |
| 16                   | Plumbing accessories(GI pipe, HDPE pipe welding, joining etc.)                                                                                                                         | Set   | 1        |                   |              |        |         |
| 17                   | Remote Monitoring Unit - GPRS with data logging feature                                                                                                                                | Nos   | 1        |                   |              |        |         |
| 18                   | Verification, Installation and Commissioning                                                                                                                                           | stage | 1        |                   |              |        |         |
| 19                   | Panel Mounting Structure, Hot dipped Galvanized structure(Galvanized angle 50*50*5 mm-Vertical angle) With RCC Footing of min 300X300X750mm and use of SS nutbolts for panels mounting | Set   | 1        |                   |              |        |         |
| <b>Sub Total (B)</b> |                                                                                                                                                                                        |       |          |                   |              |        |         |
| <b>C</b>             | <b>Mechanical item</b>                                                                                                                                                                 |       |          |                   |              |        |         |
| 1                    | GI Nipple 2"/6"long                                                                                                                                                                    | Nos   | 6        |                   |              |        |         |
| 2                    | GI elbow 2"                                                                                                                                                                            | Nos   | 1        |                   |              |        |         |
| 3                    | GI Unequal Tee (2"/0.5")                                                                                                                                                               | Nos   | 1        |                   |              |        |         |
| 4                    | 4 inch Pressure Gauge, 40kg                                                                                                                                                            | Nos   | 1        |                   |              |        |         |



| S.N<br>.                                    | Component Description                                                                                                                                                                                                          | Unit      | Quantity | Rate              |              | Amount | Remarks |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|-------------------|--------------|--------|---------|
|                                             |                                                                                                                                                                                                                                |           |          | In<br>Figures(Rs) | In Words(Rs) |        |         |
| 5                                           | Cast Steel Check Valve(NRV)-DN 50 mm Double flanged Class ASA300 cast steel swing check (N-R) valve :Hydrostatic Test pressure : Body 150Kg/cm2 , Seat 110 Kg/cm2, Each valve shall be supplied with MS/GI flange at both ends | Nos       | 1        |                   |              |        |         |
| 6                                           | Equal Tee 2"                                                                                                                                                                                                                   | Nos       | 1        |                   |              |        |         |
| 7                                           | Cast Steel Gate Valve-DN 50 mm Double flanged Class ASA300 cast steel Gate valve :Hydrostatic Test pressure Body 150 Kg/cm2 , Seat 110 Kg/cm2 : Each valve shall be supplied with MS/GI flange at both ends                    | Nos       | 1        |                   |              |        |         |
| 8                                           | Tripod stand-Tripod heavy duty 6m long all complete                                                                                                                                                                            | set       | 1        |                   |              |        |         |
| 9                                           | Chain Pulley-3 ton capacity chain pulley (ISO/ISI Standard)                                                                                                                                                                    | set       | 1        |                   |              |        |         |
| 10                                          | Pump casing pipe (HDPE made at least PN 10, 8" diameter, 10 feet long, inlet: 63mm, outlet: 50mm with proper vent pipes) with all required accessories. Pump set to RVT Connection.                                            | Set       | 1        |                   |              |        |         |
| <b>Sub Total (C)</b>                        |                                                                                                                                                                                                                                |           |          |                   |              |        |         |
| <b>Total (A+B+C)</b>                        |                                                                                                                                                                                                                                |           |          |                   |              |        |         |
| <b>13% Vat on Vat Applicable Components</b> |                                                                                                                                                                                                                                |           |          |                   |              |        |         |
| <b>Total Amount including VAT</b>           |                                                                                                                                                                                                                                |           |          |                   |              |        |         |
| <b>D</b>                                    | <b>Transportation of all electromechanical equipment's -Up to Road Head at site</b>                                                                                                                                            | <b>LS</b> |          |                   |              |        |         |
|                                             |                                                                                                                                                                                                                                |           |          |                   |              |        |         |



**Important Note:** Contractor/Firm can propose separate economical, efficient design & estimated BoQ by authorized Engineering designer with one of the pumping systems of **Grundfos or Pedrollo or Lorentz** or equivalent. Technical evaluation can consider the new design and proposed costing maintaining the minimum standards of technical specifications.

Transportation (Road Head locations): Kalimati-1, Rajikot

Please tick the following information option as per your capacity:

|                                                                                                                    |                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Availability Pump & Panel in the stock                                                                             | <input type="checkbox"/> Yes <input type="checkbox"/> No                                                                                                                            |
| Time of materials delivery to the sites after agreement with UC:                                                   | <input type="checkbox"/> Within One month <input type="checkbox"/> 1-2 month <input type="checkbox"/> More than 2 months                                                            |
| Availability of spare parts of solar pump, Panel & other accessories in local Market:                              | <input type="checkbox"/> Available in Tulsipur, Dang<br><input type="checkbox"/> Birendranagar, Surkhet<br><input type="checkbox"/> Nepalganj<br><input type="checkbox"/> Kathmandu |
| Availability of Local Technical Agent for repair & maintenance of solar pump, Panel & other accessories in region: | Available in<br><input type="checkbox"/> Tulsipur, Dang<br><input type="checkbox"/> Birendranagar, Surkhet<br><input type="checkbox"/> Nepalganj                                    |



## Annex: 1 Cover Letter format

[On Firm's Letterhead]

<Insert date>

To: Rajikot Lift WSS

User Committee Kalimati-1 Salyan

We, the undersigned, provide the attached proposal in accordance with **RFQ** Design, Supply, Delivery, Installation, Testing and Commissioning of Solar PV Water Pumping System **dated** ..... Our attached proposal is for the total price of <Sum in Words Rs ..... Sum in Figures..... for the three systems) >. We honestly understood & accepted the technical specification and requirement of the WSUC for the given task.

I certify a validity period of ..... days for the prices provided in the attached Bill of Quantities. Our proposal shall be binding upon us subject to the modifications resulting from any discussions.

Offeror shall verify here the items specified in this RFQ document.

We understand that the User Committee is not bound to accept any proposal it receives.

Yours sincerely,

Authorized Signature:

Name and Title of Signatory: .....

Name of Firm: .....

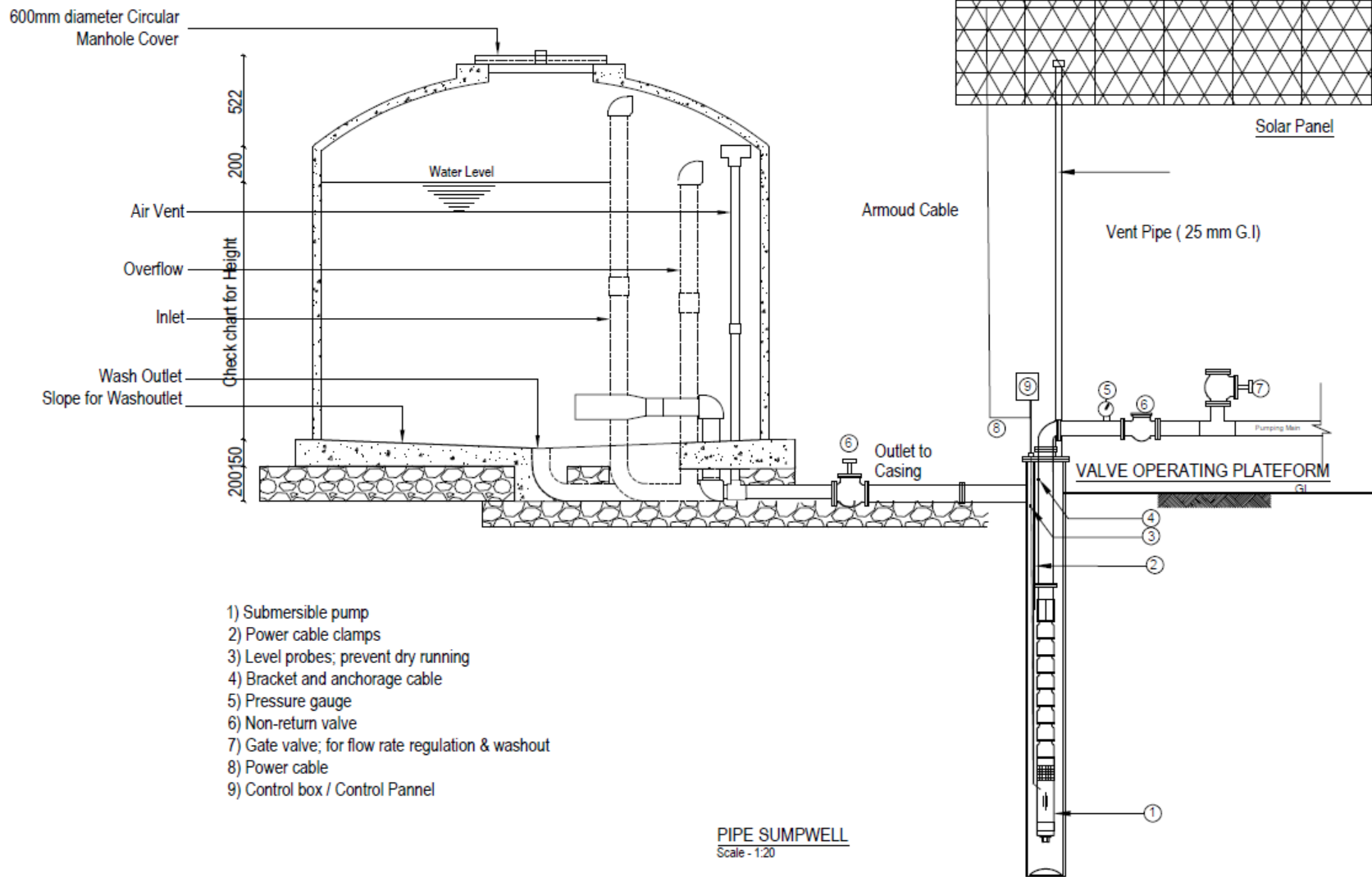
Address: .....

Telephone & contact Mobile no: .....

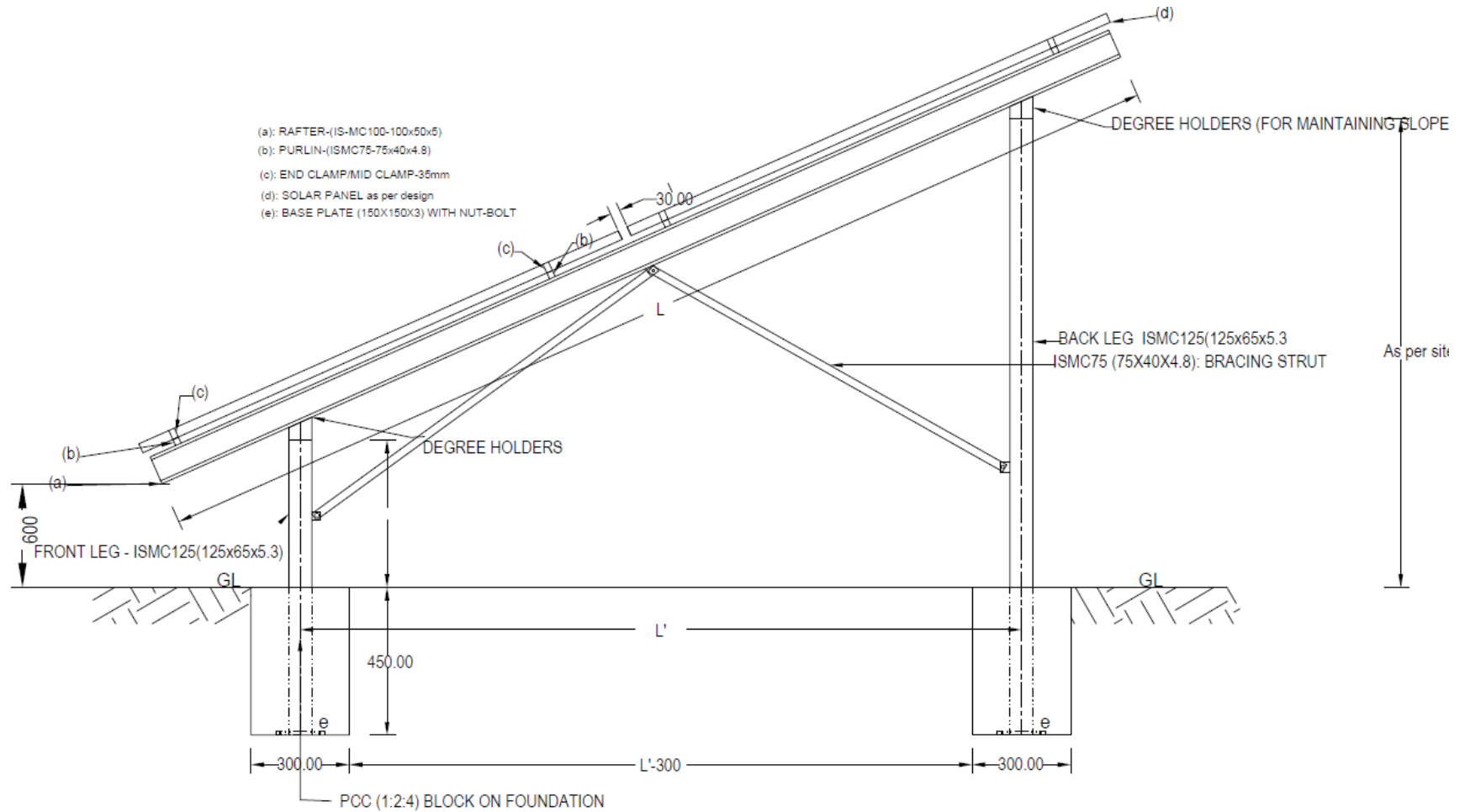
Email: .....

Company Seal/Stamp:

## Annex :2 Drawing of Casing Pipe



### Annex :3 Drawing of Solar mounting frame



ELEVATION OF SOLAR MOUNTING STRUCTURE : POTRAIT MODE OF SOLAR PANEL INSTALLATION



## Annex:3 Initial Design

| Design of Pump                                                                                                                                          |                                             |              |                                            |                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------|--------------------------------------------|----------------------------------------------|
| Rajikot Lift DWS Project                                                                                                                                |                                             |              |                                            |                                              |
| LACCP<br>Insert from 1<br>Demand                                                                                                                        |                                             |              |                                            |                                              |
| Distance of pumping main, L                                                                                                                             |                                             |              | = 745.20 m                                 | From Site Visit Conducted (with 10% mark up) |
| Total level difference between Source and proposed reservoir                                                                                            |                                             |              | = 227.90 m                                 | From Site Visit Conducted                    |
| The discharge to be pumped, Q                                                                                                                           |                                             |              | = 6092.60 L/Hr                             | 101.5 LPM                                    |
|                                                                                                                                                         |                                             |              | = 1.692 lps                                |                                              |
| By Lea's formula, economical size of pumping main, D is given then:                                                                                     |                                             |              |                                            |                                              |
| D = $1.22\sqrt{Q}$                                                                                                                                      |                                             |              |                                            |                                              |
| Hence, D                                                                                                                                                |                                             |              | = 50.19 mm                                 |                                              |
| However available size of GI pipe is:                                                                                                                   |                                             |              | = 50.00 mm                                 |                                              |
|                                                                                                                                                         | Hence, use 50 mmØ GI pipe having bore       |              | = 50.00 mm                                 |                                              |
| Calculation of head loss :                                                                                                                              |                                             |              |                                            |                                              |
|                                                                                                                                                         | Here, Discharge, Q                          |              | = 1.692 Lps                                |                                              |
|                                                                                                                                                         | For 50 mmØ GI pipe                          |              |                                            |                                              |
|                                                                                                                                                         | Pipe bore, D                                |              | = 50.00 mm                                 |                                              |
|                                                                                                                                                         | For length, L                               |              | = 745.20 m                                 |                                              |
|                                                                                                                                                         | Pipe material being used                    |              | GI                                         |                                              |
|                                                                                                                                                         | Velocity of flow, $V = Q/A = 4Q/\pi D^2$    |              | = 0.86 m/s                                 |                                              |
|                                                                                                                                                         | Absolute roughness                          |              | = 0.15 mm                                  | From table                                   |
|                                                                                                                                                         | Coefficient of friction, $f$                |              | = 0.0296                                   |                                              |
| Using Darcy-Weisbach equation                                                                                                                           |                                             |              |                                            |                                              |
|                                                                                                                                                         | Headloss, $H_1 = f \cdot L/D \cdot v^2/2g$  |              | = 16.71 m                                  |                                              |
|                                                                                                                                                         | Total headloss                              |              | = 16.71 m                                  |                                              |
| Total head for pumping = Level difference + headloss + Suction head                                                                                     |                                             |              |                                            |                                              |
| Depth of collection tank (If deep boring keep that depth here)                                                                                          |                                             |              | = 2.00 m                                   |                                              |
| However take the dyanamic level of water for submersible pump as 1.5 m below the collection tank                                                        |                                             |              |                                            |                                              |
|                                                                                                                                                         |                                             |              | = 1.50 m                                   |                                              |
| Additional Head Loss (10% of total static head measured)                                                                                                |                                             |              | = 22.79 m                                  |                                              |
|                                                                                                                                                         | ∴ Total dynamic head, H                     |              | = 270.90 m                                 |                                              |
| Horse Power of Pump                                                                                                                                     |                                             |              |                                            |                                              |
|                                                                                                                                                         | $HP = \frac{Q \rho g H}{746 \eta}$          |              |                                            |                                              |
| Where,                                                                                                                                                  |                                             |              |                                            |                                              |
|                                                                                                                                                         | Q = discharge, m³/s                         |              |                                            |                                              |
|                                                                                                                                                         | $\rho$ = density of water, kg/m³            |              |                                            |                                              |
|                                                                                                                                                         | g = acceleration due to gravity, m/s²       |              |                                            |                                              |
|                                                                                                                                                         | H = total dynamic head, m                   |              |                                            |                                              |
|                                                                                                                                                         | $\eta$ = efficiency of pump                 |              |                                            |                                              |
| Assuming efficiency of pump as                                                                                                                          | = 50.00 %                                   |              | (average eff. of pump available in market) |                                              |
| The HP of pump required                                                                                                                                 | = 12.03                                     |              | = 8.98 KW                                  |                                              |
| Requirement                                                                                                                                             | 101.5 LPM @ 270.90 Meter Total Dynamic Head |              |                                            |                                              |
| Based on above pump design and available performance chart, submersible pump with performance of at least 125 L/M at 322 meter head has been considered |                                             |              |                                            |                                              |
| From pump manufacturer's characteristic performance curve, following pump matches                                                                       |                                             |              |                                            |                                              |
| Name of pump :                                                                                                                                          | KSB                                         |              |                                            |                                              |
| Pump model :                                                                                                                                            | UFN 60/24 UMAI 150, 13/22                   |              |                                            |                                              |
| Phase of power supply :                                                                                                                                 | Three Phase                                 | Outlet: 50mm | 2"                                         |                                              |
| Power of pump :                                                                                                                                         | 11 kW                                       | (15 HP)      |                                            |                                              |
| Discharge :                                                                                                                                             | 125 LPM at 322m Head                        |              |                                            | From Pump Performance Curve                  |

