Prequalification
Works

Design, Supply, Installation and Commissioning of five mini-grids and stand-alone systems in Uman, Tol (Munien), Tol (Wonip), Onoun, and Moch, Chuuk, Federated State of Micronesia

THE WORLD BANK
IBRD • IDA

April 2026

Invitation for Prequalification

Country: Federated States of Micronesia

Name of Project: Access and Renewable Increase for Sustainable Energy (Pl81253)

Contract Title: Design, Supply, Installation and Commissioning of five mini-grids and stand-alone systems in Uman, Tol (Munien), Tol (Wonip), Onoun, and Moch, Chuuk

Grant No.: E429-FM

Prequalification Reference No.: MG-PQ-Chuuk

Issued on: April 20, 2026

1. The Government of the Federated States of Micronesia, represented by the Department of Resources and Development (DoR&D) has received financing from the World Bank toward the cost of the Access and Renewable Increase for Sustainable Energy project (ARISE) Pl81253, and intends to apply part of the proceeds toward payments under the contract for Design, Supply, Installation and Commissioning of five mini-grids and stand-alone systems in Uman, Tol (Munien), Tol (Wonip), Onoun and Moch, Chuuk.

2. DoR&D seeks to prequalify contractors for the design, supply, installation, and commissioning of power systems in five communities: (1) Uman; (2) Wonip on Tol Island; (3) Munien on Tol Island; (4) Moch; and (5) Onoun. Communities 1, 2, and 3 are in the inner Chuuk Lagoon, while Communities 4 and 5 are in the Mortlocks and Northwest, respectively. The scope of work includes the engineering, procurement, and construction of the following activities:

    - Power generation systems,
    - Low-voltage and medium-voltage power distribution network, user service lines, and end-user indoor wiring.
    - Stand-alone power systems for certain designated customers.

    As well as the provision of a comprehensive, hands-on Operation and Maintenance (O&M) training for state utility personnel, partner staff, and local community members.

    It is expected that the Request for Bids will be published in July 2026

3. Prequalification will be conducted through the procedures as specified in the World Bank's Procurement Regulations for IPF Borrowers September 2025 ("Procurement Regulations"), and is open to all eligible Applicants as defined in the Procurement Regulations

4. Interested eligible Applicants may obtain further information from the DoR&D at the email address *(a)* below during office hours (*800 to 1700 hours Pohnpei time from Monday to Friday*). A complete set of prequalification documents in **English can be downloaded** at

https://personnel.gov.fm/bidding-contract/ and https://dofa.gov.fm/ and https://drive.google.com/drive/folders/1SOyAZd3BudA_h-bjzs7CiYU0cb76lJ68?usp=sharing

5. Applications for prequalification should be submitted by email with the email subject indicated as "*Prequalification for Chuuk Mini-grids*" and delivered to address (a) below by *10:00 am Pohnpei Standard Time* on *May 20, 2026*. Late applications will be returned unopened.

   (a) ***The Project Manager, ARISE***

   National Government Complex, Kaselehlie Building,
   Department of Resources and Development, Energy Division

   City: Palikir, Pohnpei

   ZIP Code: 96941

   Country: Federated States of Micronesia

   Telephone: (691) 320-2646/5133/2620

   Electronic mail address:

   arise@rd.gov.fm

   CC: sebastien.pitot@ttaenergy.com and
   roger.sallent@ttaenergy.com

Prequalification Document Works

Procurement of:

Design, Supply, Installation and Commissioning of five mini-grids and stand-alone systems in Uman, Tol (Munien), Tol (Wonip), Onoun, and Moch, Chuuk

Invitation for Prequalification No: FSM-W-01

Prequalification Document (PQD) No*: MG-PQ-Chuuk*

Project*:* Access and Renewable Increase for Sustainable Energy (Pl81253)

Employer: Department of Resources and Development (DoR&D)

Country: Federated States of Micronesia

Issued on*: April 20, 2026*

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PART 1 – Prequalification Procedures

Section I - Instructions to Applicants

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Section I - Instructions to Applicants

A. General

1. Scope of Application

1.1 In connection with the invitation for Prequalification indicated in Section II (Prequalification Data Sheet) (PDS), the Employer, as defined **in the PDS,** issues this Prequalification Document ("Prequalification Document") to prospective applicants ("Applicants") interested in submitting applications ("Applications") for prequalification to bid for the Works described in Section VII (Scope of Works). In case the Works are to be bid as individual contracts (i.e., the slice and package procedure), these are listed **in the PDS**. The Request for Bids (RFB) number corresponding to this prequalification is also provided **in the PDS.**

2. Source of Funds

2.1 The Borrower or Recipient (hereinafter called "Borrower") indicated **in the PDS** has applied for or received financing (hereinafter called "funds") from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called "the Bank") in an amount specified **in the PDS,** towards the cost of the project named **in the PDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) resulting from the bidding for which this prequalification is conducted.

2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the loan (or credit) account for the purpose of any payment to persons or entities, or for any import of goods, equipment, plant or materials, or services if such payment or import, to the knowledge of the Bank, is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the loan (or credit).

3. Fraud and Corruption

3.1 The Bank requires compliance with the Bank's Anti-Corruption Guidelines and its prevailing sanctions policies and

procedures as set forth in the WBG's Sanctions Framework, as set forth in Section VI, Fraud and Corruption.

3.2 In further pursuance of this policy, Applicants shall permit and shall cause their agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit the Bank to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, bid submission (in case prequalified), proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

4. Eligible Applicants

4.1 Applicants shall meet the eligibility criteria as per this ITA and ITA 5.1 and 5.2.

4.2 An Applicant may be a firm that is a private entity, a state-owned enterprise or institution subject to ITA 4.8 or any combination of such entities in the form of a joint venture ("JV") under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the prequalification process, bidding (in the event the JV submits a Bid) and during contract execution (in the event the JV is awarded the Contract). Unless specified **in the PDS**, there is no limit on the number of members in a JV.

4.3 A firm may apply for prequalification both individually, and as part of a joint venture, or participate as a subcontractor. If prequalified, it will not be permitted to bid for the same contract both as an individual firm and as a part of the joint venture or as a subcontractor. However, a firm may participate as a subcontractor in more than one Bid, but only in that capacity. Bids submitted in violation of this procedure will be rejected.[1]

4.4 A firm and any of its affiliates (that directly or indirectly control, are controlled by or are under common control with that firm)

[1] If this Document is being used to prequalify Applicants for the Procurement of Plant, modify this provision in the PDS to reflect the "One Bid per Bidder" provision in the Bank's Standard Procurement Document for Plant.

may submit its application for prequalification either individually, as joint venture or as a subcontractor among them for the same contract. However, if prequalified, only one prequalified Applicant will be allowed to bid for the same contract. All Bids submitted in violation of this procedure will be rejected.

4.5 An Applicant may have the nationality of any country, subject to the restrictions pursuant to ITA 5.1 and 5.2. An Applicant shall be deemed to have the nationality of a country if the Applicant is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed specialized sub-contractors or suppliers for any part of the Contract including related Services.

4.6 Applicants shall not have a conflict of interest. Applicants shall be considered to have a conflict of interest, if they, or any of their affiliates, participated as a consultant in the preparation of the design or technical specifications or have been hired or proposed to be hired by the Employer or Borrower as Engineer for contract implementation of the Works that are the subject of this prequalification. In addition, Applicants may be considered to have a conflict of interest if they have a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the prequalification Document or Request for Bids (RFB) Document or specifications of the Contract, and/or the Bid evaluation process of such Contract; or (ii) would be involved in the implementation or supervision of such Contract, unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the prequalification, RFB process and execution of the Contract.

4.7 An Applicant that has been sanctioned by the Bank, pursuant to the Bank's Anti-Corruption Guidelines, and in accordance with its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework, as described in Section VI, paragraph 2.2 d. shall be ineligible to be prequalified for, initially selected for, bid for, propose for, or

be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address specified in the PDS.

4.8 Applicants that are state-owned enterprise or institutions in the Employer's Country may be eligible to prequalify, compete and be awarded a Contract(s) only if they can establish, in a manner acceptable to the Bank, that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not under supervision of the Employer.

4.9 An Applicant shall not be under suspension from bidding by the Employer as the result of the execution of a Bid/Proposal–Securing Declaration.

4.10 An Applicant shall provide such documentary evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request.

4.11 A firm that is under a sanction of debarment by the Borrower from being awarded a contract is eligible to participate in this procurement, unless the Bank, at the Borrower's request, is satisfied that the debarment; (a) relates to fraud or corruption, and (b) followed a judicial or administrative proceeding that afforded the firm adequate due process.

5. Eligibility

5.1 Firms and individuals may be ineligible if they are nationals of ineligible countries as indicated in Section V. The countries, persons or entities are ineligible if:

(a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or

(b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any

country, person, or entity in that country.

5.2 When the Works are implemented across jurisdictional boundaries (and more than one country is a Borrower, and is involved in the procurement), then exclusion of a firm or individual on the basis of ITA 5.1(a) above by any country may be applied to that procurement across other countries involved, if the Bank and the Borrowers involved in the procurement agree.

B. Contents of the Prequalification Document

6. Sections of Prequalification Document

6.1 This Prequalification Document consists of parts 1 and 2 which comprise all the sections indicated below, and which should be read in conjunction with any Addendum issued in accordance with ITA 8.

PART 1 Prequalification Procedures

- Section I - Instructions to Applicants (ITA)
- Section II - Prequalification Data Sheet (PDS)
- Section III - Qualification Criteria and Requirements
- Section IV - Application Forms
- Section V – Eligible Countries
- Section VI – Fraud and Corruption

PART 2 Works Requirements

- Section VII - Scope of Works

6.2 Unless obtained directly from the Employer, the Employer accepts no responsibility for the completeness of the document, responses to requests for clarification, the minutes of the pre-Application meeting (if any), or Addenda to the Prequalification Document in accordance with ITA 8. In case of any discrepancies, documents issued directly by the Employer shall prevail.

6.3 The Applicant is expected to examine all instructions, forms, and terms in the Prequalification Document and to furnish with its Application all information or documentation as is required by the Prequalification Document.

7. Clarification of

7.1 An Applicant requiring any clarification of the Prequalification

Prequalification Document and Pre-Application Meeting

Document shall contact the Employer in writing at the Employer's address indicated **in the PDS.** The Employer will respond in writing to any request for clarification provided that such request is received no later than fourteen (14) days prior to the deadline for submission of the applications. The Employer shall forward a copy of its response to all prospective Applicants who have obtained the Prequalification Document directly from the Employer, including a description of the inquiry but without identifying its source. If so indicated **in the PDS**, the Employer shall also promptly publish its response at the web page identified **in the PDS**. Should the Employer deem it necessary to amend the Prequalification Document as a result of a clarification, it shall do so following the procedure under ITA 8. and in accordance with the provisions of ITA 17.2.

7.2 If indicated **in the PDS**, the Applicant's designated representative is invited at the Applicant's cost to attend a pre-Application meeting at the place, date and time mentioned **in the PDS**. During this pre-Application meeting, prospective Applicants may request clarification of the project requirement, the criteria for qualifications or any other aspects of the Prequalification Document.

7.3 Minutes of the pre-Application meeting, if applicable, including the text of the questions asked by Applicants, including those during the meeting (without identifying the source) and the responses given, together with any responses prepared after the meeting will be transmitted promptly to all prospective Applicants who have obtained the Prequalification Document. Any modification to the Prequalification Document that may become necessary as a result of the pre-Application meeting shall be made by the Employer exclusively through the use of an Addendum pursuant to ITA 8. Non-attendance at the pre-Application meeting will not be a cause for disqualification of an Applicant.

8. Amendment of Prequalification Document

8.1 At any time prior to the deadline for submission of Applications, the Employer may amend the Prequalification Document by issuing an Addendum.

8.2 Any Addendum issued shall be part of the Prequalification Document and shall be communicated in writing to all Applicants who have obtained the Prequalification Document from the Employer. The Employer shall promptly publish the

Addendum at the Employer's web page identified **in the PDS**.

8.3 To give Applicants reasonable time to take an Addendum into account in preparing their Applications, the Employer may, at its discretion, extend the deadline for the submission of Applications in accordance with ITA 17.2.

C. Preparation of Applications

9. Cost of Applications

9.1 The Applicant shall bear all costs associated with the preparation and submission of its Application. The Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the prequalification process.

10. Language of Application

10.1 The Application as well as all correspondence and documents relating to the prequalification exchanged by the Applicant and the Employer, shall be written in the language specified **in the PDS.** Supporting documents and printed literature that are part of the Application may be in another language, provided they are accompanied by an accurate translation of the relevant passages in the language specified **in the PDS,** in which case, for purposes of interpretation of the Application, the translation shall govern.

11. Documents Comprising the Application

11.1 The Application shall comprise the following:

(a) **Application Submission Letter**, in accordance with ITA 12.1;

(b) **Eligibility:** documentary evidence establishing the Applicant's eligibility, in accordance with ITA 13.1;

(c) **Qualifications:** documentary evidence establishing the Applicant's qualifications, in accordance with ITA 14; and

(d) any other document required as specified **in the PDS**.

11.2 The Applicant shall furnish information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Application

12. Application Submission Letter

12.1 The Applicant shall complete an Application Submission Letter as provided in Section IV (Application Forms). This Letter must be completed without any alteration to its format.

13. Documents Establishing the Eligibility of the

13.1 To establish its eligibility in accordance with ITA 4, the Applicant shall complete the eligibility declarations in the Application Submission Letter and Forms ELI (eligibility) 1.1 and 1.2,

Applicant

included in Section IV (Application Forms).

14. Documents Establishing the Qualifications of the Applicant

14.1 To establish its qualifications to perform the contract(s) in accordance with Section III, Qualification Criteria and Requirements, the Applicant shall provide the information requested in the corresponding Information Sheets included in Section IV (Application Forms).

14.2 Wherever an Application Form requires an Applicant to state a monetary amount, Applicants should indicate the USD equivalent using the rate of exchange determined as follows:

(a) For construction turnover or financial data required for each year - Exchange rate prevailing on the last day of the respective calendar year (in which the amounts for that year is to be converted).

(b) Value of single contract - Exchange rate prevailing on the date of the contract.

Exchange rates shall be taken from the publicly available source identified **in the PDS**. Any error in determining the exchange rates in the Application may be corrected by the Employer.

15. Signing of the Application and Number of Copies

15.1 The Applicant shall prepare one original of the documents comprising the Application as described in ITA 11 and clearly mark it "ORIGINAL". The original of the Application shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Applicant. In case the Applicant is a JV, the Application shall be signed by an authorized representative of the JV on behalf of the JV and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized signatories.

15.2 The Applicant shall submit copies of the signed original Application, in the number specified **in the PDS,** and clearly mark them "COPY". In the event of any discrepancy between the original and the copies, the original shall prevail.

D. Submission of Applications

16. Sealing and Marking of Applications

16.1 The Applicant shall enclose the original and the copies of the Application in a sealed envelope that shall:

(a) bear the name and address of the Applicant;

(b) be addressed to the Employer, in accordance with ITA 17.1;

and

(c) bear the specific identification of this prequalification process indicated **in the PDS** 1.1.

16.2 The Employer will accept no responsibility for not processing any envelope that was not identified as required in ITA 16.1 above.

17. Deadline for Submission of Applications

17.1 Applicants may either submit their Applications by mail or by hand. Applications shall be received by the Employer at the address and no later than the deadline indicated **in the PDS.** When so specified **in the PDS,** Applicants have the option of submitting their Applications electronically, in accordance with electronic Application submission procedures specified **in the PDS.**

17.2 The Employer may, at its discretion, extend the deadline for the submission of Applications by amending the Prequalification Document in accordance with ITA 8, in which case all rights and obligations of the Employer and the Applicants subject to the previous deadline shall thereafter be subject to the deadline as extended.

18. Late Applications

18.1 The Employer reserves the right to accept applications received after the deadline for submission of applications, unless otherwise specified **in the PDS**.

19. Opening of Applications

19.1 The Employer shall open all Applications at the date, time and place specified **in the PDS**. Late Applications shall be treated in accordance with ITA 18.1.

19.2 Applications submitted electronically (if permitted pursuant to ITA 17.1) shall be opened in accordance with the procedures specified **in the PDS.**

19.3 The Employer shall prepare a record of the opening of Applications to include, as a minimum, the name of the Applicants. A copy of the record shall be distributed to all Applicants.

E. Procedures for Evaluation of Applications

20. Confidentiality

20.1 Information relating to the Applications, their evaluation and results of the prequalification shall not be disclosed to Applicants or any other persons not officially concerned with the prequalification process until the notification of

prequalification results is made to all Applicants in accordance with ITA 28.

20.2 From the deadline for submission of Applications to the time of notification of the results of the prequalification in accordance with ITA 28. any Applicant that wishes to contact the Employer on any matter related to the prequalification process may do so only in writing.

21. Clarification of Applications

21.1 To assist in the evaluation of Applications, the Employer may, at its discretion, ask an Applicant for a clarification (including missing documents) of its Application, to be submitted within a stated reasonable period of time. Any request for clarification from the Employer and all clarifications from the Applicant shall be in writing.

21.2 If an Applicant does not provide clarifications and/or documents requested by the date and time set in the Employer's request for clarification, its Application shall be evaluated based on the information and documents available at the time of evaluation of the Application.

22. Responsiveness of Applications

22.1 The Employer may reject any Application which is not responsive to the requirements of the Prequalification Document. In case the information furnished by the Applicant is incomplete or otherwise requires clarification as per ITA 21.1, and the Applicant fails to provide satisfactory clarification and/or missing information, it may result in disqualification of the Applicant.

23. Margin of Preference

23.1 Unless otherwise specified **in the PDS,** a margin of preference for domestic bidders[2] shall not apply in the bidding process resulting from this prequalification.

24. Subcontractors

24.1 Unless otherwise stated **in the PDS,** the Employer does not intend to execute any specific elements of the Works by sub-contractors selected in advance by the Employer (so-called "Nominated Subcontractors")**.**

24.2 The Applicant shall not propose to subcontract the whole of

[2] An individual firm is considered a domestic Bidder for purposes of the margin of preference if it is registered in the country of the Employer, has more than 50 percent ownership by nationals of the country of the Employer, and if it does not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign contractors. JVs are considered as domestic Bidders and eligible for domestic preference only if the individual member firms are registered in the country of the Employer, have more than 50 percent ownership by nationals of the country of the Employer, and the JV shall be registered in the country of the Borrower. The JV shall not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign firms. JVs between foreign and national firms will not be eligible for domestic preference.

the Works. The Employer, in ITA 25.2, may permit the Applicant to propose subcontractors for certain specialized parts of the work as indicated therein as ("Specialized Subcontractors"). Applicants planning to use such Specialized Subcontractors shall specify, in the Application Submission Letter, the activity(ies) or parts of the Works proposed to be subcontracted along with details of the proposed subcontractors including their qualification and experience.

F. Evaluation of Applications and Prequalification of Applicants

25. Evaluation of Applications

25.1 The Employer shall use the factors, methods, criteria, and requirements defined in Section III, Qualification Criteria and Requirements, to evaluate the qualifications of the Applicants, and no other methods, criteria, or requirements shall be used. The Employer reserves the right to waive minor deviations from the qualification criteria if they do not materially affect the technical capability and financial resources of an Applicant to perform the Contract.

25.2 Subcontractors proposed by the Applicant shall be fully qualified for their parts of the Works. The subcontractor's qualifications shall not be used by the Applicant to qualify for the Works unless their parts of the Works were previously designated by the Employer **in the PDS** as can be met by Specialized Subcontractors, in which case, the qualifications of the Specialized Subcontractor proposed by the Applicant may be added to the qualifications of the Applicant for the purpose of the evaluation.

25.3 In case of multiple contracts, Applicants should indicate in their Applications the individual contract or combination of contracts in which they are interested. The Employer shall prequalify each Applicant for the maximum combination of contracts for which the Applicant has thereby indicated its interest and for which the Applicant meets the appropriate aggregate requirements. The qualification criteria and requirements are specified in Section III.

25.4 However, with respect to the specific experience under item Section III (Qualification Criteria and Requirements), 4.2 (a) , the Employer will select any one or more of the options as identified below:

N is the minimum number of contracts

V is the minimum value of a single contract.

(a) Prequalification for one Contract:

Option 1: (i) N contracts, each of minimum value V;

Or

Option 2: (i) N contracts, each of minimum value V,

Or

(ii) Less than or equal to N contracts, each of minimum value V, but with total value of all contracts equal or more than N x V

(b) Prequalification for Multiple Contracts

Option 1: (i) Minimum requirements for combined contract(s) shall be the aggregate requirements for each contract for which the Applicant has applied for as follows, and N1, N2, N3, etc. shall be different contracts:

Lot 1: N1 contracts, each of minimum value V1;

Lot 2: N2 contracts, each of minimum value V2;

Lot 3: N3 contracts, each of minimum value V3; ----etc.

Or

Option 2: (i) Minimum requirements for combined contract(s) shall be the aggregate requirements for each contract for which the Applicant has applied for as follows, and N1, N2, N3, etc. shall be different contracts:

Lot 1: N1 contracts, each of minimum value V1;

Lot 2: N2 contracts, each of minimum value V2;

Lot 3: N3 contracts, each of minimum value V3; ----etc,

Or

(ii) **Lot 1:** N1 contracts, each of minimum value V1; or number of contracts less than or equal to N1, each of minimum value V1, but with total value of all contracts equal or more than N1 x V1

Lot 2: N2 contracts, each of minimum value V2; or number of contracts less than or equal to N2, each of minimum value V2, but with total value of all contracts equal or more than N2 x V2

Lot 3: N3 contracts, each of minimum value V3; or number of contracts less than or equal to N3, each of minimum value V3, but with total value of all contracts equal or more than N3 x V3 ----etc.

Or

Option 3: (i) Minimum requirements for combined contract(s) shall be the aggregate requirements for each contract for which the Applicant has applied for as follows, and N1, N2 ,N3, etc. shall be different contracts:

Lot 1: N1 contracts, each of minimum value V1;

Lot 2: N2 contracts, each of minimum value V2;

Lot 3: N3 contracts, each of minimum value V3; ----etc,

Or

(ii) **Lot 1:** N1 contracts, each of minimum value V1; or number of contracts less than or equal to N1, each of minimum value V1, but with total value of all contracts equal or more than N1 x V1

Lot 2: N2 contracts, each of minimum value V2; or number of contracts less than or equal to N2, each of minimum value V2, but with total value of all contracts equal or more than N2 x V2

Lot 3: N3 contracts, each of minimum value V3; or number of contracts less than or equal to N3, each of minimum value V3, but with total value of all contracts equal or more than N3 x V3 ----etc,

Or

(iii) Subject to compliance as per (ii) above with respect to minimum value of single contract for each lot, total number of contracts is equal or less than N1 + N2 + N3 +--but the total value of all such contracts is equal or more than N1 x V1 + N2 x V2 + N3 x V3 +---.

25.5 Only the qualifications of the Applicant shall be considered. The qualifications of other firms, including the Applicant's subsidiaries, parent entities, affiliates, subcontractors (other than Specialized Subcontractors in accordance with ITA 25.2 above) or any other firm(s) different from the Applicant shall not be considered.

26. Employer's Right to Accept or Reject Applications

26.1 The Employer reserves the right to accept or reject any Application, and to annul the prequalification process and reject all Applications at any time, without thereby incurring any liability to the Applicants.

27. Prequalification of Applicants

27.1 All Applicants whose Applications substantially meet or exceed the specified qualification requirements will be prequalified by the Employer.

27.2 An Applicant may be "conditionally prequalified," that is, qualified subject to the Applicant submitting or correcting certain specified nonmaterial documents or deficiencies to the satisfaction of the Employer.

27.3 Applicants that are conditionally prequalified will be so informed along with the statement of the condition(s) which must be met to the satisfaction of the Employer before or at the time of submitting their Bids.

28. Notification of Prequalification

28.1 The Employer shall notify all Applicants in writing of the names of those Applicants who have been prequalified or conditionally prequalified. In addition, those Applicants who have been disqualified will be informed separately.

28.2 Applicants that have not been prequalified may write to the

Employer to request, in writing, the grounds on which they were disqualified.

29. Request for Bids

29.1 Promptly after the notification of the results of the prequalification, the Employer shall invite Bids from all the Applicants that have been prequalified or conditionally prequalified.

29.2 Bidders may be required to provide a Bid Security or a Bid-Securing Declaration acceptable to the Employer in the form and an amount to be specified in the bidding document.

29.3 The successful Bidder shall be required to provide a Performance Security as specified in the bidding document.

29.4 If applicable, the successful Bidder shall be required to provide a separate Environmental and Social (ES) Performance Security.

29.5 Bidders shall be required to provide a Code of Conduct which will apply to their and sub-contractors' personnel that includes the minimum requirements specified in the bidding document.

29.6 Bidders shall be required to submit management strategies and implementation plans that address key Environmental and Social (ES) risks (including Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH)) requirements.

29.7 The successful Bidder shall provide additional information about its beneficial ownership using the Beneficial Ownership Disclosure Form included in the bidding document.

29.8 If specified in the PDS, Bidders shall be required to submit a Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment (SH) Declaration, using the Sexual Exploitation and Abuse (SEA), and/or Sexual Harassment (SH) declaration form included in the bidding documents.

29.9 Prior to Contract award, the Employer will verify that the successful Bidder (including each member of a JV) is not disqualified by the Bank due to noncompliance with contractual SEA/SH prevention and response obligations. The Employer will conduct the same verification for each subcontractor proposed by the successful Bidder. If any proposed subcontractor does not meet the requirement, the Employer will require the Bidder to propose a replacement

subcontractor.

30. Changes in Qualifications of Applicants

30.1 Any change in the structure or formation of an Applicant after being prequalified in accordance with ITA 27 and invited to bid (including, in the case of a JV, any change in the structure or formation of any member and also including any change in any specialized subcontractor whose qualifications were considered to prequalify the Applicant) shall be subject to the written approval of the Employer prior to the deadline for submission of Bids. Such approval shall be denied if (i) a prequalified applicant proposes to associate with a disqualified applicant or in case of a disqualified joint venture, any of its members; (ii) as a consequence of the change, the Applicant no longer substantially meets the qualification criteria set forth in Section III (Qualification Criteria and Requirements); or (iii) in the opinion of the Employer, the change may result in a substantial reduction in competition. Any such change should be submitted to the Employer not later than fourteen (14) days after the date of the Request for Bids.

31. Procurement Related Complaint

31.1 The procedures for making a Procurement-related Complaint are as specified in the PDS.

Section II - Prequalification Data Sheet (PDS)

A. General	
ITA 1.1	The identification of the Invitation for Prequalification is: *MG-PQ-Chuuk* The Employer is: **National Government of Federated State of Micronesia represented by Department of Resources and Development (DoR&D), Federated States of Micronesia** The name of the Prequalification is: **Design, Supply, Installation and Commissioning of five mini-grids and stand-alone systems in Uman, Tol (Munien), Tol (Wonip), Onoun, and Moch, Chuuk** The number and identification of the RFB is: FM-DORD-546537-CW-RFB
ITA 2.1	The Borrower is: National Government of Federated State of Micronesia
ITA 2.1	Loan or Financing Agreement amount budgeted for the works is: *US$*9.8 million
ITA 2.1	The name of the Project is: **Access and Renewable Increase for Sustainable Energy (ARISE) - P181253**
ITA 4.2	Maximum number of members in the JV shall be: **Three (3)**
ITA 4.7	A list of debarred firms and individuals is available on the Bank's external website: http://www.worldbank.org/debarr.
B. Contents of the Prequalification Document	
ITA 7.1	For **clarification purposes,** the Employer's address is: The Project Manager, ARISE National Government Complex, Kaselehlie Building, Department of Resources and Development, Energy Division City: Palikir, Pohnpei ZIP Code: **96941** Country: Federated States of Micronesia Telephone: **(691) 320-2646/5133/2620** Electronic mail address:

	arise@rd.gov.fm CC: sebastien.pitot@ttaenergy.com, and roger.sallent@ttaenergy.com
ITA 7.2	Pre-Application Meeting will be held **online** on **May 5, 2026 at 1900 Pohnpei Time** A link will be made available on the website: *https://personnel.gov.fm/bidding-contract/* or *https://dofa.gov.fm/* Applicants can also request an invitation link to arise@rd.gov.fm CC: sebastien.pitot@ttaenergy.com, and roger.sallent@ttaenergy.com There will be no site visit sponsored by the Employer at this stage.
C. Preparation of Applications	
ITA 10.1	This Prequalification document has been issued in the **English** language. Bidders shall not submit Bids in more than one language. All correspondence exchange shall be in the **English** language.
ITA 11.1 (d)	The Applicant shall submit with its Application, the following additional documents: N/A
ITA 14.2	The source for determining exchange rates is **United States Federal Reserve, Foreign Exchange Rates – H.10. (https://www.federalreserve.gov/releases/h10/current/)**
ITA 15.2	In addition to the original, the number of copies to be submitted with the Application is: *N/A*
D. Submission of Applications	
ITA 17.1	**The deadline for Application submission is:** Date: May 20, 2026 Time: 10am Pohnpei Time, FSM For **Application submission purposes only,** the Employer's address is: The Project Manager, ARISE National Government Complex, Kaselehlie Building, Department of Resources and Development, Energy Division

	City: Palikir, Pohnpei ZIP Code: **96941** Country: Federated States of Micronesia Telephone: **(691) 320-2646/5133/2620** Electronic mail address: arise@rd.gov.fm CC: sebastien.pitot@ttaenergy.com, and roger.sallent@ttaenergy.com Late Application and hard-copy submissions will be returned unopened.
ITA 18.1	Late Applications will be returned unopened to the Applicants.
ITA 19.1	The opening of the Applications shall be on May 20, 2026 at 10:30am Pohnpei Standard Time in the conference room of National Government Complex, Kaselehlie Building, Department of Resources and Development, Energy Division City: Palikir, Pohnpei ZIP Code: 96941 Country: Federated States of Micronesia Applications shall be opened publicly and the public can participate online via a link that will be made available on the website: *https://personnel.gov.fm/bidding-contract/* or *https://dofa.gov.fm/*
ITA 19.2	The electronic Application opening procedures shall be: (i) Applicants shall navigate to the main website to enable them to download the Documents and any subsequent addenda through the weblink *https://personnel.gov.fm/bidding-contract/* or *https://dofa.gov.fm/* (ii) Applicants shall email all password protected Applications to the designated email address. (iii) Application shall be submitted to the designated email, prior to the deadline for submission of the Application. All files should in their file names identify the name of the Applicant and the Application identification number and password protected (Passwords are to be submitted prior to the public opening of bids to the designated email address mentioned in (ii) above.) (iv) Only Applications that are received by the designated email before the deadline for bid submission shall be considered. The Employer takes no responsibility for files that are not received on time, incompatible due to file type, file sets that are

	delivered incomplete or corrupt, or emails that are rejected due to size. (v) To ensure your Application is received before the closing deadline, it is strongly recommended that Applicants allow sufficient time to upload their bid submission files.
E. Procedures for Evaluation of Applications	
ITA 24.1	At this time the Employer does not intend to execute certain specific parts of the Works by sub-contractors selected in advance.
ITA 29.8	The Employer will request Bidders to submit Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment (SH) Declaration during the Request for Bids stage.
ITA 31.1	The procedures for making a Procurement-related Complaint are detailed in the "Procurement Regulations for IPF Borrowers (Annex III)." If an Applicant wishes to make a Procurement-related Complaint, the Applicant shall submit its complaint following these procedures, In Writing (by the quickest means available, such as by email or fax), to: **For the attention**: *Elina Akinaga* **Title/position**: *Secretary, Department of Resource and Development* **Employer**: *Department of Resource and Development* **Email address***: eakinaga@rd.gov.fm* In summary, at this stage a Procurement-related Complaint may challenge any of the following: **1.** the terms of the Prequalification Documents; **2.** the Employer's decision to not prequalify an Applicant

Section III - Qualification Criteria and Requirements

This section contains all the methods, criteria, and requirements that the Employer shall use to evaluate Applications. The information to be provided in relation to each requirement and the definitions of the corresponding terms are included in the respective Application Forms.

Contents

A. ELIGIBILITY AND QUALIFICATION METHOD

The evaluation of eligibility and qualification will be conducted on a **pass/fail basis**. Each Application submitted in response to this prequalification will be assessed against the **Eligibility and Qualification Criteria** set out in the following table.

The assessment will be based on the information and documentation provided by the Applicant in the **Submission Forms** listed in Section IV, any justification document annexed, and the contractor's history of work in the Federated States of Micronesia.

Applicants must ensure that all forms are fully completed and supported by clear and verifiable documentation as required. Failure to provide the necessary information, or providing incomplete, inconsistent, or ambiguous responses, may result in disqualification.

For each criterion, the Applicant will receive a **"Pass"** or a **"Fail"** evaluation. The evaluation will be carried out by the Employer following the following approach:

- **Pass**: an Applicant will receive a "Pass" if it demonstrates full compliance with the specific criterion. Clear documentation and evidence of required technical capabilities, financial capacity, personnel qualifications, and experience as required.
- **Fail**: an Applicant will receive a "Fail" if it fails to demonstrate compliance with the required criterion.

Only Applicants that meet all criteria will be deemed prequalified and invited to submit bids at the subsequent stage.

There will be no opportunity to correct or supplement applications after the submission deadline, except as requested by the Employer for the purpose of clarifying ambiguities or confirming information already submitted.

The Employer reserves the right to verify the accuracy and authenticity of any information or documentation submitted. Misrepresentations, whether deliberate or unintentional, will be grounds for disqualification.

B. ELIGIBILITY AND QUALIFICATION CRITERIA

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirement
				All Members Combined	Each Member	One Member	
1. Eligibility							
1.1	**Nationality**	Nationality in accordance with ITA 4.5	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.2	**Conflict of Interest**	No conflicts of interest in accordance with ITA 4.6	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Application Submission Letter
1.3	**Bank Eligibility**	Not having been declared ineligible by the Bank, as described in ITA 4.7 and 5.1	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Application Submission Letter
1.4	**State-owned Entity of the Borrower Country**	Applicant required to meet conditions of ITA 4.8	Must meet requirement	Must meet requirement	Must meet requirement	N / A	Forms ELI -1.1 and 1.2, with attachments
1.5	**United Nations resolution or Borrower's country law**	Not having been excluded as a result of prohibition in the Borrower's country laws or official regulations against commercial relations with the Applicant's country, or by an act of compliance with UN Security Council resolution, both in accordance with ITA 5.1 and 5.2 and Section V.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
2. Historical Contract Non-Performance							
2.1	**History of Non-Performing**	Declare and history of Non-performance of a contract[1] which occurred as a result of	Must meet requirement[1]	Must meet requirements	Must meet	N/A	Form CON-2

[1] Nonperformance, as decided by the Employer, shall include all contracts where (a) nonperformance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the contractor. Nonperformance shall not include contracts where Employers decision was overruled by the dispute resolution mechanism. Nonperformance must be based on all information on fully settled

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirement
				All Members Combined	Each Member	One Member	
	Contracts	contractor's default and termination for cause since 1st January **2018**			requirement[2]		
2.2	**Suspension Based on Execution of Bid/Proposal Securing Declaration by the Employer**	Not under suspension based on execution of a Bid/Proposal Securing Declaration pursuant to ITA 4.9.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Application Submission Letter
2.3	**Pending Litigation**	No pending litigation against the Applicant, declare any pending litigation.	Must meet requirement	N/A	Must meet requirement	N/A	Form CON – 2
2.4	**Litigation History**	No consistent history of court/arbitral award decisions against the Applicant[3] since **1st January 2018.**	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON – 2
2.5	**Declaration: Environmental, and Social (ES) past performance**	Declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any environmental, or social (including Sexual Exploitation and Abuse) contractual obligations including Forced Labor in Solar components in the past five years[4.]	Must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make	N/A	Each must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized	N/A	Form CON-3 ES Performance Declaration

disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the applicant have been exhausted.

[2] This requirement also applies to contracts executed by the Applicant as JV member.

[3] The Applicant shall provide accurate information on the related Application Form about any litigation or arbitration resulting from contracts completed or ongoing under its execution over the last five years. A consistent history of awards against the Applicant or any member of a joint venture may result in rejection of the Application.

[4] The Employer may use this information to seek further information or clarifications during the bidding stage and the associated due diligence.

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirement
				All Members Combined	Each Member	One Member	
			the declaration		Sub-contractor/s must also make the declaration.		
2.6a	**Bank's SEA and/or SH Disqualification**	(a) At the time of Contract Award, not subject to disqualification by the Bank for non-compliance with SEA/ SH obligations (b) If the Applicant had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations, the Applicant shall either (i) provide evidence of an arbitral award on the disqualification made in its favour; or (ii) demonstrate that it has adequate capacity and commitment to comply with SEA/SH prevention and response obligations; or (iii) provide evidence that it has already demonstrated such capacity and commitment for another Bank financed works contract	Must meet requirement (including each subcontractor)	N/A	Must meet requirement (including each subcontractor proposed by the Applicant)	N/A	Application Submission Letter, Form CON-4
3. Financial Situation and Performance							
3.1	**Financial Capabilities**	(i) The Applicant shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the	Must meet requirement	Must meet requirement	N/A	N/A	Form FIN – 3.1, with attachments

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirement
				All Members Combined	Each Member	One Member	
		construction cash flow requirements estimated as **One million eight hundred thousand USD (US$1,800,000)** for the subject contract(s) net of the Applicants other commitments (ii) The Applicant shall also demonstrate, to the satisfaction of the Employer, that it has adequate sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments. (iii) The audited balance sheets or, if not required by the laws of the Applicant's country, other financial statements acceptable to the Employer, for the last **Five (5)** years shall be submitted and must demonstrate the current soundness of the Applicant's financial position and indicate its prospective long-term profitability.	Must meet requirement Must meet requirement	Must meet requirement N/A	N/A Must meet requirement	N/A N/A	
3.2	**Average Annual Construction Turnover**	Minimum average annual construction turnover of **Seven Million USD (US$7,000,000)**, calculated as total certified payments received for contracts in progress and/or completed within the last **Five (5)** years, divided by **Five (5**)	Must meet requirement	Must meet requirement	Must meet **Twenty-five percent (25%)** of the requirement	Must meet **Fifty percent (50%)** of the requirement	Form FIN – 3.2
4. Experience							
4.1 (a)	**General Construction Experience**	Experience under construction contracts in the role of prime contractor, JV member, subcontractor, or management contractor for at least the last **Eight (8)** years	Must meet requirement	N/A	Must meet requirement	N/A	Form EXP – 4.1

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirement
				All Members Combined	Each Member	One Member	
4.2 (a)	**Specific Construction & Contract Management Experience**	(i) A minimum number of **Five (5)** similar contracts specified below that have been satisfactorily and substantially[5] completed as a prime contractor, joint venture member [6], management contractor or subcontractor between 1st January **2018** and Application submission deadline: each with a value of at least **Seven Hundred Thousand USD (USD 700,000**), The similarity of the contracts shall be based on the following: - **Design and installation of off-grid PV mini-grids with electrical battery systems.** - **Electrical works related to PV plants in remote areas.** - **Electrical and civil works related to installation of underground distribution lines.** - **At least one PV project located in the Pacific Island region.**	Must meet requirement	Must meet requirement[7]	N/A	Must meet the following requirements for the key activities listed below N/A	Form EXP 4.2(a)

[5] Substantial completion shall be based on 80% or more works completed under the contract.

[6] For contracts under which the Applicant participated as a joint venture member or sub-contractor, only the Applicant's share, by value, and role and responsibilities shall be considered to meet this requirement.

[7] In the case of JV, the value of contracts completed by its members shall not be aggregated to determine whether the requirement of the minimum value of a single contract has been met. Instead, each contract performed by each member shall satisfy the minimum value of a single contract as required for single entity. In determining whether the JV meets the requirement of total number of contracts, only the number of contracts completed by all members each of value equal or more than the minimum value required shall be aggregated.

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirement
				All Members Combined	Each Member	One Member	
4.2 (b)		For the above and any other contracts [substantially completed and under implementation] as prime contractor, joint venture member, or sub-contractor between **1st January 2018** and Application submission deadline, a minimum construction experience in the following key activities successfully completed[8]: - **Design and installation of off-grid PV mini-grids with electrical battery systems.** - **Electrical works related to PV plants in remote areas.** - **Electrical and civil works related to installation of underground distribution lines.** - **At least one PV project located in the Pacific Island region.**	Must meet requirements	Must meet requirements	N/A	**N/A**	Form EXP – 4.2 (b)
4.2 (c)	**Specific Experience in managing ES aspects**	For the contracts in 4.2 (a) above and/or any other contracts substantially completed as prime contractor, joint venture member, or Subcontractor between **1st January 2018** and Application submission deadline, experience in managing ES risks and impacts in the following aspects: - **Developed a Contractor-ESMP for an off-grid PV mini-grids with electrical battery systems.**	Must meet requirements	Must meet requirement	Must meet the following requirements: N/A	Must meet the following requirements: *N/A*	Form EXP – 4.2 (c)

[8] Volume, number or rate of production of any key activity can be demonstrated in one or more contracts combined if executed during same time period.

No.	**Subject**	**Requirement**	**Single Entity**	**Joint Venture (existing or intended)**			**Submission Requirement**
				All Members Combined	**Each Member**	**One Member**	

Section IV - Application Forms

Table of Forms

Application Submission Letter

Date: *[insert day, month, and year]*
PQD No. and title: *[insert PQD number and title]*

To: *Department of Resource and Development, FSM*

We, the undersigned, apply to be prequalified for the referenced PQD and declare that:

(a) **No reservations:** We have examined and have no reservations to the Prequalification Document, including Addendum(s) No(s), issued in accordance with ITA 8: *[insert the number and issuing date of each addendum]*.

(b) **No conflict of interest:** We have no conflict of interest in accordance with ITA 4;

(c) **Eligibility:** We (and our subcontractors) meet the eligibility requirements as stated ITA 4, we have not been suspended by the Employer based on execution of a Bid/Proposal-Securing Declaration in accordance with ITA 4.9;

(d) **Suspension and Debarment**: We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and other development banks. Further, we are not ineligible under the Employer's country laws or official regulations or pursuant to a decision of the United Nations Security Council;

(e) **Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment (SH):** [*select the appropriate option from (i) to (v) below and delete the others*].

We *[where JV, insert:* "including any of our JV members"*]*, and any of our subcontractors:

(i) [have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations.]

(ii) [are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations.]

(iii) [had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations. An arbitral award on the disqualification case has been made in our favor.]

(iv) [had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations for a period of two years. We have subsequently provided and demonstrated that we have adequate capacity and commitment to comply with SEA and SH prevention and response obligations.]

(v) [had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations for a period of two years. We have attached documents demonstrating that we have adequate capacity and commitment to comply with SEA and SH prevention and response obligations.]

(f) **State-owned enterprise or institution:** [*select the appropriate option and delete the other*] [*We are not a state-owned enterprise or institution*] / [*We are a state-owned enterprise or institution but meet the requirements of ITA 4.8*];

(g) Subcontractors and **Specialized Subcontractors:** We, in accordance with ITA 24.2 and 25.2, plan to subcontract the following key activities and/or parts of the works:

[Insert any of the key activities identified in Section III - 4.2(a) or (b) which the Employer has permitted under the Prequalification Document and which the Applicant intends to subcontract along with complete details of the Specialized Subcontractors, their qualification and experience]

(h) **Commissions,** gratuities**, fees:** We declare that the following commissions, gratuities, or fees have been paid or are to be paid with respect to the prequalification process, the corresponding bidding process or execution of the Contract:

Name of Recipient	Address	Reason	Amount
[insert full name for each occurrence]	*[insert street/ number/city/country]*	*[indicate reason]*	*[specify amount currency, value, exchange rate and US$ equivalent]*
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

[If no payments are made or promised, add the following statement: "No commissions or gratuities have been or are to be paid by us to agents or any third party relating to this Application]

(i) **Not bound to accept:** We understand that you may cancel the prequalification process at any time and that you are neither bound to accept any Application that you may receive nor to invite the prequalified Applicants to bid for the contract subject of this Prequalification process, without incurring any liability to the Applicants, in accordance with ITA 26.1.

(j) **True and correct:** All information, statements and description contained in the Application are in all respect true, correct and complete to the best of our knowledge and belief.

Signed *[insert signature(s) of an authorized representative(s) of the Applicant]*

Name [insert full name of person signing the Application]

In the capacity of *[insert capacity of person signing the Application]*

Duly authorized to sign the Application for and on behalf of: Applicant's

Name *[insert full name of Applicant or the name of the JV]*

Address *[insert street number/town or city/country address]*

Dated on *[insert day number]* day of *[insert month], [insert year]*

[For a joint venture, either all members shall sign or only the authorized representative, in which case the power of attorney to sign on behalf of all members shall be attached]

Form ELI -1.1
Applicant Information Form

Date: *[insert day, month, year*]
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

Applicant's name *[insert full name]*
In case of Joint Venture (JV), name of each member: *[insert full name of each member in JV]*
Applicant's actual or intended country of registration: *[indicate country of Constitution]*
Applicant's actual or intended year of incorporation: *[indicate year of Constitution]*
Applicant's legal address [in country of registration]: *[insert street/ number/ town or city/ country]*
Applicant's authorized representative information Name: *[insert full name]* Address: *[insert street/ number/ town or city/ country]* Telephone/Fax numbers: *[insert telephone/fax numbers, including country and city codes]* E-mail address: *[indicate e-mail address]*
1. Attached are copies of original documents of ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITA 4.5. ☐ In case of JV, letter of intent to form JV or JV agreement, in accordance with ITA 4.2. ☐ In case of state-owned enterprise or institution, in accordance with ITA 4.8 documents establishing: • Legal and financial autonomy • Operation under commercial law • Establishing that the Applicant is not under supervision of the Employer 2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

Form ELI -1.2
Applicant's JV Information Form

[The following form is additional to Form ELI – 1.1., and shall be completed to provide information relating to each JV member (in case the Applicant is a JV) as well as any Specialized Subcontractor proposed to be used by the Applicant for any part of the Contract resulting from this prequalification]

Date: *[insert day, month, year]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

Applicant name: *[insert full name]*
Applicant's JV Member's name: *[insert full name of Applicant's JV Member]*
Applicant's JV Member's country of registration: *[indicate country of registration]*
Applicant JV Member's year of constitution: *[indicate year of constitution]*
Applicant JV Member's legal address in country of constitution: *[insert street/ number/ town or city/ country]*
Applicant JV Member's authorized representative information Name: *[insert full name]* Address: *[insert street/ number/ town or city/ country]* Telephone/Fax numbers: *[insert telephone/fax numbers, including country and city codes]* E-mail address: *[indicate e-mail address]*
1. Attached are copies of original documents of ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITA 4.5. ☐ In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and they are not under the supervision of the Employer, in accordance with ITA 4.8. 2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

Form CON – 2
Historical Contract Non-Performance, Pending Litigation and Litigation History

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member's Name: *[insert full name]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

<table>
<tr><td colspan="4">Non-Performed Contracts in accordance with Section III, Qualification Criteria and Requirements</td></tr>
<tr><td colspan="4">☐ Contract non-performance did not occur since 1st January [insert year] specified in Section III, Qualification Criteria and Requirements, Sub-Factor 2.1.
☐ Contract(s) not performed since 1st January [insert year] specified in Section III, Qualification Criteria and Requirements, requirement 2.1</td></tr>
<tr><td>Year</td><td>Non-performed portion of contract</td><td>Contract Identification</td><td>Total Contract Amount (current value, currency, exchange rate and US$ equivalent)</td></tr>
<tr><td>[insert year]</td><td>[insert amount and percentage]</td><td>Contract Identification: [indicate complete contract name/ number, and any other identification]
Name of Employer: [insert full name]
Address of Employer: [insert street/city/country]
Reason(s) for nonperformance: [indicate main reason(s)]</td><td>[insert amount]</td></tr>
<tr><td colspan="4">Pending Litigation, in accordance with Section III, Qualification Criteria and Requirements</td></tr>
<tr><td colspan="4">☐ No pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3.
☐ Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3 as indicated below.</td></tr>
</table>

Year of dispute	**Amount in dispute (currency)**	**Contract Identification**	**Total Contract Amount (currency), USD Equivalent (exchange rate)**
[insert year]	*[insert amount]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Employer" or "Contractor"]* Status of dispute:	*[insert amount]*
Litigation History in accordance with Section III, Qualification Criteria and Requirements			
☐ No Litigation History in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4. ☐ Litigation History in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4 as indicated below.			
Year of award	**Outcome as percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (currency), USD Equivalent (exchange rate)**
[insert year]	*[insert percentage]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Employer" or "Contractor"]* Reason(s) for Litigation and award decision *[indicate main reason(s)]*	*[insert amount]*

Form CON – 3
ES Performance Declaration

[The following table shall be filled in for the Applicant, each member of a Joint Venture and each Specialized Subcontractor]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member's or Specialized Subcontractor's Name: *[insert full name]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

Environmental and Performance Declaration in accordance with Section III, Qualification Criteria, and Requirements

☐ **No suspension or termination of contract**: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental or Social, (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.5.

☐ **Declaration of suspension or termination of contract**: The following contract(s) has/have been suspended or terminated and/or Performance Security called by an employer(s) for reasons related to Environmental or Social, (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.5. Details are described below:

Year	Suspended or terminated portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US$ equivalent)
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for suspension or termination: *[indicate main reason(s) e.g. gender based violence; sexual exploitation or sexual abuse breaches]*	*[insert amount]*
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]*	*[insert amount]*

		Reason(s) for suspension or termination: *[indicate main reason(s)]*	
…	…	*[list all applicable contracts]*	…
Performance Security called by an employer(s) for reasons related to ES performance			
Year	Contract Identification		Total Contract Amount (current value, currency, exchange rate and US$ equivalent)
[insert year]	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for calling of performance security: *[indicate main reason(s) e.g. gender-based violence; sexual exploitation or sexual abuse breaches]*		*[insert amount]*

Form CON – 4
Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment Performance Declaration

[The following table shall be filled in by the Applicant, each member of a Joint Venture and each subcontractor proposed by the Applicant]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member's or Subcontractor's Name: *[insert full name]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

SEA and/or SH Declaration **in accordance with Section III, Qualification Criteria, and Requirements**
We: ☐ (a) have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations ☐ (b) are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations ☐ (c) had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations An arbitral award on the disqualification case has been made in our favor. ☐ (d) had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations for a period of two years. We have subsequently demonstrated that we have adequate capacity and commitment to comply with SEA/ SH obligations. ☐ (e) had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations for a period of two years. We have attached evidence demonstrating that we have adequate capacity and commitment to comply with SEA/ SH obligations.
[*If (c) above is applicable, attach evidence of an arbitral award reversing the findings on the issues underlying the disqualification.]*
[If (d) or (e) above are applicable, provide the following information:]
Period of disqualification: From: _____ To: _____
If previously provided for another Bank financed works contract, details of evidence that demonstrated adequate capacity and commitment to comply with SEA/ SH obligations (**as per (d) above)** Name of Employer: _____ Name of Project: _____

Contract description: _____ Brief summary of evidence provided: _____ _____ Contact Information: (Tel, email, name of contact person): _____ _____
As an alternative to the evidence under (d), other evidence demonstrating adequate capacity and commitment to comply with SEA/ SH obligations (**as per (e) above)** *[attach details as appropriate]*.

Form FIN – 3.1
Financial Situation and Performance

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

1. Financial data

Type of Financial information in (currency)	**Historic information for previous** *[insert number] years, [insert in words]* **(amount in currency, currency, exchange rate*, USD equivalent)**				
	Year 1	Year 2	Year 3	Year4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

* Refer ITA 14 for the exchange rate

2. Sources of Finance

[The following table shall be filled in for the Applicant and all parties combined in case of a Joint Venture]

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.

No.	Source of finance	Amount (US$ equivalent)
1		
2		
3		

3. Financial documents

The Applicant and its parties shall provide copies of financial statements for *[number]* years pursuant Section III, Qualifications Criteria and Requirements, Sub-factor 3.1. The financial statements shall:

(a) reflect the financial situation of the Applicant or in case of JV member, and not an affiliated entity (such as parent company or group member).

(b) be independently audited or certified in accordance with local legislation.

(c) be complete, including all notes to the financial statements.

(d) correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements[1] for the *[number]* years required above; and complying with the requirements

[1] If the most recent set of financial statements is for a period earlier than 12 months from the date of Application, the reason for this should be justified.

Form FIN - 3.2
Average Annual Construction Turnover

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

Annual turnover data (construction only)			
Year	**Amount** **Currency**	**Exchange rate***	**USD equivalent**
[indicate calendar year]	*[insert amount and indicate currency]*		
		Average Annual Construction Turnover **	

* Refer ITA 14 for date and source of exchange rate.

** Total USD equivalent for all years divided by the total number of years. See Section III, Qualification Criteria and Requirements, 3.2.

Form EXP - 4.1
General Construction Experience

[The following table shall be filled in for the Applicant and in the case of a JV Applicant, each Member]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

[Identify contracts that demonstrate continuous construction work over the past [number] years pursuant to Section III, Qualification Criteria and Requirements, Sub-Factor 4.1.List contracts chronologically, according to their commencement (starting) dates.]

Starting Year	**Ending Year**	**Contract Identification**	**Role of Applicant**
[indicate year]	*[indicate year]*	Contract name: *[insert full name]* Brief Description of the Works performed by the Applicant: *[describe works performed briefly]* Amount of contract: *[insert amount in currency, mention currency used, exchange rate and US$ equivalent*]* Name of Employer: *[indicate full name]* Address: *[indicate street/number/town or city/country]*	*[insert "Prime Contractor" or "JV Member" or "Sub-contractor" or "Management Contractor"]*
		Contract name: *[insert full name]* Brief Description of the Works performed by the Applicant: *[describe works performed briefly]* Amount of contract: *[insert amount in currency, mention currency used, exchange rate and US$ equivalent*]* Name of Employer: *[indicate full name]* Address: *[indicate street/number/town or city/country]*	*[insert "Prime Contractor" or "JV Member" or "Sub-contractor" or "Management Contractor"]*
		Contract name: *[insert full name]* Brief Description of the Works performed by the Applicant: *[describe works performed briefly]* Amount of contract: *[insert amount in currency, mention currency used, exchange rate and US$ equivalent*]* Name of Employer: *[indicate full name]*	*[insert "Prime Contractor" or "JV Member" or "Sub-contractor" or "Management Contractor"]*

		Address: *[indicate street/number/town or city/country]*	

* Refer ITA 14 for date and source of exchange rate.

Form EXP - 4.2(a)
Specific Construction and Contract Management Experience

[The following table shall be filled in for contracts performed by the Applicant, each member of a Joint Venture, and Specialized Sub-contractors]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
PQD No. and title: *[insert PQD number and title]*
Page *[insert page number]* of *[insert total number]* pages

Similar Contract No. *[insert number]* of *[insert number of similar contracts required]*	**Information**			
Contract Identification	*[insert contract name and number, if applicable]*			
Award date	*[insert day, month, year, e.g., 15 June, 2015]*			
Completion date	*[insert day, month, year, e.g., 03 October, 2017]*			
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount	*[insert total contract amount in local currency]*		US$ *[insert Exchange rate and total contract amount in US$ equivalent]**	
If member in a JV or sub-contractor, specify share in value in total Contract amount and roles and responsibilities	*[insert a percentage amount]*	*[insert total contract amount in local currency]*	*[insert exchange rate and total contract amount in US$ equivalent]**	
	[insert roles and responsibilities]			
Employer's Name:	*[insert full name]*			
Address: Telephone/fax number E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert e-mail address, if available]*			

* Refer ITA 14 for date and source of exchange rate.

Form EXP - 4.2(a) (cont.)
Specific Construction and Contract Management Experience (cont.)

Similar Contract No. *[insert number]* of *[insert number of similar contracts required]*	**Information**
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	*[insert amount in local currency, exchange rate, US$ in words and in Figures]*
2. Physical size of required works items	*[insert physical size of items]*
3. Complexity	*[insert description of complexity]*
4. Methods/Technology	*[insert specific aspects of the methods/technology involved in the contract]*
5. Construction rate for key activities	*[insert rates and items]*
6. Other Characteristics	*[insert other characteristics as described in Section VII, Scope of Works]*

Form EXP - 4.2(b)
Construction Experience in Key Activities

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Applicant's JV Member's Name: *[insert full name]*
Sub-contractor's Name[2] (as per ITA 24.2 and 24.3): *[insert full name]*
PQD No. and title: *[insert PQD number and title]*

Page *[insert page number]* of *[insert total number]* pages

All Sub-contractors for key activities must complete the information in this form as per ITA 24.2 and 24.3 and Section III, Qualification Criteria and Requirements, 4.2.

1. Key Activity No. One: *[insert brief description of the Activity, emphasizing its specificity]*

Total Quantity of Activity under the contract: _____

	Information			
Contract Identification	*[insert contract name and number, if applicable]*			
Award date	*[insert day, month, year, e.g., 15 June, 2015]*			
Completion date	*[insert day, month, year, e.g., 03 October, 2017]*			
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount	*[insert total contract amount in contract currency(ies)]*		US$ *[insert exchange rate and total contract amount in US$ equivalent]*	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year *[Insert extent of participation indicating actual quantity of key activity successfully completed in the role performed]*	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year 1				
Year 2				
Year 3				
Year 4				

[2] If applicable

Employer's Name:	*[insert full name]*
Address: Telephone/fax number E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert e-mail address, if available]*

2. Activity No. Two

3. .....

	Information
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:	
	[insert response to inquiry indicated in left column]

Form EXP - 4.2(c)
Specific Experience in Managing ES aspects and any additional sustainable procurement aspects

[The following table shall be filled in for contracts performed by the Applicant, and each member of a Joint Venture]

Applicant's Name:_____
Date: _____
Applicant's JV Member Name: _____
PQD No. and title: _____
Page _____ of _____ pages

1. Key Requirement no 1 in accordance with 4.2 (c): _____

Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Subcontractor ☐
Total Contract Amount			US$	
Details of relevant experience				

2. Key Requirement no 2 in accordance with 4.2 (c): _____
3. Key Requirement no 3 in accordance with 4.2 (c): _____
4. ...

Section V - Eligible Countries

Eligibility for the Provision of Goods, Works and Services in Bank-Financed Procurement

In reference to ITA 5.1 and 5.2, for the information of the Applicants, at the present time firms and individuals, supply of goods, or contracting of works or services, from the following countries are excluded from this prequalification process:

Under ITA 5.1 (a): *None*

Under ITA 5.1 (b): *None*

Section VI - Fraud and Corruption

(This Section VI shall not be modified)

1. Purpose

1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

2.2 To this end, the Bank:

a. Defines, for the purposes of this provision, the terms set forth below as follows:

i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;

iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

v. "obstructive practice" is:

(a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.

b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

d. Pursuant to the Bank's Anti-Corruption Guidelines, and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible: (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;1 (ii) to be a nominated2 sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;

e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents, personnel, permit the Bank to inspect[3] all accounts,

[1] For the avoidance of doubt, a sanctioned party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and bidding, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.

[2] A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

[3] Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.

records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

PART 2 – Works' Requirements

Section VII - Scope of Works

IMPORTANT NOTICE TO BIDDERS

Section VII – Scope of Works contains the full Employer's Requirements intended to form part of the subsequent *Request for Bids for Plant Design, Supply and Installation*.

All documents comprising Section VII are provided in full for the information of applicants participating in the prequalification phase.

Please note that certain technical requirements may be revised following completion of the prequalification process.

At the prequalification stage, bidders are **not** required to fill in any of the documents annexed to Section VII.

Applicants are encouraged to review the technical requirements carefully and to submit any comments or requests for clarification at this stage.

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Abbreviations

AR	Acceptance Ratio
BMS	Battery Monitoring System
BoQ	Bill of Quantities
CV	Curriculum Vitae
DL	Distribution Line
DoD	Depth of Discharge
EHS	Environmental, Health and Safety
ESIA	Environmental and Social Impact Assessment
GHI	Global Horizontal Irradiation
Imp	Current at the maximum power point
Isc	Short-circuit current
LFP	Lithium Iron Phosphate
MPPT	Maximum Power Point Tracking
NEC	National Electrical Code
NESC	National Electrical Safety Code
O&M	Operations and Maintenance
OHL	Overhead Line
PV	Photovoltaic
SHS	Solar Home System
SoC	State of Charge
SoW	Scope of Works
SPD	Surge Protection Device
STC	Standard Test Conditions
UGL	Underground line
Vmp	Voltage at maximum power point
Voc	Open-circuit voltage

1. Introduction

1.1. Objective

This section defines the minimum technical requirements for engineering, procurement, and construction, as well as for the two-year operation and maintenance of 5 mini-grids to be constructed in Chuuk, Federated States of Micronesia. The scope includes the complete power generation systems and the associated underground power distribution lines, as well as Solar Home Systems (SHS).

Each mini-grid will be based on a centralised hybrid power plant comprising photovoltaic (PV) generators, a Lithium-Ion battery energy storage system (BESS), and a backup diesel generator. The distribution lines, both in medium voltage (MV) and low voltage (LV), will supply electricity to the various end users within each community. Scattered users will be supplied via dedicated SHSs.

The table below summarises the main specifications of the mini-grids.

Table 1. Summary of mini-grids under the scope of work

	PV capacity (kWp)	Battery useful capacity (kWh)	Battery inverter (kVA)	Backup diesel generator (kVA)	Distribution line voltage regime	Number of users connected to the mini-grid	Number of SHS
Uman	327	660	93	93	MV	342	7
Tol (Wonip)	206	405	58	58	MV	185	0
Tol (Munien)	65	155	19	19	LV	68	1
Onoun	80	190	25	25	LV	91	0
Moch	104	225	31	31	LV	100	0

The table below summarises the scope of work (SOW):

Table 2. Scope of Works

	Scope of work	Section
1	An initial site visit to verify its condition and identify any difficulties or potential risks related to the construction and installation phases.	NA
2	Develop and adhere to occupational health and safety plans as well as environmental and social management plans.	Section 2.3.3
3	Engineering, supply, construction and commissioning of PV power plants, including PV generator, technical building, diesel generator shelter, security fencing and perimeter lighting.	Section 2.1
4	Engineering, supply, construction and commissioning of LV and MV distribution lines, user service lines, and end-user indoor wiring.	Section 3.3.1
5	Engineering, supply, installation and commissioning of Solar Home Systems.	Section 3.4
6	Supply of spare parts.	Section 3.5
7	Operator O&M training.	Section 4.9
8	Operation and Maintenance (O&M) for 24 months.	Section 4.10

The list of required work specified in this document is not exhaustive. The Contractor is responsible for providing all materials and services necessary to carry out the work mentioned above.

The Employer reserves the right to modify the planned quantities at the time of contract award and during its validity. The unit prices shown in the bidding offer will apply when the quantity change is ±20%.

In the event of any technical discrepancy, the technical requirements specified in this document shall take precedence over all other contractual documents.

The Employer expresses its appreciation to all bidders for their attention to this Technical Specifications Document and its associated Annexes.

1.2. Reference documents

The following table presents the main reference documents for this project:

Table 3 Summary of reference documents

Name of document	Content	Action required for the bidder
Error! Reference source not f ound.	Checklist summarising all deliverables to be submitted in the bid to comply with this document.	Complete the Excel spreadsheet and submit it with your technical proposal.
Annex 0 – Offer deliverables checklist **Annex A – Detailed Information on PV Sites**	Provides detailed information and pictures of each PV site.	To be considered as a reference
Annex B – PV Layouts	Reference drawings of the PV power plant's physical layouts.	To be considered as a reference
Annex C –Single Line Diagrams	Reference single-line drawings for the PV powerplant, distribution line (both MV and LV) and user connections.	To be considered as a reference
Annex D – Canopy Reference Drawings	Reference drawings for canopy structure.	To be considered as a reference
Annex E – BoQ	Bill of quantities for the financial proposal.	Complete the Excel spreadsheet and submit it with your financial proposal.
Annex F – GIS Files	Reference drawings and KML files showing the distribution line layouts for each site.	To be considered as a reference
Annex G – Design requirements	Main technical compliance requirements for the design of the mini-grids.	Complete the Excel spreadsheet and submit it with your technical proposal.
Annex H – Component technical specifications	Main technical compliance requirements for the mini-grid components, installation, and civil engineering works.	Complete the Excel spreadsheet and submit it with your technical proposal.
Annex I – CPUC Suprima 5 Overview for IT	Provides information on Suprima 5 architecture	To be considered as a reference.
Annex J – Template Rated Criteria Table	Structured table for bidders to present their narrative justifications, proposal references, and evidence supporting each rated criterion	Complete the Word file and submit it as a PDF with your technical proposal.
Annex K – Geo-technical assessments	Geotechnical assessment results and engineering recommendations for foundation and civil works.	To be considered as a minimum requirement during project execution.
Annex L – Roof reinforcements	Structural assessment of rooftops and	To be considered as a minimum requirement

	required reinforcement measures for PV installation.	during project execution.

1.3. Context of Chuuk

Chuuk is one of the four states of the Federated States of Micronesia (FSM), alongside Yap, Pohnpei, and Kosrae. Chuuk has an estimated population of 33,885, according to the Department of Resources & Development (DORD) of FSM.

Chuuk comprises 290 islands, of which 40 are formally inhabited and recognised as municipalities. They are subdivided into 5 regions: Northern Namomeas, Southern Namomeas, Faichuk, Northwest, and Mortlocks. Chuuk's current electrification rate is approximately 35%, with only 2 of its 40 inhabited islands currently electrified: Weno (the main island) and Tonoas.

Weno achieved full electrification in the 1960s through a diesel-powered grid, which is now transitioning to integrate more renewable energy. Four grid-connected solar PV plants were commissioned in 2019, and an additional 1.05 MWp solar project is under construction, scheduled for completion by mid-2026.

Tonoas became the second electrified island in 2022, through an Independent Power Producer agreement with Vital.

Despite these developments, Chuuk remains the least electrified state in the FSM and one of the least electrified in the Pacific region.

In addition to the ARISE programme, two electrification programmes are currently underway in Chuuk. They aim to construct solar PV mini-grids to generate electricity and supply it to the populations of outer islands:

- Under the World Bank-funded SEDAP project, CPUC is constructing mini-grids on the islands of **Udot**, **Eot**, and **Satowan**.
- The FSM.SE and ADB CREWS Projects, funded by the European Union, DFAT and the ADB, and implemented by the Pacific Community, will electrify the islands of **Fefen**, **Etten**, and **Piis-Paneu**.

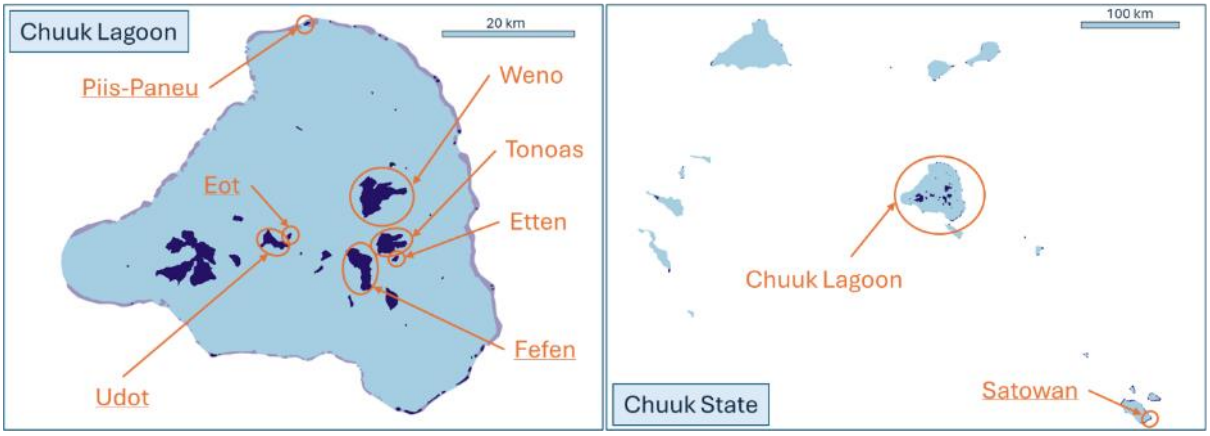


Figure 1. Map of electricity access and ongoing electrification projects in Chuuk

Table 4. Stocktake of other electrification initiatives in Chuuk

Island	Region	Atoll	Electrification status	Number of connections
Weno	N. Namomeas	Chuuk Lagoon	Diesel-based grid since the 1960s	>2,331
Tonoas	S. Namomeas	Chuuk Lagoon	Diesel-based grid since 2022	>250
Udot	Faichuk	Chuuk Lagoon	Solar PV mini-grids Construction to be completed Q2 2026	269
Eot	Faichuk	Chuuk Lagoon	Solar PV mini-grid Construction to be completed in Q2 2026	55
Satowan	Mortlocks	Satawan Atoll	Solar PV mini-grid Construction to be completed in Q2 2026	152
Fefen	S. Namomeas	Chuuk Lagoon	Solar PV mini-grid Construction to be completed Q4 2027	652
Etten	S. Namomeas	Chuuk Lagoon	Solar PV mini-grid Construction to be completed Q4 2027	54
Piis-Paneu	N. Namomeas	Chuuk Lagoon	Solar PV mini-grid Construction to be completed Q4 2027	78

Figure 2. Pictures of energy projects in Chuuk

Top left: Solar canopy in Udot Island; Top right: CPUC power plant on Weno Island; Bottom left: Solar canopy for a PV mini-grid on Eot Island; Bottom right: excavation of a distribution network on Udot Island.

1.4. Location of sites

The sites covered under the Scope of Work (SoW) are located across both the inner Chuuk Lagoon and the outer atolls of Chuuk. Three sites, Uman, Tol (Wonip), and Tol (Munien), are situated within the inner lagoon, while the remaining two sites, Moch and Onoun, are located in the outer lagoon.

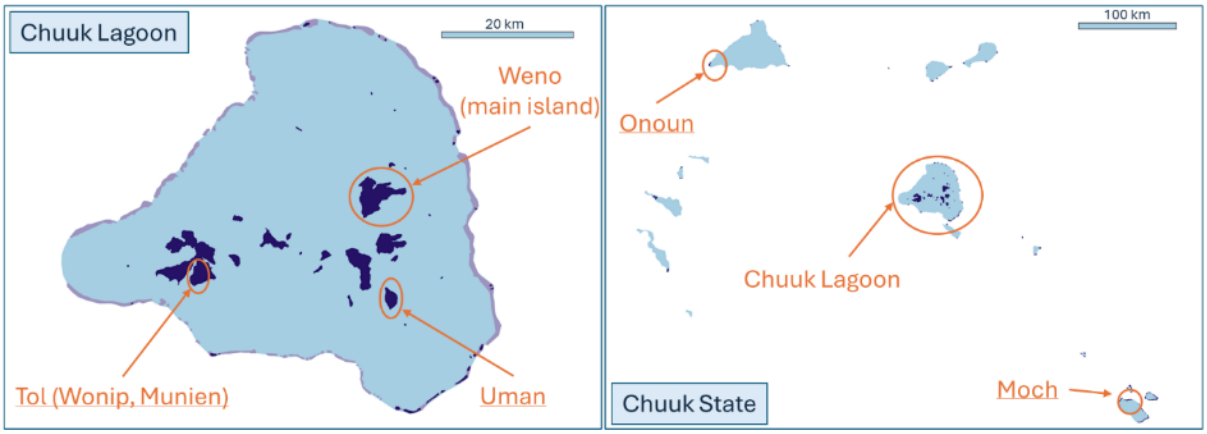


Figure 3. Map of the location of the islands

Table 5 provides the precise geographical coordinates for each island.

Table 5. Coordinates for each community

Community	Region	Atoll	Latitude	Longitude
Uman	S. Namomeas	Chuuk Lagoon	7.30013 N	151.8806E
Tol (Wonip)	Faichuk	Chuuk Lagoon	7.33129 N	151.6077E
Tol (Munien)	Faichuk	Chuuk Lagoon	7.32194 N	151.6157E
Onoun	Northwest	Namomuito Atoll	8.57933 N	149.6844E
Moch	Mortlocks	Satawan Atoll	5.49091 N	153.5420E

The following subsections provide an overview of the mini-grid layouts and the terrain available for locating PV generators, technical buildings, and diesel generator shelters. These sections are complemented by the following annexes: Annex 0 – Offer deliverables checklist

- Annex A – Detailed Information on PV Sites**Annex 0 – Offer deliverables checklist**
- **Annex A – Detailed Information on PV Sites:** provides further information collected during the site visits.
- **Annex F – GIS Files**: provides a preliminary layout of the MV and LV distribution lines, including user locations. It also contains the GIS files.
- **Annex B – PV Layouts**: Provides example drawings of the PV generation power plants.

1.4.1. Uman

Figure 4 provides an overview of the mini-grid in Uman, showing the location of the power plant, the MV distribution layout, step-down transformers, users connected to the mini-grid, and users supplied by Solar Home Systems.

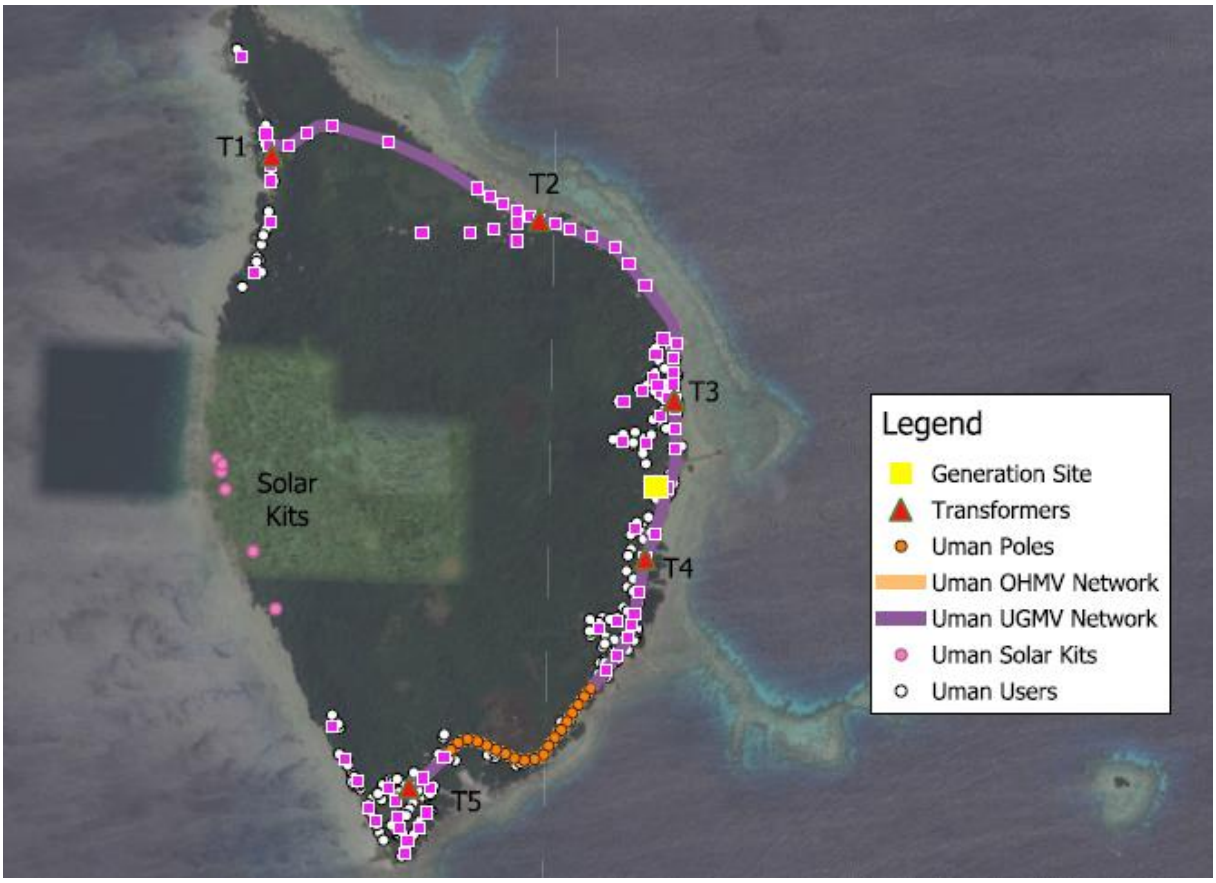


Figure 4. Mini-grid overview of Uman

Figure 5 shows the locations of potential PV sites in Uman, highlighting both rooftop and land areas designated for PV plant construction.

Figure 5. Aerial view of the proposed PV site for Uman

Table 6. Summary of available generation sites in Uman

Label	Community	Name	Location	Installation type	Available area
U-RT1	Uman	Elementary School of Sapota	7.299932, 151.888415	Tilted rooftop	60m x 12m
U-RT2	Uman	Municipal Storage	7.299806, 151.888488	Tilted rooftop	29.8m x 11.7m
U-RT3	Uman	Theresa Memorial Church	7.300365, 151.888673	Tilted rooftop	29m x 16m
U-CP1	Uman	Government Land	7.29929, 151.88838	Canopy	2,500m^2

Note: it is preferred to maximise PV installed at the school, municipal storage, and government land to avoid using the church.

1.4.2. Tol (Wonip)

Figure 6 provides an overview of the mini-grid in Tol (Wonip), showing the location of the two potential generation sites G1 and G2, the MV distribution layout, step-down transformers, and users connected to the mini-grid.

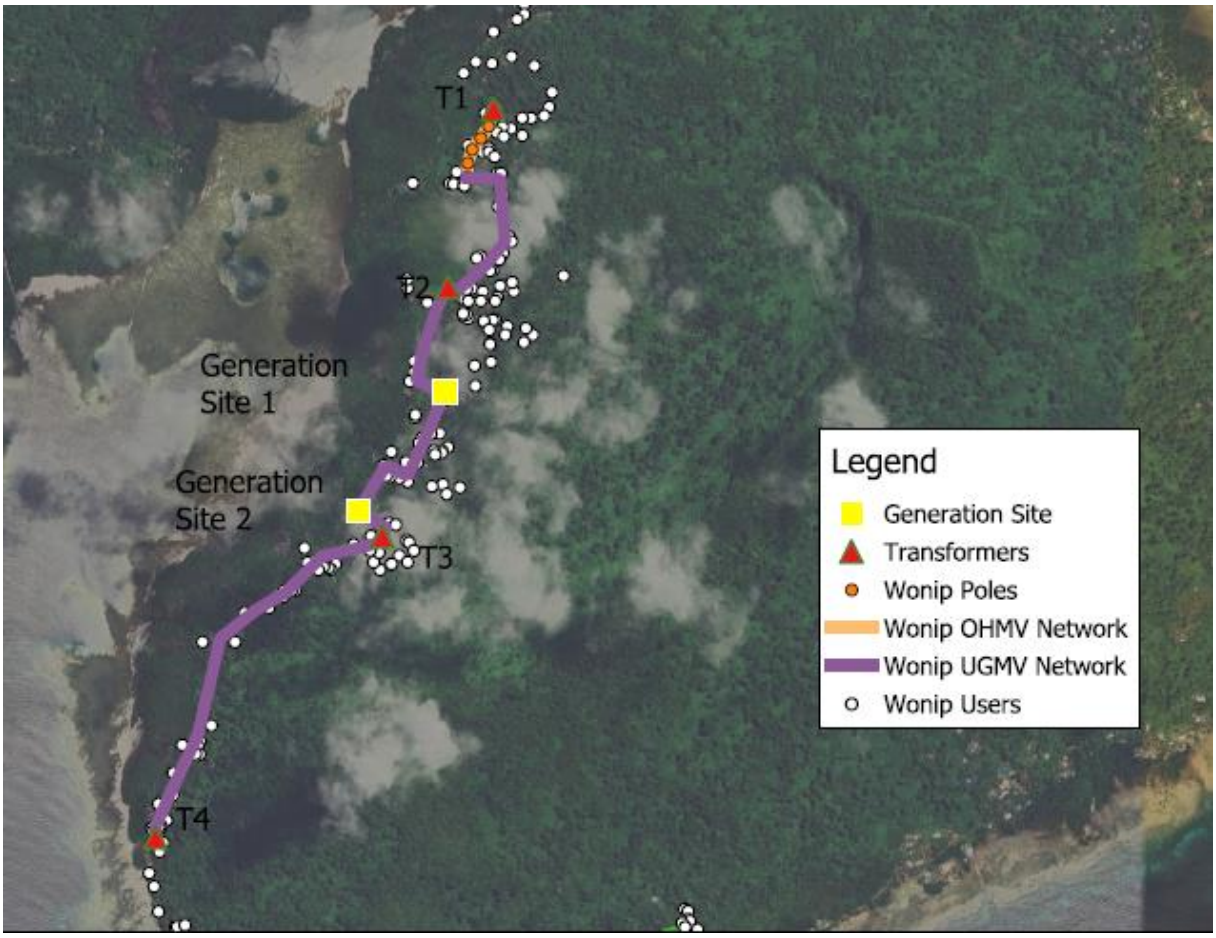


Figure 6. Mini-grid overview of Tol (Wonip).

Note: The users shown in the southernmost part of the aerial picture, far away from transformer T4, will be connected to another mini-grid: Tol (Munien).

Figure 7 and Figure 8 show the locations of PV sites in Tol (Wonip), highlighting both the rooftop and land areas designated for the construction of PV plants. The sites are distributed in the community.

Figure 7. Aerial view of the proposed generation PV site 1 (G1) for Tol (Wonip)

Figure 8. Aerial view of the proposed generation PV site 2 (G2) for Tol (Wonip)

Table 7. Summary of available generation sites in Tol (Wonip)

Label	Community	Name	Location	Installation type	Available area
W-RT1	Tol (Wonip)	Bethel Church	7.336447, 151.611714	Tilted rooftop	29m x 14m
W-RT2	Tol (Wonip)	Wonip Elementary School	7.336550, 151.611870	Tilted rooftop	51m x 9.5m
W-CP1	Tol (Wonip)	Basketball Court	7.333437, 151.609700	Canopy	22m x 13m
W-CP2	Tol (Wonip)	Wonip Elementary School Yard	7.336550, 151.611870	Canopy	60m x 25m

Note: It is preferred to install the full PV capacity at G2 (W-RT2 and W-CP2). However, bidders may also utilise the available areas at G1 (W-RT1 and W-CP1). G1 is located approximately 400 m from G2; therefore, if a distributed PV configuration is proposed, bidders shall provide an appropriate communication system between the two sites in accordance with the technical specifications.

1.4.3. Tol (Munien)

Figure 9 provides the overview of the mini-grid in Tol (Munien), showing the location of the powerplant, the LV distribution layout (both underground “UG” and overhead “OH”), the pillar boxes and the users connected to the mini-grid.

Figure 9. Mini-grid overview of Tol (Munien).

Figure 10 shows the location of the PV site in Tol (Munien), highlighting the rooftop area designated for PV plant construction.

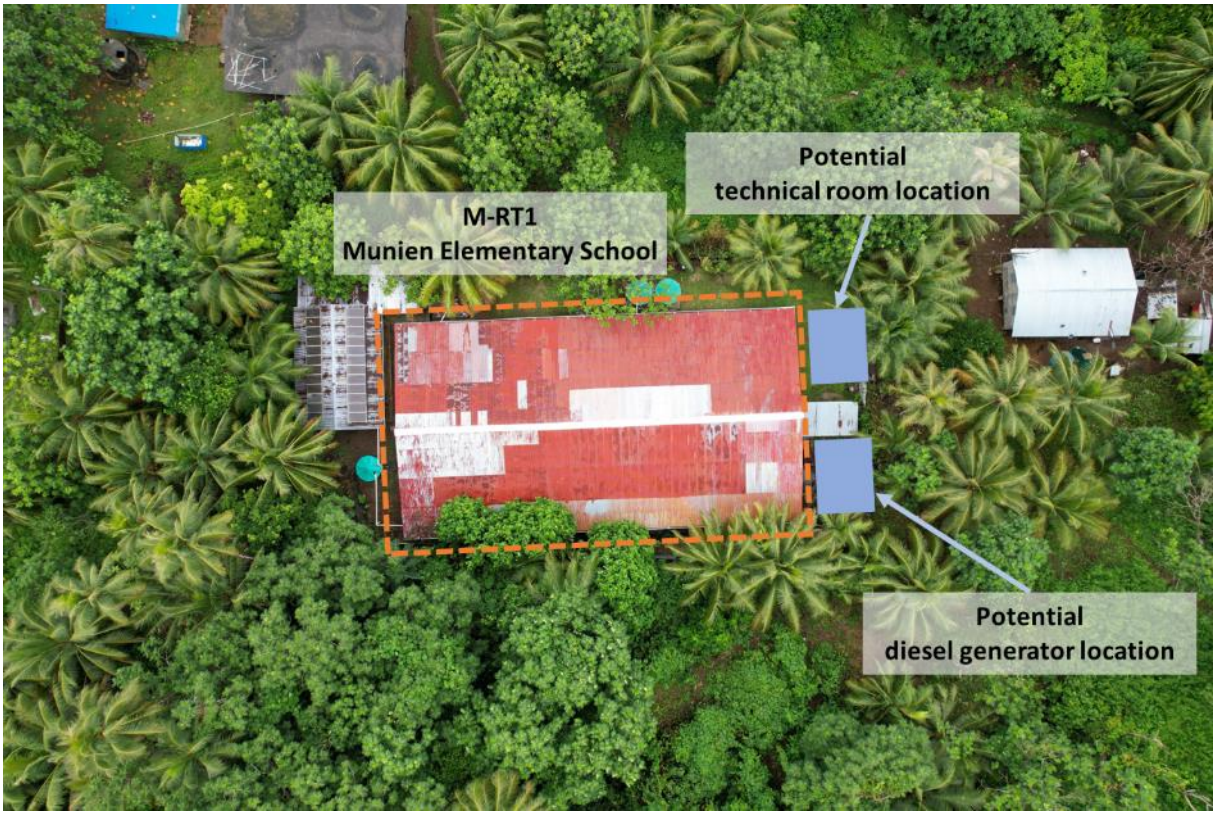


Figure 10. Aerial view of the proposed PV site for Tol (Munien)

Table 8. Summary of Available generation sites in Tol (Munien)

Label	Community	Building name	Location	Installation type	Available area
M-RT1	Tol (Munien)	Munien Elementary School	7.323083, 151.617494	Tilted rooftop	32m x 19m

1.4.4. Onoun

Figure 11 provides an overview of the mini-grid in Onoun, showing the location of the power plant, the underground LV distribution layout, the pillar boxes, and the users connected to the mini-grid.

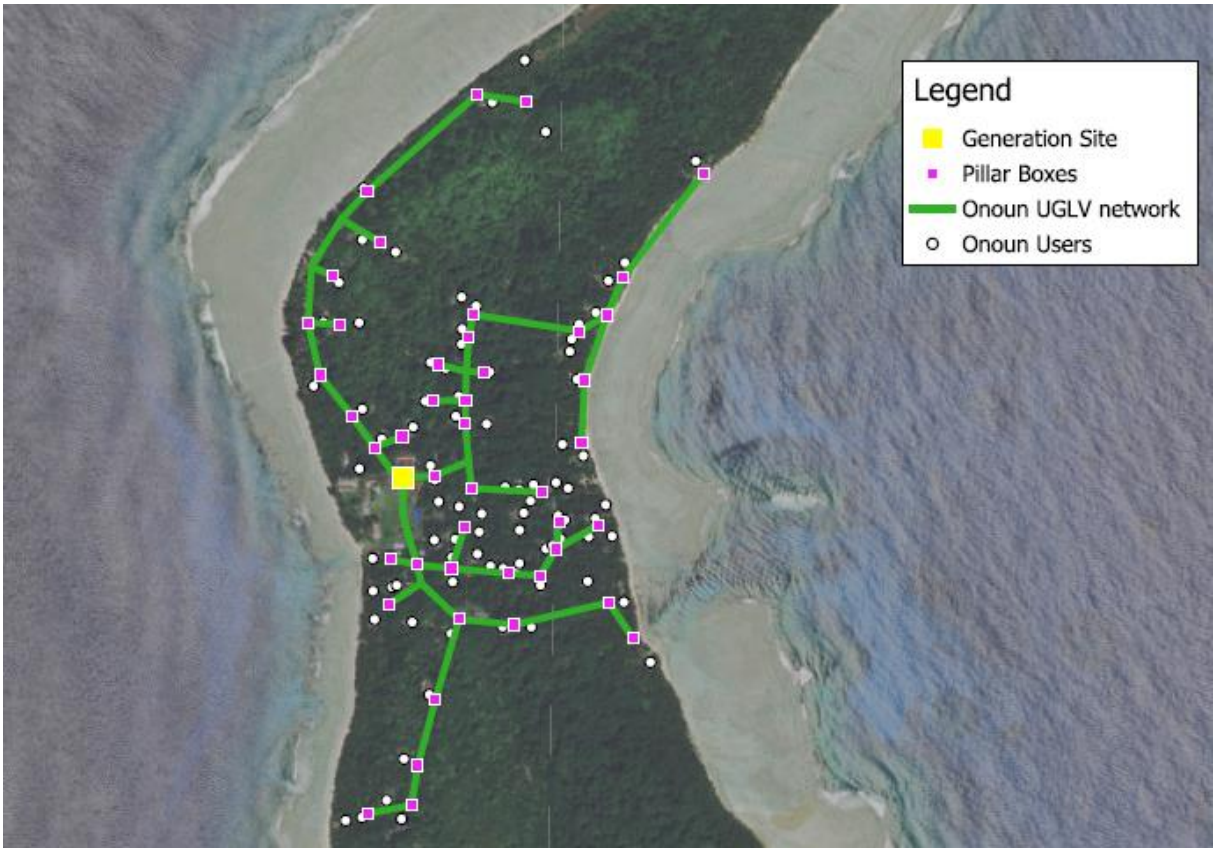


Figure 11. Mini-grid overview of Onoun.

Figure 12 shows the locations of PV sites in Onoun, highlighting the areas available for the PV generators. The PV can be installed at the school in the rear and/or over the existing PV plant site.

Figure 12. Aerial view of the proposed PV site for Onoun

Note that there is currently a ground-mounted PV installation which is not operational due to a battery failure (circled in red). This PV generator and the fencing around it shall be decommissioned by the Contractor. The current PV system's technical room can be used for the diesel generator shelter.

Table 9. Summary of Available generation sites in Onoun

Label	Community	Name	Location	Installation type	Available area
O-CP1	Onoun	School Yard	8.580864, 149.683589	Canopy	30m x 30m = 900m^2

1.4.5. Moch

Figure 13 provides an overview of the mini-grid in Moch, including the power plant location, underground LV distribution layout, pillar boxes, and users connected to the mini-grid.

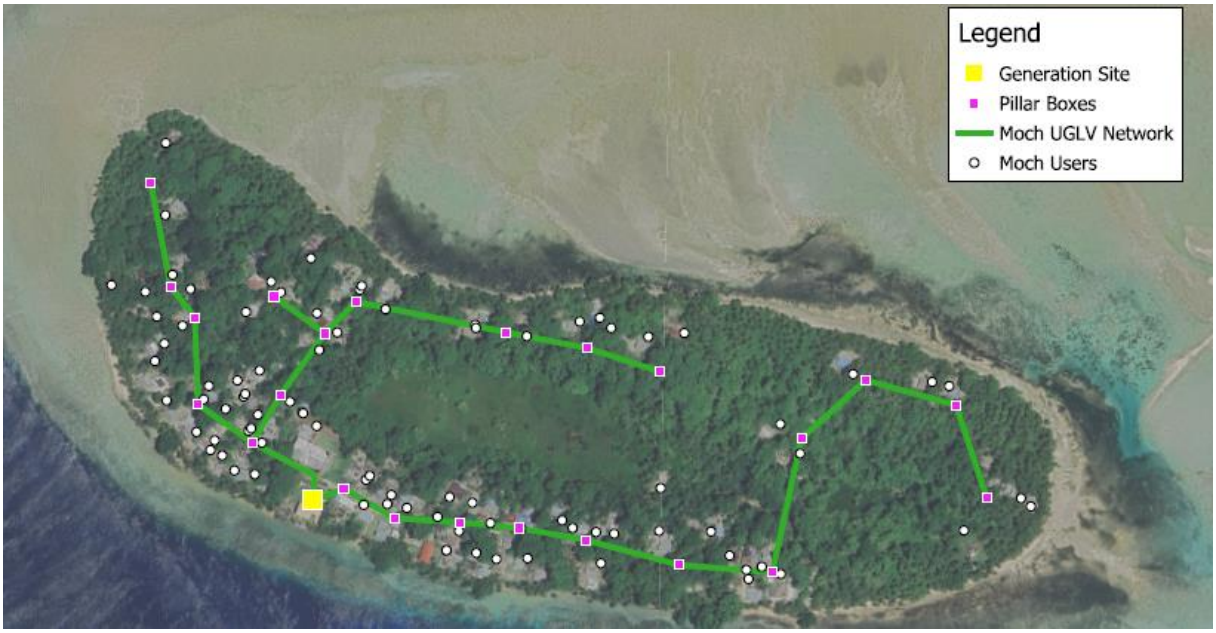


Figure 13. Mini-grid overview of Moch

Figure 14 shows the locations of PV sites in Moch, highlighting both rooftop and land areas designated for PV plant construction.

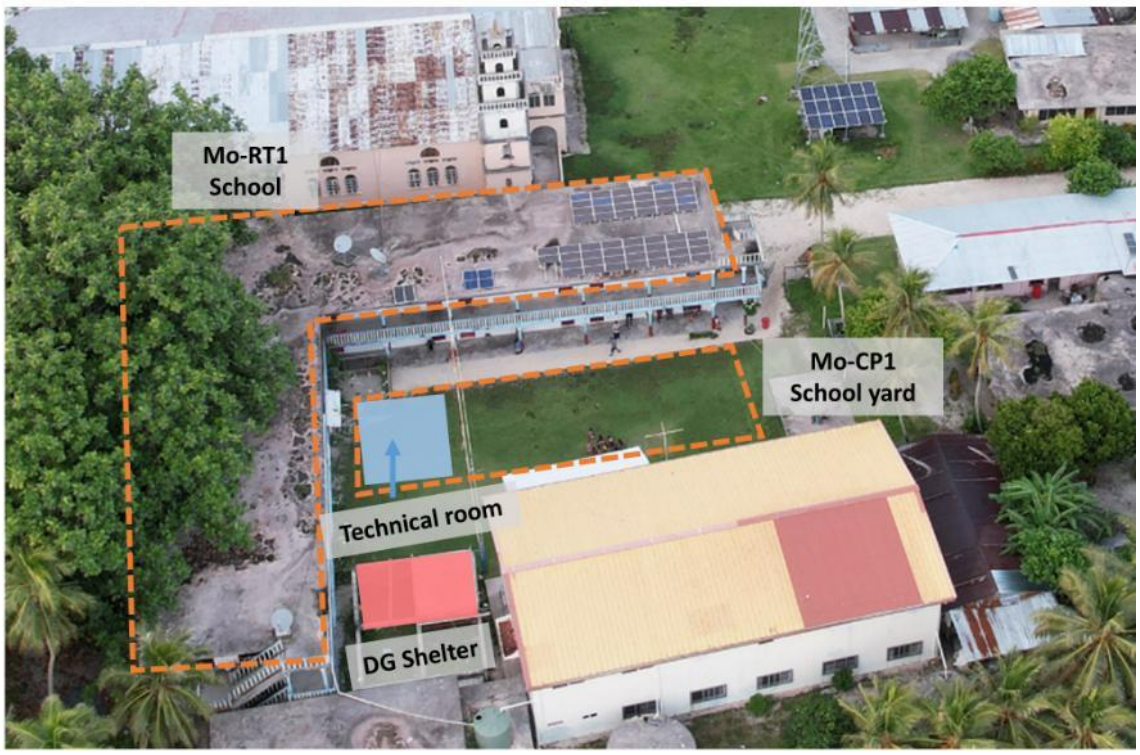


Figure 14. Aerial view of the proposed PV site for Moch

Table 10. Summary of available generation sites in Moch

Label	Community	Name	Location	Installation type	Available area
Mo-RT1	Moch	Moch School	5.490406, 153.540018	Flat rooftop	649m^2
Mo-CP1	Moch	Moch School Yard	5.490231, 153.540019	Canopy	29m x 16m

1.5. Accessibility and logistics

1.5.1. Site accessibility

Chuuk is accessible via Chuuk International Airport (TKK), located on Weno Island. The airport is served by regular United Airlines “Island Hopper” flights operating between Guam and Honolulu. A map illustrating the main air routes connecting Chuuk with neighbouring islands and international gateways is provided for reference.

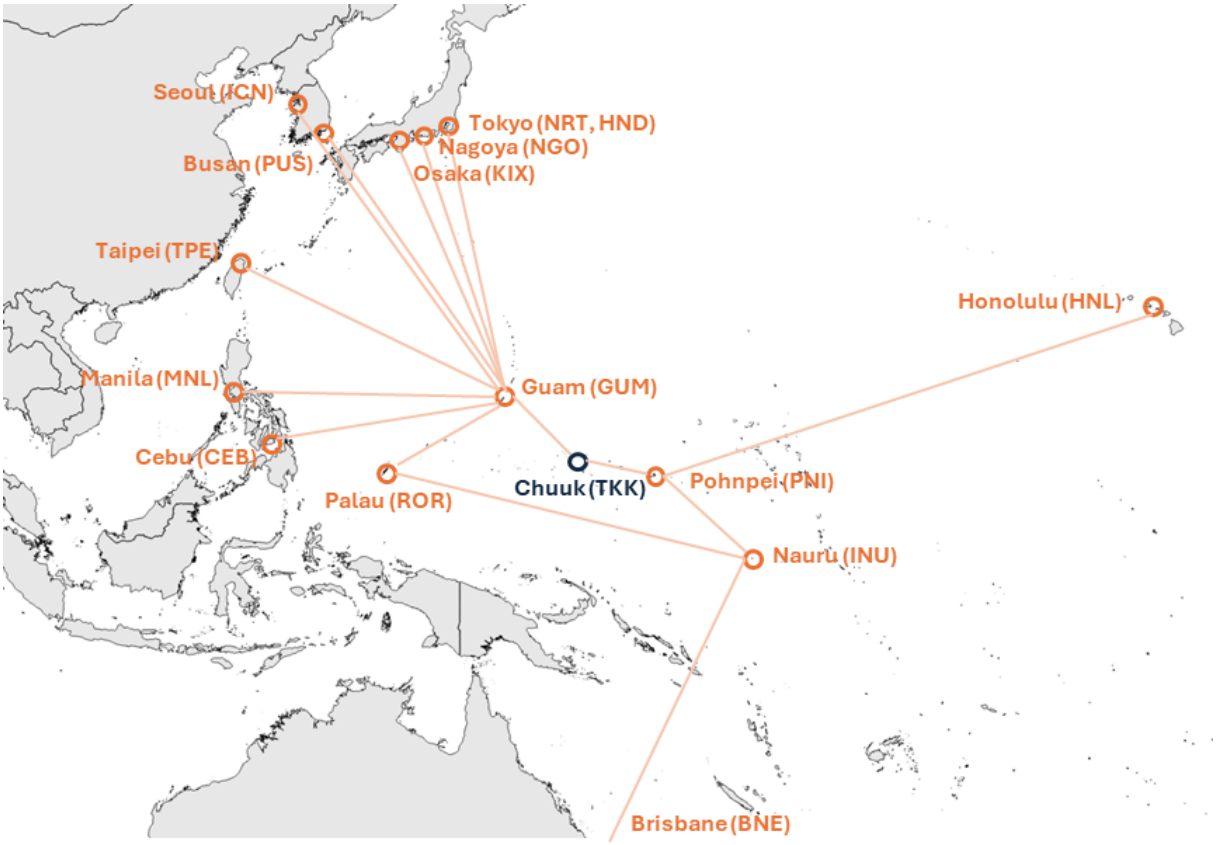


Figure 15. Main regular air routes to and from Chuuk

The table below provides an overview of the most practical access routes to each site from Weno Island.

Table 11. Summary of site accessibility

Islands	Distance from Weno	Accessibility by sea	Accessibility by air
Uman, Tol	Sheltered lagoon waters < 30 km	Small boat 30 to 45 min from Weno	-
Onoun	Open sea; 270 km	Ocean-going vessel 10 hours from Weno	**Onoun Civil Airfield** Weekly service by Caroline Islands Air 2 hours from Weno
Moch	Open sea; 290 km	Ocean-going vessel 12 hours from Weno	**Mortlocks (Ta) Civil Airfield** Weekly service by Caroline Islands Air 3 hours from Weno or Pohnpei

1.5.2. Logistics for equipment and materials

(1) International shipping to Chuuk

Most of the construction materials will need to be imported. The primary port of entry is the shipping harbour located on Weno Island, where equipment is typically delivered by sea freight in 20- and 40-foot containers. Weno receives regular shipments via transhipment hubs in Guam (from the USA) and Busan (from China).

Figure 16. Weno shipping harbour

(2) Transport of materials to inner lagoon communities

Figure 17. Example jetty in Uman

Inner lagoon islands are accessible from Weno by small motorboats, with travel times ranging from 40 minutes to 60 minutes depending on sea conditions. Materials can be unloaded at existing jetties or via beach landings. In some cases, **landing craft with bow ramps** (or "landing barges") can be used to deliver heavy equipment such as generators directly onto beaches. However, shipping containers are not suitable for direct beach landings.

Some landing sites are constrained by damaged jetties, mangroves, or coral reefs, necessitating the use of smaller vessels and piece-by-piece unloading, often with palletised loads. Engagement with local communities and CPUC is essential to leverage their knowledge and collaboratively develop effective strategies for unloading and transporting materials. Further details for each community are provided in subsequent sections.

(3) Transport of materials to outer lagoon communities

Outer lagoon islands require **seaworthy vessels** capable of navigating over 200 nautical miles of open waters beyond Chuuk Lagoon. These vessels must be equipped with essential maritime navigation and communication tools. Travel times from Weno to outer lagoon communities can range from 10 to 15 hours, depending on sea conditions. Local transport agents, as well as government ships, regularly service these communities and can be utilised.

Upon reaching the atoll surrounding each outer lagoon community, ships can anchor in calm

waters before transferring materials to smaller craft for final delivery. Similar to inner lagoon communities, landing options include jetties (where functional) and beach landing sites. Landing crafts with bow ramps can handle heavy equipment, but containerised cargo is not suitable for these operations. In some areas, damaged jetties and natural obstacles such as mangroves and coral may require unloading materials in smaller loads using pallets. Detailed information for each community is provided later in this document.

(4) Transport of material within the communities

On most islands, there are no paved roads. Instead, coral soil walking paths serve as the primary means of movement. Light trucks, excavators, and other small machinery can access many parts of the communities. For transporting materials, **lightweight utility vehicles** such as tricycles or motorised carts with trailers can be particularly effective. Detailed logistical considerations for each community are included in subsequent sections.

Figure 18. Path on Tol (Wonip)

1.5.3. International shipping

Sea freight will be directed to the Port of Weno on Weno Island in 20- and 40-foot containers. Weno receives regular cargo from the US (transhipping in Guam) and from China (transhipping in Busan).

Table 12. International shipping agents and carrying capacity for Chuuk

Shipping agent	Carrying capacity	Route	Cost estimate	Contact in Chuuk
Matson	20 and 40 ft	Guam to Weno	20’ container +$2000 40’ container +$2900 (depends on weight and goods)	Sea Venture Company seaventurecompany@gmail.com
Kyowa	20 and 40 ft	Busan to Weno	20’ containers $3600 40’ containers $6,000 to $7,000	Truk Transportation (TRANSCO) Gideon Bisalen, General Manager – transco@mail.fm

Note: Before the vessel arrives in Weno, the contractor must submit the Bill of Lading to the FSM Department of Resources and Development for review and approval. Once approved, they will coordinate with the Department of Finance and Administration to issue an exemption letter, enabling the contractor to complete customs clearance in Weno.

1.5.4. Local shipping and logistics

Note: The Employer acknowledges the challenges associated with organising logistics for transporting material to the outer islands. This information is provided to help potential bidders plan their logistics. During implementation, CPUC and the local authorities will provide guidance and support to the awarded Contractor in finding suitable transport solutions to ensure successful delivery.

Equipment and material storage on Weno

To help store equipment and materials on Weno before shipping to project sites, CPUC will provide, at no cost to the Contractor for the duration of the project, a covered storage space at the Weno Solar Facility in Mechitiw.

This space will be roughly equivalent to three 40-foot containers. The Weno Solar Facility is accessible on the main road and has a boat ramp and dock where the contractor can load cargo onto small boats bound for project sites.

Equipment or materials stored in this space will remain under the Contractor's sole responsibility, and they must ensure proper and safe storage. It is recommended that the Contractor bring their own containers.

Site accessibility

Table 13 summarises the modes of transportation available to and within each community.

Table 13. Details of transport access to each community

Community	Road access	Jetty access	Flat barge access	Barge and container access	Plane access
Uman	Flat paths on the island	Yes	Yes, landing on the jetty	No	-
Tol (Wonip)	Flat paths on the island	Damaged	Yes, through a channel in the mangroves	No	-
Tol (Munien)	Flat paths on the island	Yes	Yes, landing on the jetty	No	-
Onoun	Flat paths on the island	No	Yes, landing on a beach or at a channel	No	**Onoun Civil Airfield** Weekly service by Caroline Islands Air 2 hours from Weno
Moch	Flat paths on the island	No	Yes, landing at a channel	No	**Mortlocks (Ta) Civil Airfield** Weekly service by Caroline Islands Air 3 hours from Weno or Pohnpei

Inner lagoon communities

The table below provides an overview of the shipping agents and transport options available for transporting material to the inner lagoon communities.

Table 14. Domestic shipping agents and carrying capacity from Weno to Fefen

Shipping Agent	Carrying capacity	Cost estimate[1]	Contact
Vital carrier	75 tons / 4 x 20' or 2 x 40' containers	Whole day: $5,250 (one round-trip) + $60/ton	Hannah-Marie Isaac hannah-marie.isaac@fsmpc.com
Truk Transportation (TRANSCO)	Transco Barge 15 tons	$4,000 per trip	Gideon Bisalen, General Manager – transco@mail.fm
Local small boats	1 ton	$250 per round trip	Can be chartered in collaboration with CPUC and the community

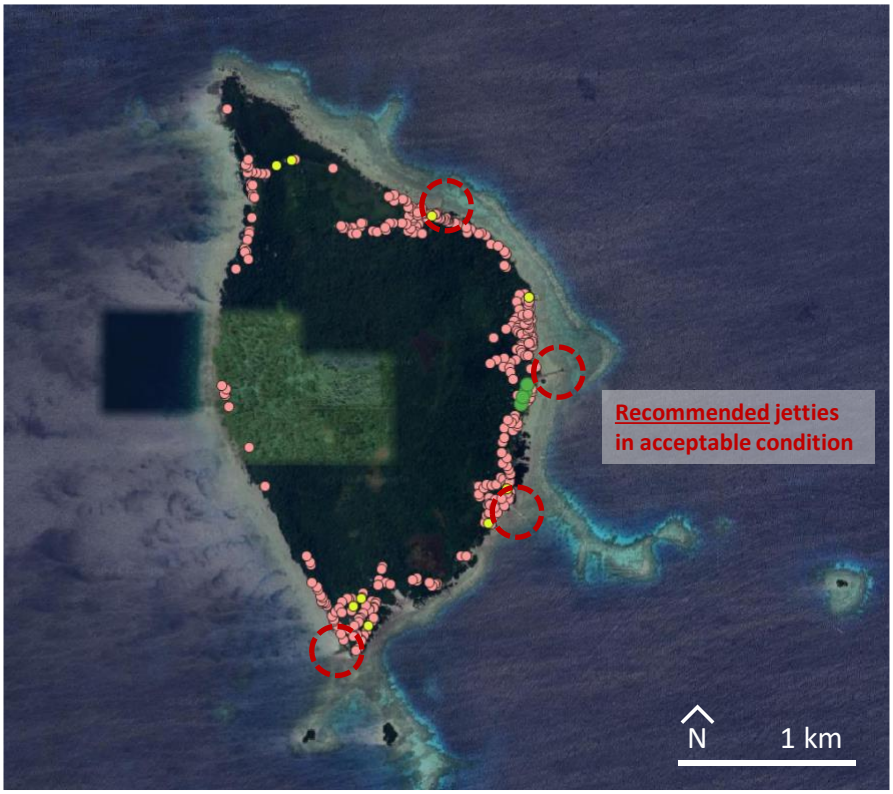


Figure 19. Recommended offloading locations for Uman

[1] Note that the shipping agents and cost estimates provided in the above are for reference only. Bidders should contact the shipping agents to obtain updated quotes.

Figure 20. Recommended offloading locations for Tol (Wonip)

Figure 21. Recommended offloading locations for Tol (Munien)

Outer lagoon communities

Transport to the outer lagoon communities requires ocean-going vessels to deliver equipment and materials to the sites. Several charter options are available from Weno, with indicative costs of approximately $20,000 to $ 30,000 for the transport of 2 to 4 containers of goods (*North Star*, *Sea Heaven, Vital Carrier*).

Alternatively, the Contractor may utilise the government-operated vessels (such as the *Caroline Voyager* and *Micronesian Navigator*), which provide regular service to these islands. These vessels offer the option to book cargo hold space at a reduced cost.

All logistics arrangements for the outer islands shall be planned in close coordination with the FSM Department of Resources and Development, CPUC, and FSM TC&I to ensure efficient scheduling, appropriate handling, and alignment with government transport operations.

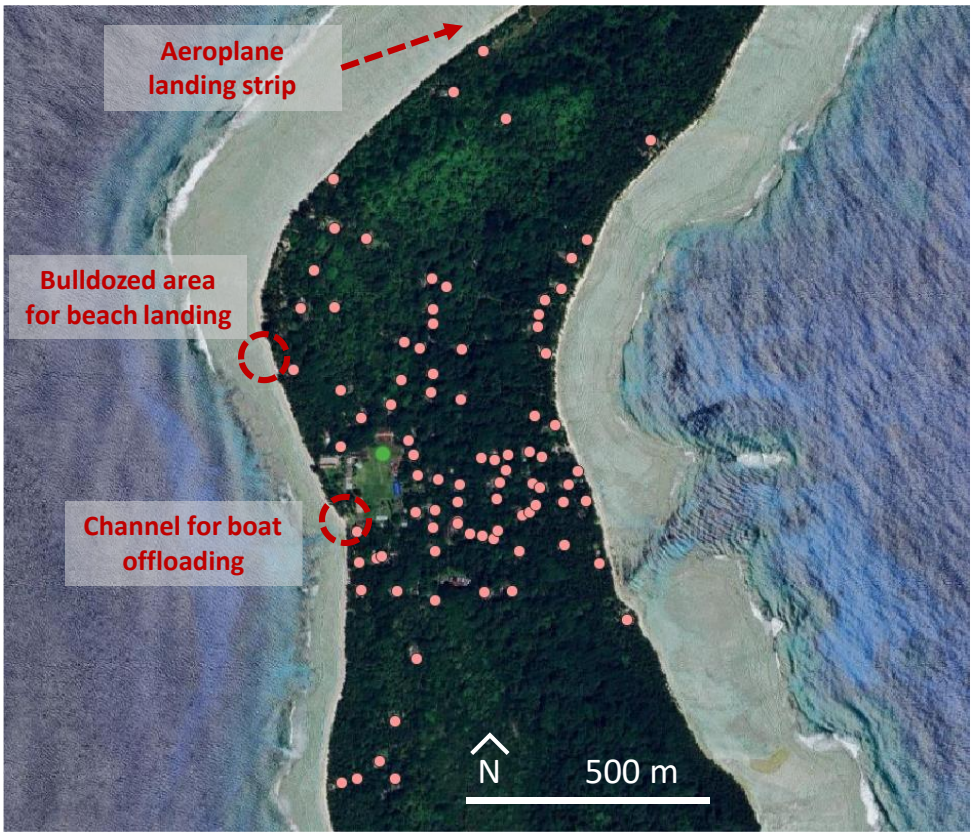


Figure 22. Recommended offloading locations for Onoun

Figure 23. Recommended offloading locations for Moch

1.5.5. Basic utilities on the islands

Note: The Employer acknowledges the challenges associated with finding accommodation and ensuring basic utilities for workers on the outer islands. This information is provided to help potential bidders plan and manage the deployment of their workforce. During implementation, CPUC and local authorities will provide guidance and support to the awarded Contractor in securing suitable accommodation and establishing contact with island authorities to facilitate coordination and effective project execution.

Accommodations for staff

On Weno

Throughout the duration of the contract, the Contractor is expected to maintain a permanent presence on Weno to ensure effective coordination with CPUC and to manage logistics and administrative activities.

Accommodation options available on Weno include *Truk Stop*, *Midlands*, and *Level 5*. Reference prices range from approximately $500 to $2,000 per month, sufficient to accommodate a small on-site team. The identification of suitable accommodation can be undertaken in coordination with CPUC and the relevant local authorities.

On the outer islands

The Contractor's teams will need to be based on the outer islands. The Contractor will be responsible for making all necessary arrangements for accommodation, toilet, and food for their personnel, as amenities are limited on the outer islands. There are no supermarkets on these islands, only small shops.

Indicative costs for renting accommodation for up to 10 workers on the outer islands range from $250 to $500 per month. The identification of a suitable location can be coordinated in collaboration with CPUC and the relevant local authorities.

To support local economic development, the Contractor is encouraged to utilise community services wherever possible. This may include hiring local residents to cook and provide meals, sourcing housing alternatives within the community, and creating income-generating opportunities for local families. All additional provisions not available locally must be brought to the site.

To minimise waste and the use of single-use water bottles, Contractors are encouraged to treat locally sourced water using filters, chlorination, UV sterilisation, boiling, and/or other methods.

Proper sanitation facilities, such as portable toilets and showers, should be installed to maintain hygiene and worker welfare throughout the project duration. All such infrastructure and equipment must be removed from the site, unless an agreement is made between the Contractor and the local community to retain any items for future use (ensuring environmental requirements are adhered to throughout).

Storage of equipment and materials

The Contractor shall be responsible for finding a storage area near the site works in agreement with the communities. The Contractor shall be responsible for managing security at the storage facility, including hiring a security guard and implementing any additional measures to ensure the safety and protection of stored items. A temporary structure shall be considered for the proper storage of materials.

A typical reference cost for renting a staging area to store equipment and machinery ranges from $250 to $500 per month. The identification of a suitable location can be coordinated in collaboration with CPUC and the relevant local authorities.

Internet

The site lacks high-quality internet access. However, phone and SMS connectivity can be established using a local SIM card, which provides access to 2G networks. To provide more reliable, faster internet access during the project's construction phase, the Contractor shall use a Low Earth Orbit (LEO) satellite solution (e.g., Starlink) to ensure uninterrupted connectivity.

Water, gravel, and sand

Water required for civil works shall be sourced locally, subject to prior communication and agreements with the community for access. All costs related to water usage during civil works

must be clearly stated in the contract. While no payments for water are expected, the contractor should arrange with the community for the use of groundwater (surface collection, no pumping required) or rainwater. The contractor may need to bring storage tanks if necessary.

There is no readily available gravel source on the islands; therefore, alternative supply arrangements are required. Options include:

- Crushing basalt boulders locally sourced from volcanic islands (approx. $100 to $200 per cubic metre)
- Purchasing crushed gravel from Weno (approx. $115 per cubic metre)

Sand is available locally at approximately:

- Coral sand: approx. $120 per cubic metre.
- Black sand: approx. $450 per cubic metre.

Note: prices are indicative only and should be verified by the Bidders.

Electricity

No electricity supply is available on site; households often make use of small private diesel generators. The Contractor shall arrange temporary power supply to meet the needs of all construction activities, ensuring compliance with safety and operational standards.

1.6. Environmental conditions

1.6.1. Design considerations

All the following environmental considerations shall be considered in the detailed design during procurement documents:

Table 15. Environmental requirements for the design.

Name	Value
Ambient temperature	Minimum: 25°C Maximum: 35°C
Relative humidity	Maximum: 100%
Wind speed	Design wind speed: 129 mph or 208 km/h (Category 3 on the Saffir-Simpson scale)
Overall horizontal irradiation for sizing (for solar home systems calculations)	5.4 kWh/m2/day
Marine environment	All power plants will be located in coastal areas. Therefore, all components and structures shall be designed for a minimum lifetime of 25 years and be protected from corrosion and comply with quality standards suitable for marine environments (C5-M environment). This is a critical requirement and the Employer can request the Contractor to arrange Factory Acceptance Tests and/or an inspection by a third-party internationally recognized conformity assessment company at the expenses of the Contractor, if deemed necessary.

1.6.2. Solar radiation

Table 16. Average daily radiation for the Weno weather station

Month	Average daily radiation GHI ($kWh/m^2/day$)
Jan	4.9
Feb	5.4
Mar	5.6
Apr	5.9
May	5.4
Jun	5
Jul	5.7
Aug	5.7
Sep	5.6
Oct	6.2
Nov	4.7
Dec	4.5
Average	5.4

Source: PVGIS-ERA5 database[2]

2 https://re.jrc.ec.europa.eu/pvg_tools/en/

1.6.3. Temperature

Figure 24 shows the monthly average temperature for the island of Weno, which will be similar to those of the communities of Uman, Tol (Wonip), Tol (Munien), Onoun, and Moch.

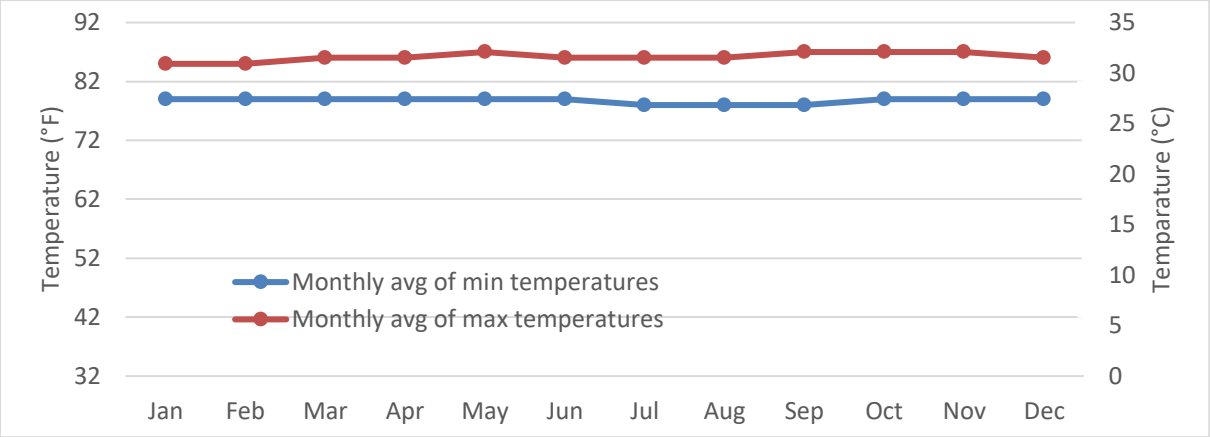


Figure 24. Monthly average of max. and min. temperatures recorded in Weno

1.6.4. Marine environment

All power plants will be in coastal areas. Therefore, all components and structures shall be protected from corrosion and comply with quality standards for marine environments.

1.6.5. Soil composition

The soil composition of coral islands is predominantly compacted coral, which is dense, shallow, and prone to limited drainage. This type of soil is particularly susceptible to flooding during heavy rainfall due to its compacted nature, which restricts the natural flow of water. The main pathways on these islands, while passable, are often obstructed by rocks and tree roots, making excavation and site preparation more challenging. Additionally, many areas feature soft, unstable soil that is vulnerable to erosion. Coastal erosion is a significant issue, with reports indicating an annual loss of approximately 1 foot of shoreline.

Given these environmental conditions, it is essential to position installations well away from the shoreline to mitigate the risks of flooding from waves, king tides, and storm surges. The region's freshwater table, typically 2 to 4 meters deep, further influences the stability of construction sites. This shallow water table can lead to waterlogging or soil subsidence, potentially affecting the integrity of building foundations. Therefore, careful consideration of site selection and appropriate engineering measures, such as elevated foundations and proper drainage systems, is critical to ensuring the durability and safety of structures on these islands.

For geotechnical considerations, bidders shall refer to the soil investigation results provided for Sapota Village, Uman Island (U-CP1) and Wonip Village, Tol Island (W-CP1) in the geotechnical report (Annex K). For the sites of Onoun and Moch, no geotechnical tests were conducted under

this project; however, bidders shall refer to the geological characteristics of Piis-Paneu Island as described in the same report, since Onoun and Moch present similar coral-atoll geological profiles.

The Employer has conducted geo-technical assessments, see **Annex K – Geo-technical assessments**. These assessments are for reference purposes only. There is no guarantee that the on-island values will be equivalent to those assessed elsewhere. The final assessments are to be done by the Contractor in the islands within the scope of this project.

Table 17. Soil composition and reference site in Annex K

Applicable to sites	Reference site in Annex K	Soil description	Underlying material
Uman	Uman	Compacted coral limestone with coral sand and fill material	Shallow soil cover over coral bedrock; generally dense with limited compressibility; suitable for shallow foundations subject to proper drainage and excavation control
Wonip	Wonip	Coral sand over compacted coral limestone	Variable thickness of coral sand layer; shallow groundwater table; excavation may encounter hard coral; erosion and drainage to be considered
Onoun & Moch	Piis Paneu	Coral sand and coral rubble over coral limestone	Typical atoll geology; loose to medium-dense coral sand near surface; highly permeable; shallow freshwater lens

1.6.6. Lightning strike

There are no available records of lightning strikes in Uman, Tol (Wonip), Tol (Munien), Onoun, and Moch. No damages or casualties have been reported due to lightning. Additionally, NASA's measurements of lightning density indicate low values in these areas. Consequently, lightning strikes are not considered a significant hazard in the studied locations, and lightning activity is regarded as low.

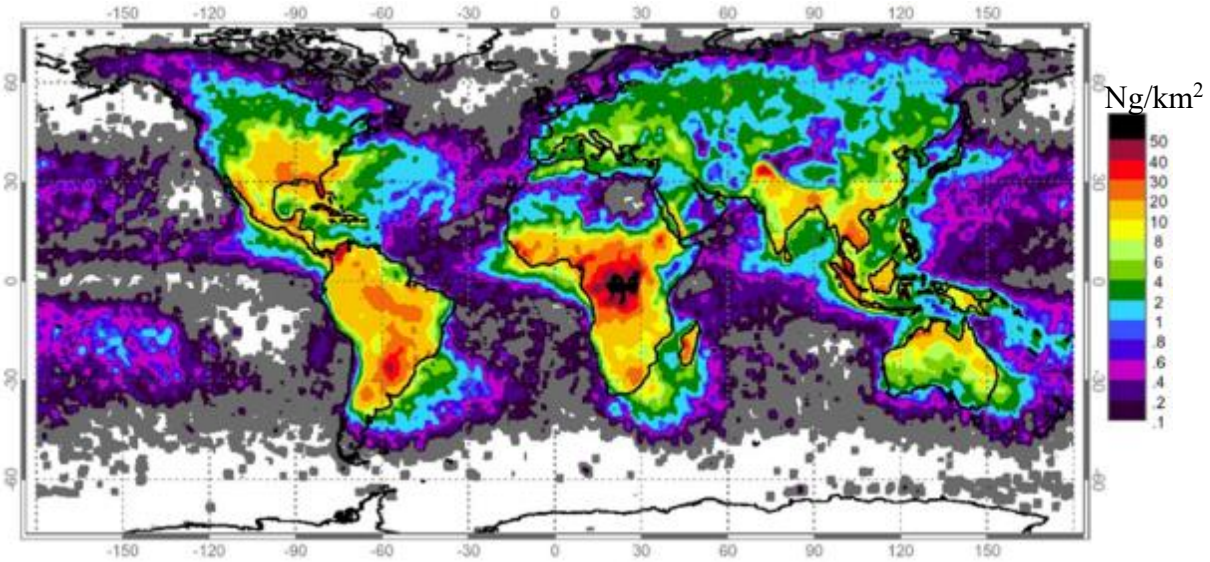


Figure 25. World map showing the lightning density (Ng). Source: Nasa
Note: The lightning density (Ng) is the number of lightning impacts per km² and per year.

1.6.7. Risk of high winds

The following table presents the Saffir-Simpson hurricane wind scale.

Table 18 Saffir-Simpson Hurricane Wind Scale

Category	Sustained winds	Types of damage due to hurricane winds
1	74-95 mph 64-82 kt 119-153 kph	**Very dangerous winds will cause some damage: Well-constructed frame homes could sustain damage to roofs, shingles, vinyl siding,** and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles will likely result in power outages that could last several days.
2	96-110 mph 83-95 kt 154-177 kph	**Extremely dangerous winds will cause extensive damage**: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted, blocking numerous roads. Near-total power loss is expected, with outages lasting several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 kph	**Devastating damage will occur**: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 kph	**Catastrophic damage will occur**: Well-built framed homes can sustain severe damage, with the loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles will be downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 kph or higher	**Catastrophic damage will occur**: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Centre

Currently, the Chuuk Building Code requires Category 2. However, recent studies indicate that climate change will lead to slightly more intense typhoons, with an average 5% increase in intensity in the Northwest Pacific for a +2°C temperature rise. **As a result, Category 3 wind speeds will be used for all design purposes.**

1.7. Existing solar PV assets

All project sites currently have solar PV systems ranging from 4.5 to 13.7 kWp, installed between 2012 and 2015, with batteries to supply electricity to the schools.

The Contractor is responsible for identifying, decommissioning, and safely removing any existing generation assets (both roof-mounted and ground-mounted) at these sites. Decommissioning includes safely disconnecting, dismantling, and removing all PV generation components, including PV modules, batteries, inverters, charge controllers, and related electrical or structural infrastructure.

Removed equipment must be transported to Weno and handed over to the CPUC.

The Contractor shall coordinate with the CPUC to ensure that decommissioning activities are planned and carried out with minimal disruption to the schools.

2. General requirements

2.1. Scope of work

The Contractor is responsible for the following Scope of Works (SoW):

1. Site inception visit.
2. Detailed engineering, supply and installation of new rooftop reinforcements. More details can be found in Section 3.1.
3. Detailed Engineering, supply, construction and commissioning of the power generation plants as summarised in Table 19, including a fully equipped technical building and a back-up diesel generator installed under an open shelter, with all applicable import permits and taxes, as well as construction insurances. More details can be found in Section 3.2.
4. Engineering, supply, construction and commissioning of an underground distribution line as summarised in Table 19including street lighting, service mains, energy meters, user main board, user indoor wiring, with all applicable import permits and taxes, as well as construction insurances. More details can be found in Section 3.3.
5. Decommissioning of existing generation assets as listed in section 1.7. More details regarding the works can be found in section 3.2.1
6. Supply, installation and commissioning of Solar Home Systems. More details can be found in Section 3.4.
7. Arrangement of any construction infrastructure required, such as secure and weather-protected storage space, site office, sanitary facilities, etc. The Contractor shall provide on-site security in accordance with insurance requirements and all applicable local and international codes and standards.
8. Arrangement of all required human resources, including working permits and visas.
9. Supply of spare parts as per Section 3.5.
10. Handover, including a training on the Operation and Maintenance of the mini-grid. The training shall consist of 40 hours and shall be given to 5-10 local technical staff as per Section 4.9.
11. O&M: remote assistance during 24 months, plus a total of 2 site visits. More details can be found in Section 4.8.

Each mini-grid consists of various PV arrays distributed across rooftops and canopies. The following table summarises the main requirements for each mini-grid.

Table 19. Summary of the main requirements per mini-grid.

Required parameters	Uman	Tol (Wonip)	Tol (Munien)	Onoun	Moch
Total PV capacity (kWp @STC)	≥ 327	≥ 206	≥ 65	≥ 80	≥ 104
Type of PV support structure	2x tilted rooftop 1x canopy	1x tilted rooftop 1x canopy	1x tilted rooftop	1x canopy	1x flat rooftop 1x canopy
Battery useful capacity (kWh @C24 @25°C)	≥ 660	≥ 405	≥ 155	≥ 190	≥ 225
Battery type	Li-ion LFP				
Battery inverter, total continuous power output (kVA @40°C)	≥ 93	≥ 58	≥ 19	≥ 25	≥ 31
Back-up diesel generator, nominal power output at prime power (kVA @40°C, @humidity=90%, at specified height from sea level)	≥ 93	≥ 58	≥ 19	≥ 25	≥ 31
Distribution line nominal frequency (Hz)	60 Hz				
Medium-voltage distribution line nominal voltage, line-to-line	7.96 / 13.8 kV 3-ph 4-wire	7.96 / 13.8 kV 3-ph 4-wire	n.a.	n.a.	n.a.
Low-voltage distribution line nominal voltage	Split-phase 120V/240V	Split-phase 120V/240V	Split-phase 120V/240V	Split-phase 120V/240V	Split-phase 120V/240V
Step-up Transformer nominal power (kVA)	≥ 93 ≥ bat inverter power ≥ genset power	≥ 100 both at G1 and G2	n.a.	n.a.	n.a.
Step-down transformers, number and nominal power (kVA)	1 x 25kVA 4 x 37.5kVA	4 x 25kVA	n.a.	n.a.	n.a.
Number of users connected to the minigrid	342	185	68	91	100
Number of solar home systems – Type SHS3	7	0	1	0	0

The Contractor shall achieve the Completion Date within a maximum Time for Completion of 18 months.

2.2. Quality assurance

The Contractor shall have a Quality Assurance system in place that complies with ISO 9001 or higher standards. The Contractor shall ensure that all proposed equipment has already been proven to work reliably in similar coastal, remote-island environments.

All systems and equipment must use a previously demonstrated, commercially deployed technology. All equipment shall be new and in perfect condition, and shall be installed according to the manufacturer's specifications, in compliance with the manufacturer's warranties.

All containers and packaging for separately shipped components shall be suitable for land or sea transport and provide adequate protection for the equipment inside against damage from weather, vibration, or transportation shock.

The engineering, construction and commissioning shall follow the following standards:

Table 20. Standards for mini-grid design and construction

Standard	Name
NEC	National Electrical Code
NEC 690	National Electrical Code: Solar Photovoltaic (PV) Systems
UL 9540	Energy Storage Systems and Equipment
NFPA 855	Standard for the Installation of Stationary Energy Storage Systems
IEEE 1547	Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
NFPA 780	The Installation of Lightning Protection Systems
IBC	International Building Code
NESC	National Electrical Safety Code
USDA-RUS	USDA's Rural Utilities Service
BS EN ISO 12944, 14713-1	Corrosion protection of steel structures
ASCE 7-10	Minimum Design Loads for Buildings and Other Structures

The latest editions of the standards shall apply.

During construction, the Contractor shall:

1. Submit a Quality Control and Assurance Plan (before construction starts), plan detailing the different quality controls to undertake at each step of the construction process for approval to the Employer.
2. Conduct regular quality checks and inspections throughout the project phases, including design, construction, and installation, to maintain high-quality standards and rectify any deficiencies promptly.
3. Maintain detailed project documentation, including design drawings, construction plans, installation manuals, and test results.

4. Submit regular progress reports to the Employer and/or contract supervisor (Owner's Engineer), detailing the status of works, challenges encountered, and any corrective actions taken.
5. Upon project completion, the Contractor shall provide as-built drawings and comprehensive operation and maintenance manuals for all installed systems.

2.3. Risk management

2.3.1. General principles

The Contractor shall also ensure that the works are carried out in an orderly state appropriate to the avoidance of danger and undue disturbance to staff, visitors, and assets. The Contractor must take precautions to prevent any damage to the property and equipment during the execution of the works.

The Contractor shall be held liable for the cost of any damages done as a result of their operation, where such damage is done to any fixed objects, such as signs, posts, buildings, or any vehicle that is parked in a designated car parking area. A damage report must be completed by the Contractor for each incident of damage, with the Employer notified immediately.

All equipment used by the Contractor shall be equipped with necessary safety and protective features in line with the OHS requirements. All personnel must wear the recommended PPE, such as adequate protective headgear, footwear, eyewear, and gloves, etc, during work and may be prevented from engaging in these works if not properly attired.

The Contractor must immediately inform the Employer of any equipment breakdowns and any anticipated delays in carrying out the works. It is the responsibility of the Contractor to secure, at their own expense, alternative equipment (e.g., through a subcontract) to complete the services without unreasonable delay. If subcontractors are to be used, the Employer's consent must be obtained prior to their engagement.

All workers and equipment brought to the project site by the Contractor shall be the Contractor's full responsibility. The Employer shall not be liable for any injuries to the Contractor’s workers on the site or damages to machines while carrying out this scope of work.

2.3.2. Unexploded ordnances (UXO)

Chuuk's strategic significance during World War II led to its heavy occupation by the Japanese Imperial Army, which established a key Pacific naval base in Chuuk Lagoon. Following the occupation, intense combat occurred throughout the region. As a result, there is a high likelihood of UXO remaining in various areas of the state.

However, in the communities under consideration, the risk of UXO is deemed low, as these islands were not heavily occupied by Japanese forces during the war. Nonetheless, safety measures will be implemented in collaboration with the relevant authorities within the Government of Chuuk to manage this low-level risk.

To ensure safety, the Contractor shall be responsible for carrying out a comprehensive UXO survey of all sites before construction begins. This includes magnetometer surveys, ground-penetrating radar, and, as needed, historical mapping of wartime activity.

The contractor shall coordinate with the Chuuk Environmental Protection Agency (EPA) to comply with local requirements and organise the survey. Partnerships with specialised UXO removal teams and local authorities should be established to mitigate any residual risks.

During construction, strict safety protocols must be enforced. Workers should undergo UXO awareness training, and excavation activities must follow controlled procedures, including preliminary site inspections and standby emergency response teams. In case UXO is detected, immediate reporting mechanisms and evacuation procedures must be in place.

2.3.3. Environmental and social considerations

The Contractor shall comply with all requirements set out in the environmental and social instruments prepared for the Project under the World Bank Environmental and Social Framework (ESF), including the Environmental and Social Management Plan (ESMP), Labor Management Procedures (LMP), Stakeholder Engagement Plan (SEP), and Land Access Plan (where applicable).

The Contractor shall make explicit provision for managing environmental and social risks and impacts identified in the ESMP, including but not limited to:

- Construction-related impacts such as dust, noise, vibration, traffic disruption, and restricted access to properties and services.
- Waste management, including solid waste, hazardous waste, and e-waste, with preference for reuse, refurbishment, or recycling, and safe disposal of obsolete solar home systems (SHS).
- Occupational health and safety risks, requiring preparation and implementation of Contractor OHS procedures, provision of PPE, safe storage of hazardous substances, and compliance with accident and incident reporting systems.
- Risks to community health and safety, particularly in works near schools, hospitals, and residential areas, including managing noise, dust, and potential exposure to pathogens.
- Sustainable sourcing of construction materials, with no use of coral, coastal sand, or unapproved local aggregate sources.
- Protection of cultural heritage through implementation of chance find procedures for cultural artifacts or unexploded ordnance (UXO).
- Land access and tenure requirements, including obtaining written agreements or leases from landowners and ensuring due diligence reporting.
- Social risks, including prevention of sexual exploitation and abuse/sexual harassment (SEA/SH), violence against children (VAC), human trafficking, and risks associated with

imported or migrant labour; all workers must sign a Code of Conduct and attend awareness training.
- Gender equality and social inclusion measures, including implementation of the Women's Empowerment Action Plan and provisions for safe and inclusive workplaces.
- Climate adaptation and resilience measures, resource efficiency, and pollution prevention, including energy and water efficiency, erosion and sediment control, and management of spills.
- Implementation of the Grievance Redress Mechanism (GRM), including the SEA/SH-specific pathway for handling sensitive grievances.

The Contractor shall prepare and implement site-specific Contractor Environmental and Social Management Plans (C-ESMPs) consistent with the ESMP and subject to clearance by the Employer/Engineer prior to the commencement of works, and update them as required during implementation.

3. Detailed requirements

3.1. Roof and structural reinforcements

The detailed structural reinforcement works required for each building are outlined in **Annex L – Roof reinforcements**.

Table 21. Summary of required structural and rooftop reinforcements.

Site-ID	Structural condition	Reinforcement required	Reinforcement requirement
U-RT1 Elementary School of Sapota	Poor condition	Yes	• Replacement of deteriorated timber roof members (rafters and purlins) with compliant sections. • Reinforcement of all roof connections; replacement of nails with screws/bolts. • Installation of purlin-to-rafter strapping and overall roof bracing. • Application of anti-corrosion protection to metal roofing sheets. • Installation of rooftop safety lines for PV installation and maintenance. • Localised repair of undermined soil and investigation/repair of damaged structural elements where observed.
U-RT2 Municipal Storage			Assessment ongoing and will be completed after the prequalification phase.
U-RT3 Therasa Memorial Church			Assessment ongoing and will be completed after the prequalification phase.
W-RT1 Bethel Church	Fair	Yes	• Targeted strengthening of timber roof members to accommodate additional PV loads. • Reinforcement of connections and installation of purlin strapping.

			• Verification of load paths and roof anchorage prior to PV installation. • Rooftop safety provisions for installation and O&M.
W-RT2 **Wonip Elementary School**	Good condition	No	• Application of anti-rust paint on the rooftop metal sheets. • Installation of rooftop safety line for safe access.
M-RT1 **Munien Elementary School**			Assessment ongoing and will be completed after the prequalification phase.
Mo-RT1 **Moch School**			Assessment ongoing and will be completed after the prequalification phase.

3.2. PV generation power plant

3.2.1. Specific scope of work

Upon award of the contract, the Contractor shall be responsible for the engineering, supply, installation, and commissioning of all power generation plants across the five mini-grids. The Contractor's responsibilities include, but are not limited to, the following:

1. Conduct a thorough terrain site visit to verify site conditions and identify any potential challenges or risks related to the construction and installation phases.
2. Detailed engineering design of all the electrical, mechanical, and civil works involved, adhering to relevant local and international standards and regulations.
3. Arrangement of any construction infrastructure required, such as a secure and weather-protected storage place, site office, sanitary facilities, etc. The Contractor shall provide on-site security in accordance with insurance requirements and all applicable local and international codes and standards.
4. The Contractor shall perform all required civil works, including but not limited to:
   4.1. Perform land/roof clearing, grading, levelling, and demolition of ruins (for Moch site only) as necessary to prepare the site for construction. These activities shall be carried out to meet the required specifications and ensure a stable foundation for all subsequent construction works. Note that the available terrain is mainly flat, and no major land preparation is envisioned.
   4.2. Vegetation management.
   4.3. Construction of technical buildings or refit of existing buildings where needed.
   4.4. Build a shelter for the diesel generator and storage tanks, designed to provide adequate protection while ensuring proper ventilation.
   4.5. Construction or improvement of access roads of the project site where required.
   4.6. Water management system, including drainage, rainwater collection and sewage.

   The Contractor is responsible for arranging their own power and water supply during the installation of the infrastructure.

5. Decommissioning of existing generation assets on the PV sites listed in **Error! Reference source not found.**. The scope of decommissioning shall include the following activities:

5.1. The Contractor shall safely disconnect, dismantle, and remove all PV generator units, switchboards, and auxiliary systems. The PV system and all cabling shall be transported to Weno for delivery to the CPUC, which will determine their final disposition.
5.2. The Contractor shall ensure that all decommissioning works are performed in a safe and environmentally responsible manner, with appropriate documentation and coordination with CPUC and relevant local authorities.

6. Supply and installation of all necessary equipment of the PV generation plants, including spare parts, taking into account all aspects of the supply chain (purchase, customs clearance of imported goods, storage, transport, handling, packaging, etc.).
7. Conduct pre-commissioning and commissioning activities of the generation plants to verify that all installed systems and equipment are operating correctly and efficiently. This includes performance testing, safety checks, and final inspections to ensure compliance with design specifications and regulatory requirements. It is required to use a correctly sized load bank to complete those tasks.
8. Implement a comprehensive Quality Control and Assurance Plan to ensure all works are executed in compliance with the required standards and specifications. The Contractor shall conduct regular quality checks and inspections throughout the project phases, including design, construction, and installation, to maintain high-quality standards and promptly rectify any deficiencies.
9. Maintain detailed project documentation, including design drawings, construction plans, installation manuals, and test results. The Contractor shall submit regular progress reports to the Employer and/or contract supervisor (Owner's Engineer), detailing the status of works, challenges encountered, and any corrective actions taken. Upon project completion, the Contractor shall provide as-built drawings and comprehensive operation and maintenance manuals for all installed systems.
10. Training on the Operation and Maintenance of the mini-grid. The training shall consist of 40 hours and shall be given to 5-10 local technical staff. More information can be found in Section 4.9.
11. Operation & Maintenance support during the first two years of operation. The Employer will be responsible for the O&M of the assets, but the Contractor is requested to conduct 2 site visits during the first two years after commissioning to perform preventive maintenance inspections and retrain the Employer’s staff. More information can be found in Section 4.10.

3.2.2. Power plants description

The power plants are composed of:

- PV generation subsystem, including PV modules, the PV support structure (for rooftop and canopy), PV combiner boards and PV cabling.
- Power conversion subsystem, including PV charge controllers, PV inverters, battery inverters, or hybrid inverters (depending on the electrical architecture chosen by the bidder)

- Energy storage subsystem, including Li-ion batteries and the Battery Management System (BMS).
- AC bus, combining all inverters' AC outputs and the distribution supply.
- Earthing subsystem.
- Auxiliary subsystem, including air-conditioning, alarms, and fire extinguishers.
- Diesel generator, which is not expected to be running continuously but only as a backup source of power. However, if there is an issue with the battery bank or the battery inverter, the diesel generator may need to run continuously to maintain an uninterrupted power supply.
- Monitoring subsystem, including the main monitoring platform with a human-machine interface, all the components connected to it (energy/power meters, irradiance sensors, temperature sensors, etc), communication circuits, and connection to the internet to allow remote monitoring.
- All required electrical boards, switchgear, protections, cabling, earthing, etc.
- A technical building hosting the power conversion, energy storage and auxiliary subsystems
- A diesel generator shelter for the installation of the diesel generator, close to the technical building.
- A split-phase converter, in the case that the nominal output AC voltage of the battery/hybrid inverters is different from split-phase 120V/240V for LV mini-grids.
- An auxiliary transformer in MV mini-grids to provide a split-phase 120V/240V supply to the internal powerplant loads.

All other necessary equipment and materials required to ensure the correct and safe operation of the power plant.

3.2.3. Design requirements

The PV generators for the mini-grids will be installed on canopies and rooftops. In some locations, the technical building (housing the batteries, electronic components, step-up transformer, and other critical equipment) will be located under the canopy to benefit from its shade. An example of a similar construction is shown in Figure 26, featuring a canopy facing east-west and a technical building beneath it.

An example of a canopy design is provided in Annex D – Canopy Reference Drawings.

Figure 26. Example photo of a canopy with a technical building beneath (Udot Island, Chuuk)

The following table provides an example of a possible breakdown of PV capacities per available site. The minimum requirements the contractor must comply with are specified in Section 3.2. This example is further detailed in **Annex B – PV Layouts**.

Table 22. Example of PV capacity per site

Label	Community	Institution name	Type installation	Estimated. PV power (kWp)
U-RT1	Uman	Elementary school	Rooftop	114
U-RT2	Uman	Municipal storage	Rooftop	56
U-CP1	Uman	Government land	Canopy	160
			Total Uman	***330***
W-RT1 (in G1)	Tol (Wonip)	Church	Rooftop	0
W-CP1 (in G1)	Tol (Wonip)	Basketball church	Canopy	0
W-RT2 (in G2)	Tol (Wonip)	Government land	Rooftop	84
W-CP2 (in G2)	Tol (Wonip)	Basketball church	Canopy	123
			Total Tol (Wonip)	***206***
M-RT1	Tol (Munien)	School	Rooftop	65
			Total Tol (Munien)	***65***
O-CP1	Onoun	School yard	Canopy	80
			Total Onoun	***80***
Mo-RT1	Moch		Rooftop	46
Mo-CP1	Moch		Canopy	58
			Total Moch	***104***

Four electrical configurations are allowed:

1. Configuration 1: 100% DC-coupling via PV charge controllers and battery inverters. The PV charge controllers and battery inverters are separate components.
2. Configuration 2: 100% DC-coupling via hybrid inverters. The hybrid inverters have both PV and battery inputs. The PV generator is coupled to the hybrid inverter's internal DC bus via a PV charge controller with MPPT tracking, integrated within the hybrid inverter.
3. Configuration 3: Mixed AC-DC-coupling via PV charge controllers, battery inverters, and PV inverters. All these are separate components.
4. Configuration 4: Mixed AC-DC-coupling via hybrid inverters and PV inverters. The hybrid inverters have both PV and battery inputs. The PV generator is coupled to the hybrid inverter's internal DC bus via a PV charge controller with MPPT tracking, integrated within the hybrid inverter. Additional PV capacity is coupled onto an external AC bus via string PV inverters.

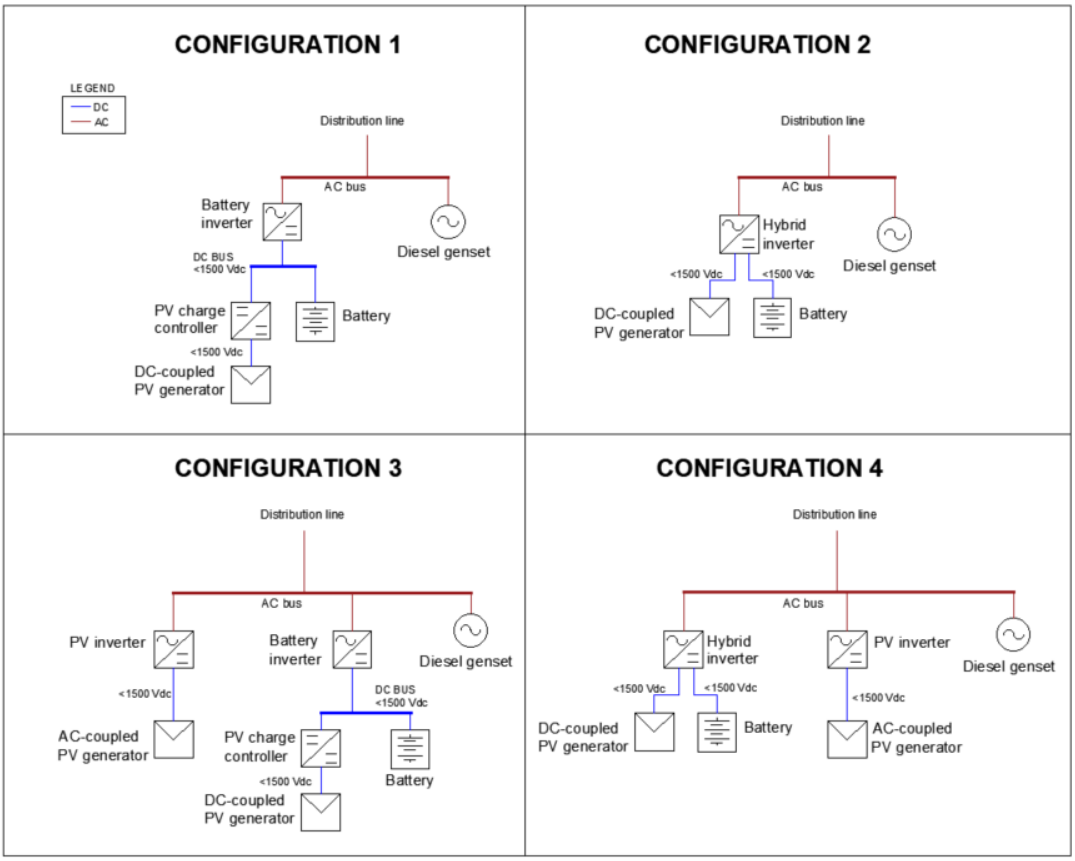


Figure 27. Block diagrams of the 4 allowed electrical configurations

The bidder shall design a system with a high level of modularity to optimise plant operations.

The Bidder is required to fill in all the Technical Specification tables provided below, also attached in the Excel version in Annex H – Component technical specifications**.** The Bidder shall indicate whether a requirement is fully compliant (FC), partially compliant (PC) or non-compliant (NC). The Bidder shall write an explanatory note in case the requirement is PC or NC. The Bidder shall prove compliance with the indicated bid document.

Important note: In each bid document stated in the table below, only the requirements stated in the "Requirement" column will be evaluated at the bidding phase. During the construction phase, all other requirements written in this document (e.g. applicable standards as per Section 2.2, installation requirements as per Section 3.2.7, etc) will apply, and may overrule the approved bidding documents. For example:

The sizing of electrical protections and cables in the power plant's SLD will not be reviewed during bid evaluation. Regardless of the sizing provided in the bid SLD, it will be the Contractor's responsibility to adequately size them during the detailed engineering phase of the Contract, complying with applicable standards as per Section 2.2, and with installation requirements as per Section 3.2.7.

Table 23. Design requirements for PV generation plant

Technical Specifications - Power plant design requirements		
ID	**Requirement**	**Value**
General requirements		
PP-DESIGN-1	Nominal voltage and frequency of the powerplant output of low-voltage mini-grids	The output voltage from the power plant to the distribution line shall be split-phase, 3-wire, 120/240 VAC for LV distribution. The nominal frequency shall be 60 Hz.
PP-DESIGN-2	Nominal voltage and frequency of the powerplant output of medium-voltage mini-grids	The LV side of the powerplant shall have a nominal voltage of 277/480 Vac, three-phase, four-wire. The transformers shall step up the voltage to 7.96/13.8kV 3-phase 4-wire for MV distribution. The nominal frequency shall be 60 Hz.
PP-DESIGN-3	Functional requirements	The power plant shall comply with the functional requirements stated in the respective section of the technical specifications document.
PP-DESIGN-4	Phase unbalancing	The design of the battery/hybrid inverters shall ensure that all phases have the same allocated power. The inverters shall comply with the minimum power as stated in the minimum requirements, while considering a potential load unbalancing of 20% in the distribution lines. The design report shall clarify any potential power de-rating of the inverters due to the split-phase power output.
PP-DESIGN-5	Interaction with other assets	A ComAp gateway shall be included to read data from the powerplant control and monitoring system and send it via the internet to the utility's main ComAp SCADA, located on the island of Weno.
General component requirements		
PP-DESIGN-6	Number of allowed PV module manufacturers and models	1 manufacturer 1 model
PP-DESIGN-7	Number of allowed PV structure manufacturers and models	3 manufacturers 3 models
PP-DESIGN-8	Number of allowed PV charge controller manufacturers and models, if applicable	1 manufacturer for LV mini-grids 1 manufacturer for MV mini-grids
PP-DESIGN-9	Number of allowed PV inverter manufacturers and models, if applicable	1 manufacturer 2 models
PP-DESIGN-10	Number of allowed battery inverters or hybrid inverters manufacturers and models	1 manufacturer for LV mini-grids 1 manufacturer for MV mini-grids
PP-DESIGN-11	Number of allowed battery manufacturers and models	1 manufacturer, 1 model for LV mini-grids 1 manufacturer, 1 model for MV mini-grids
PP-DESIGN-12	Number of allowed Diesel generator manufacturers and models	1 manufacturer, 1 model for LV mini-grids 1 manufacturer, 1 model for MV mini-grids
PP-DESIGN-13	Number of allowed hybrid controller manufacturers and models	1 manufacturer

PP-DESIGN-14	Compatibility.	Configurations 1 and 3: Both the manufacturer of the battery BMS and the manufacturer of the battery inverter and PV charge controller shall certify the compatibility of their equipment. Configurations 2 and 4: Both the battery BMS manufacturer and the hybrid inverter manufacturer shall certify the compatibility of their equipment.
Civil Works requirements		
PP-DESIGN-15	Applicable norms	The design and construction shall comply with ASCE 7/10 or equivalent, considering a category 3 typhoon on the Saffir-Simpson Hurricane Scale. (≥ 208 km/h / ≥ 129 mph)
PP-DESIGN-16	Technical building - Materials.	The technical building can be constructed with solid masonry (concrete hollow blocks are widely available in Chuuk and easy to source locally) or with Structural Insulated Panel Systems (SIPS). The solution shall comply with all other requirements stated in the bidding documents. The bidder shall demonstrate the structural integrity and thermal transmittance of the construction materials used. All materials shall be adequate for marine environments.
PP-DESIGN-17	Technical building - Foundations	The technical building shall be installed on appropriate foundations, such as reinforced concrete blocks, reinforced concrete beams, a reinforced concrete slab, or ground screws, designed to withstand the full load of the building, including all equipment and personnel. The building shall be elevated at least 60 cm above ground level to prevent flooding, even during exceptional rainfall events. All the entries of the building shall be equipped with access stairs to ensure easy and safe entry and exit for staff.
PP-DESIGN-18	Technical building - Rooms required inside the Technical Building	The technical building shall contain the following separated rooms: battery room, technical room, storage room, office room, and toilet room. The building of the MV mini-grids shall also include a dedicated room for the step-up transformer.
PP-DESIGN-19	Technical building - Floor to ceiling height. Indoor	≥ 2.70 m
PP-DESIGN-20	Technical building - Battery room requirements.	Contains batteries, associated cabling, and accessories. Ideally, it shall not have West-facing facades. It shall not have windows. It shall be accessible from the technical room.
PP-DESIGN-21	Technical building - Technical room requirements.	Contains battery/hybrid inverters, PV charge controllers, switchboards, control and monitoring devices, and accessories. Ideally, it shall not have West-facing facades.
PP-DESIGN-22	Technical building - Office room requirements.	Area ≥ 7 m^2
PP-DESIGN-23	Technical building - Storage room requirements.	Contains spare parts and O&M tools. Area ≥ 6 m2
PP-DESIGN-24	Technical building - Toilet room requirements.	Includes a toilet, a sink and a water tap, ensuring proper water drainage. Area ≥ 3 m^2

PP-DESIGN-25	Technical building - Step-up transformer room requirements.	The room shall be equipped with a natural ventilation system, and adequate airflow shall be maintained around the transformer to ensure efficient cooling and compliance with the manufacturer's requirements. The room shall have sufficient space around the transformer to allow for safe operation, maintenance, and inspections.
PP-DESIGN-26	Adjacent back-up generator shelter	The diesel generator shall be located in a shelter adjacent to the Technical Building and elevated by 60cm from the ground level via reinforced concrete foundations. The shelter will hold both the DG and the diesel tank in close proximity to each other, outside the canopy but near the technical building. The enclosure will be surrounded by a mesh fence designed to: Protect the DG and tank from theft or unauthorised access. Allow adequate ventilation to ensure proper generator operation and prevent overheating. Include a secure door or access point with a lockable mechanism.
PP-DESIGN-27	Adjacent diesel tank	The diesel storage tank shall be located adjacent to the diesel generator at least 3.0 m from the closest wall of the technical building for safety reasons.
PV Module and Structure Requirements		
PP-DESIGN-28	Method of fixation of the PV modules to the support structure	Minimum 6 anchor points to support the structure, through-bolted wherever possible.
PP-DESIGN-29	Ventilation space underneath the PV modules, for canopy and tilted roof structures	≥ 5 cm
PP-DESIGN-30	Rooftop PV structures - Flat roof - Distance between PV module rows	≥ 0.45 m
PP-DESIGN-31	Rooftop PV structures - Tilted roof- Type of fixture to the roof	The PV support structure must be fixed to the supporting rooftop structure, and not to the corrugated metal sheet.
PP-DESIGN-32	Rooftop PV structures - Tilt from the horizontal.	Coplanar with the roof.
PP-DESIGN-33	Rooftop PV structures - Configuration.	PV modules can be put in portrait or in landscape, depending on the rooftop and module dimensions
PP-DESIGN-34	Wind load used for the design	The supporting structures shall be designed to withstand at least a Category 3 typhoon on the Saffir-Simpson Hurricane Scale. (≥ 208 km/h / ≥ 129 mph)
Electrical Configuration and Protection		
PP-DESIGN-35	PV combiner boxes shall be used for the parallel connection of DC-coupled PV strings. Each PV string shall be protected against overcurrent via gPV fuses on both polarities. The PV combiner box shall include a Type II SPD. The main output of the PV combiner box shall include a DC switch-disconnector. The PV combiner box shall be installed outdoors, next to the PV strings, and mounted on the PV support structure (for canopies) or on the building (for rooftops).	
PP-DESIGN-36	A PV disconnect board shall be included within the technical building to disconnect the PV array input circuits from the PV charge controller or hybrid inverters. It shall contain a 2-pole DC breaker and one Type II SPD for each PV circuit.	

PP-DESIGN-37	Applicable for electrical configurations 1 and 3: A main DC board shall be included inside the technical building to combine the battery, PV charge controllers, and battery inverters. All inputs and outputs (to PV charge controllers, battery inverters, battery, and DC loads) shall have DC-rated disconnection and overcurrent protection on both polarities.	
PP-DESIGN-38	If the design includes AC-coupled PV generators via several PV inverters, a PV inverter board shall be included to combine the AC output of all PV inverters. It shall protect the circuits via AC breakers and shall contain a Type II SPD if installed outdoors. It can be installed inside a technical room or outdoors.	
PP-DESIGN-39	A main AC board shall be included inside the technical building to combine the battery/hybrid inverters, PV inverter board, backup generator and power the following load circuits: 1. Main distribution line. 2. Internal loads of the technical building, to be supplied with 120V/240V split-phase 3-wire. It shall contain AC breakers for all inputs and outputs, a 30 mA RCD on load circuit 2 and a Type I+II SPD.	
PP-DESIGN-40	A 1-0-2 manual transfer switch shall be included inside the technical building. One setting of the switch shall connect the main AC bus (including battery inverters, PV inverters and backup generator) to the loads, and the other setting shall connect only the backup generator to the loads, bypassing the whole PV-battery installation and allowing the backup generator as the only source of power.	
PP-DESIGN-41	PV inverter DC switch.	Shall disconnect both polarities of each PV string. The switch can be internal or external to the inverter.
PP-DESIGN-42	PV inverter DC surge protection.	Type II SPD. Can be internal or external to the inverter.
PP-DESIGN-43	The following energy meters shall be included: 1x meter for the main output towards the distribution line. 1x meter for the technical building's internal loads. 1x meter for the backup genset. 1x meter for all PV inverters in AC-coupled PV configurations.	
PP-DESIGN-44	If possible, the monitoring system can be powered directly from the DC bus to increase its power supply reliability.	
PP-DESIGN-45	(If applicable) Ratio between the PV capacity (kWp @ STC) connected to the PV inverter and the nominal AC output of the PV inverter.	≤ 1.3
PP-DESIGN-46	(If applicable) Ratio between the PV capacity (kWp @ STC) connected to a PV charge controller and the nominal output of the controller (considering the nominal current of the controller and the nominal voltage of the battery).	≤ 1.3
PP-DESIGN-47	(If applicable) Ratio between total Battery inverter/hybrid inverter AC power and total PV inverter AC power	Shall respect manufacturer recommendations
PV circuits design		
PP-DESIGN-48	Maximum Voc of the PV strings in a DC-coupled PV generator at the minimum temperature specified in the Environmental Conditions.	≤ 1500 Vdc
PP-DESIGN-49	Maximum Voc of the PV strings in a DC-coupled PV generator at the minimum temperature specified in the Environmental Conditions, if the charge controller does not	≤ 95% of the maximum input voltage allowed by the charge controllers.

	have over-voltage protection	
PP-DESIGN-50	Maximum Voc of the PV strings in an AC-coupled PV generator at the minimum temperature specified in the Environmental Conditions.	≤ 95% of the maximum input voltage allowed by the PV inverter.
PP-DESIGN-51	Vmp of the PV strings in an AC-coupled PV generator at a temperature of 25°C.	Value within the MPPT range of the PV inverter.
PP-DESIGN-52	Vmp of the PV strings in an AC-coupled PV generator at a temperature of 70°C.	Value within the MPPT range of the PV inverter.

3.2.4. Functional requirements

The power plants shall work at least under the following functional modes:

1. **Hybrid mode.**
    a. If the PV output is higher than the loads, the PV generators will supply the loads and will charge the battery. The backup generator is off, and the grid is formed by the battery or hybrid inverters.
        i. If the battery is fully charged, the control system shall curtail the PV power in order not to overcharge the battery nor overload the battery/hybrid inverter. For AC-coupled PV generators, this curtailment can be done by increasing the frequency or by sending active power setpoints via communication circuits.
    b. If the PV power is lower than the loads, the battery/hybrid inverters shall discharge the battery to cover the difference. The control system shall manage the battery to avoid excessively long or fast discharges, disconnecting it if necessary. The battery's State of Charge (SoC) shall never be below the manufacturer's recommended threshold and shall never be below the SoC that ensures the required useful battery capacity for each powerplant.
        i. If the SoC arrives at the configured SoC_{min}, the control system shall automatically start the backup generator. The backup generator shall supply the loads and charge the battery to a configurable level (typically 70% of its capacity) via the battery/hybrid inverters, which act as a battery charger. After this, the control system shall automatically stop the backup generator, and the battery/hybrid inverters shall form the grid seamlessly and supply the loads.
        ii. Note: The power plant shall be able to switch on/off automatically the backup generator based on battery SoC, and the Contractor shall supply and install all necessary controls and communication circuits. However, such automatic functionality will not be configured during commissioning and will not be used during the first phases of the project.
    c. There shall not be reverse power flow towards the diesel generator. This is especially important when designing configurations with AC-coupled PV generators.

2. **Bypass mode.**
    a. Under maintenance scenarios where the disconnection of the battery and/or PV is needed, it will be necessary to bypass the battery and PV and operate exclusively with the backup diesel generator. To do so, a Manual Transfer Switch shall be included, capable of completely isolating the battery and PV, allowing only the backup generator to supply the loads.

The backup diesel generator shall therefore be able to work in two operational modes:

1. Manual mode. The operator shall be able to manually switch the generator on or off.
2. Automatic mode. The operator shall be able to configure the optimum battery thresholds for the automatic starting and stopping of the generator, including at least the following functionalities:
    a. The generator start signal shall be automatically activated when the battery SoC is below the adjustable lower limit and/or when the output power of the battery/hybrid inverters is greater than their adjustable upper power limit.
    b. The generator stop signal shall be automatically activated when the battery SoC reaches the adjustable upper limit and/or when the output power of the battery/hybrid inverters is lower than their adjustable upper power limit.

The mini-grid in Tol (Wonip) is unique in that it features two generation plants (G1 and G2) separated by a couple of hundred meters. Therefore, some specific requirements apply for this mini-grid:

- The generation plant at G1, which includes the PV, battery, battery/hybrid inverters and back-up genset, will be the grid-forming plant. The generation plant in G2 is only made of grid-connected PV and will work as grid-following.
- In the worst-case scenario where there are practically no loads, all the PV from G2 could be directed to G1 to charge the batteries. Therefore, the battery/hybrid inverters and the (bi-directional) step-up transformer in G1 shall be able to accommodate this maximum PV power from G2.
- Under bypass mode, the PV generators at G2 have to be kept turned off as there is a risk of backfeeding into the diesel generator.
- The powerplant shall feature a hybrid controller installed at G1, which shall communicate with the battery/hybrid inverters, the genset and all the PV inverters (both in G1 and in G2). Communication with the PV inverters at G2 shall be via a dedicated underground fibre-optic line.
- The hybrid controller shall send active power setpoints to the PV inverters in order to curtail their output power as well as reactive power setpoints for voltage control. The characteristics of the communication line (latency, etc.) shall ensure that PV inverter power curtailment occurs quickly enough to maintain grid stability, while accounting for the overload capability of the battery/hybrid inverters.

- Fail-save scenarios shall be considered to ensure that the minigrid works in a safe manner after a failure of the communication network. Droop-mode control can be considered for this objective.

All mini-grids shall be able to black-start without using the backup diesel generator. This has some implications for MV mini-grids that feature a step-up transformer (Uman and Tol (Wonip)):

- The battery/hybrid inverters shall be able to black-start and magnetise the step-up transformer from the batteries alone. This shall be proven by a signed letter from the battery/hybrid inverter manufacturer stating that the envisioned system can black-start the foreseen transformers.

Re-energisation procedures (automated or manual) following system outage are required and shall be determined by the Contractor as part of its design process. As a minimum, automatic re-energising of the step-up transformer and manual re-energising of step-down transformers are required.

3.2.5. Performance requirements

At commissioning, a performance test will be conducted on the PV generator to verify proper operation. This will be done using the PV Acceptance Ratio (ARPV), which is calculated as the ratio of the measured PV power Pmeas to the expected PV power $P_{exp.}$

P_{exp} will be calculated with the following formula:

$$P_{exp} = P_{STC} \times \frac{G}{1000} \times \left(1 + \left(\frac{\beta}{100} \times (T_{cell} - 25)\right)\right) \times P_{loss}$$

Where:

- P_{STC} is the nominal power of the PV array at standard test conditions (kWp).
- G is the measured irradiance in the plane of the PV modules, in W/m^2.
- β is the temperature coefficient of the voltage as stated in the datasheet (%/°C). It is a negative number.
- T_{cell} is the PV module temperature, in °C. It can either be measured with a temperature sensor attached directly to the back sheet of the PV module, or it can be calculated from the measured irradiance and ambient temperature as:

$$T_{cell} = T_{ambient} + DT\frac{G}{1000}$$

  Where DT=29K for a roof-mounted PV structure with proper ventilation and DT=22K for ground-mounted PV structures and canopy structures.

- P_{loss} is a number ranging from 0 to 1 that accounts for expected losses, such as cable losses and shading losses.

First, the Contractor shall specify P_{STC} , β and P_{loss} in the commissioning protocol proposal to be

sent to the Employer. The final value of P_{loss} shall be clearly explained by specifying the losses in the system.

At the time of commissioning, the Contractor will measure simultaneously G, T_{cell} (or $T_{ambient}$) and the PV power production, and will calculate the AR_{PV}. The AR_{PV} must be at least 90% for the test to be successful.

3.2.6. Component requirements

The Bidder is required to fill in all the Technical Specification tables provided in this section, also attached in the Excel version in Annex H – Component technical specifications**.** The Bidder shall indicate whether a requirement is fully compliant (FC), partially compliant (PC) or non-compliant (NC). The Bidder shall write an explanatory note in case the requirement is PC or NC. The Bidder shall indicate which document (and which section within the document, if needed) provides the proof for each requested requirement. The proving document can, for example, be a datasheet, a design drawing prepared by the Bidder, a specific section of the Bidder's Design Report, or others.

3.2.6.1. PV modules

The following table sets the minimum requirements for the PV modules.

Table 24. Technical Specification table for PV modules

Technical specifications - PV modules		
ID	**Requirement**	**Value**
PV-1	Product standards. Compliance with these standards shall be documented by a certificate issued by an independent certification institution.	IEC-61215 IEC 61730-1 IEC 61730-2 IEC 61701 IEC TS 62804
PV-2	Manufacturer certificates. The manufacturer shall be certified by an internationally recognised certification agency (TUV, UL or similar).	ISO 9001 ISO 14001
PV-3	Years that the manufacturer has been present in the PV manufacturing market.	≥ 10 years
PV-4	PV module manufacturer	From the Tier 1 list
PV-5	PV cell technology.	Mono-crystalline Silicon.
PV-6	Power tolerance.	> 0 %
PV-7	Efficiency under STC conditions.	≥ 20 %
PV-8	Power temperature coefficient	better than -0.37%/C
PV-9	Frame material.	Anodized aluminium
PV-10	Front glass material and thickness.	low-iron tempered glass, ≥ 3 mm.
PV-11	Connector type.	MC4 or equivalent
PV-12	Junction box Ingress Protection rating	≥ IP65
PV-13	Number of bypass diodes.	≥ 3
PV-14	PV conductors cross-section.	≥ 4 mm2
PV-15	Maximum static loading, Front load.	≥ 5400 Pa
PV-16	Maximum static loading, Rear load.	≥ 2400 Pa

3.2.6.2. PV support structures – titled roof

Table 25. Technical specification table for tilted rooftop PV support structure

Technical Specifications - PV Support Structure - Tilted Rooftop		
ID	**Requirement**	**Value**
PVST-1	Manufacturer certificates.	ISO 9001
PVST-2	Profiles material.	The structure can be made of hot-dip galvanised steel or anodised aluminium alloy. If anodised aluminium, it shall be at least 6005-T5. If hot-dipped galvanised steel, it shall have a rustproof coating according to ISO1461. It shall be adequate to ensure a minimum design lifetime of 25 years in a C5-M corrosive environment, taking into account material thickness, exposure conditions, and expected corrosion rates. All materials used for the structure shall be corrosion-resistant.
PVST-3	Bolts and fastenings material.	Stainless steel (at least SS316)
PVST-4	Anti-corrosion measures	The structure shall provide the necessary rubber separators (EPDM or equivalent) to prevent direct contact between dissimilar metals.

3.2.6.3. PV support structures – flat roof

Table 26. Technical specification table for flat roof-mounted PV support structure

Technical Specifications - PV Support Structure – Flat Rooftop		
ID	**Requirement**	**Value**
PVST-1	Manufacturer certificates.	ISO 9001
PVST-2	Tilt from the horizontal.	10 °
PVST-3	Azimuth	Different configurations are possible: South-oriented (towards the school yard) Double orientation North-South Double orientation East-West
PVST-4	Type	Two different options are envisioned: Option 1: Structure based on concrete ballasts without roof penetration. The roof may not be able to withstand the required ballast weight (sized for Cat 3 wind speeds) in the areas within the rafters. Therefore, this option may require installing extra roof reinforcements (e.g. wooden beams) between the current rafters. Option 2: Direct anchoring via roof penetration. The anchoring shall only be done at the rafters. An approximate location of the rafters is given in the Layout drawing of Moch. This option may avoid the need for extra roof reinforcements.
PVST-5	Roof water management	The part of the roof occupied by the PV installation shows signs of water accumulation, possibly due to irregular finishing of the roof slab between rafters or to possible flexing of the roof slab between rafters. The roof's floor shall be modified to have a constant slope of 0.5% from the centre so that rainwater is not accumulated on the roof. The contractor should first select the existing roof finish by 1cm, then apply a waterproof mortar to achieve the correct slope.
PVST-6	Profiles material.	The structure can be made of hot-dip galvanised steel or anodised aluminium alloy. If anodised aluminium, it shall be at least 6005-T5. If hot-dipped galvanised steel, it shall have a rustproof coating according to ISO1461. It shall be adequate to ensure a minimum design lifetime of 25 years in a C5-M corrosive environment, taking into account material thickness, exposure conditions, and expected corrosion rates. All materials used for the structure shall be corrosion-resistant.
PVST-7	Bolts and fastenings material.	Stainless steel (at least SS316)
PVST-8	Anti-corrosion measures	The structure shall provide the necessary rubber separators (EPDM or equivalent) to prevent direct contact between dissimilar metals.
PVST-9	Maintenance corridor	At least one corridor of sufficient width shall be included in order to conduct O&M activities. If the corridor is located at the roof edge, a safety line shall be installed.

3.2.6.4. PV support structures - canopy

Table 27. Technical specification table for canopy PV support structure.

Technical Specifications - PV Support Structure - Canopy		
ID	**Requirement**	**Value**
PVSC-1	Tilt from the horizontal.	10 º
PVSC-2	Orientation.	Double-orientation, each orientation with the same tilt angle but in opposite azimuths (according to the layouts in the Annexes).
PVSC-3	Height	≥3.2m from the ground level. The canopy's height shall allow the construction of the technical building below and allow a minimum separation distance of 50cm between the technical building's roof and the canopy's ceiling.
PVSC-4	Profiles material.	The canopy shall be constructed using galvanised steel. Hot-dipped galvanised steel structures shall have a rustproof coating according to ISO1461. It shall be adequate to ensure a minimum design lifetime of 25 years in a C5-M corrosive environment, taking into account material thickness, exposure conditions, and expected corrosion rates. An additional anti-corrosion paint layer is acceptable. All materials must be corrosion-resistant.
PVSC-5	Bolts and fastenings material.	Stainless steel SS316 or higher.
PVSC-6	Waterproofing	The canopy design should ensure its waterproofing. Two solutions can be accepted: - A corrugated metal sheet is to be installed below the PV modules. Corrugated metal sheet shall be hot-dip galvanised, with a minimum gauge of 24, with the coating designed to ensure a minimum service life of 25 years in a C5-M environment. - Using waterproof PV structures (the rails and purlins permit the rainwater collection).
PVSC-7	Maintenance walking space	The canopy shall be designed for easy maintenance, including the replacement of any module. Sufficient walking space must be provided at the lower part of the canopy and on the sides.
PVSC-8	Foundations type.	Reinforced concrete, driven piles, or ground screws. If driven piles or ground screws are used, they should be made of hot-dip galvanised steel and ensure 25 years lifetime in C5-M environment. Exposed surface of the ground screws shall have the same corrosion resistance as the canopy supporting structures. The final foundation type shall be selected by the Contractor based on geotechnical conditions, structural design requirements, and site constraints, and shall be detailed in the installation requirements for each mini-grid.

PVSC-9	Continuity of water collection between canopies	Where multiple canopies are installed adjacent to each other, the entire canopy assembly shall be waterproofed as a continuous system. No water leakage shall occur at interfaces between adjacent canopies. Rainwater shall be collected and drained in a controlled manner across the canopy assembly.

3.2.6.5. PV charge controller

Table 28. Technical specification table for PV charge controller

Technical Specifications - PV Charge Controller		
ID	**Requirement**	**Value**
CC-1	Product standards.	IEC 62109-1 and/or UL 1741
CC-2	The years that the manufacturer has been present in the international market.	≥ 5 years
CC-3	PV voltage.	< 1500 Vdc
CC-4	Maximum efficiency.	≥ 97 %
CC-5	Technology	Shall allow maximum power point tracking (MPPT) of the PV generator and provide regulation phases according to battery technology. Shall communicate and be compatible with the Li-ion BMS.
CC-6	Protections.	Short-circuit, over-temperature and reverse polarity.
CC-7	Cut-off and alarm levels	Cut-off and alarm levels configurable according to the battery SoC.
CC-8	IP rating.	≥ IP20 or equivalent
CC-9	Ambient temperature operational range.	At least 15°C - 40°C

3.2.6.6. PV inverter

(for configurations 3 and 4)

Table 29. Technical specification table for PV inverter

Technical Specifications - PV Inverter		
ID	**Requirement**	**Value**
PVINV-1	Product standards.	IEC 62109-1, IEC 62109-2, IEC 62116, IEC 61727.
PVINV-2	The years that the manufacturer has been present in the international market.	≥ 5 years
PVINV-3	Nominal Voltage	Two options are allowed: Option 1: Three-phase, 277/480 Vac Option 2: Split phase, 120/240 Vac (only allowed for mini-grids without MV distribution line).
PVINV-4	Nominal frequency.	60 Hz
PVINV-5	Voltage and Frequency	The inverter shall have adjustable voltage and frequency settings to “fine-tune” its operational ranges.
PVINV-6	Nominal AC output power.	Between 5 and 50 kW
PVINV-7	Euro-efficiency (as defined by the Joint Research Center).	≥ 95 %
PVINV-8	Maximum total harmonic distortion	≤ 4%
PVINV-9	Technology	Transformer-less, MPPT string inverters

PVINV-10	Number of MPPT	≥ 2
PVINV-11	Number of PV strings per MPPT.	< 3
PVINV-12	Functions and controls	Active power limitation possible via both frequency droop control (the PV inverter power depends on the grid frequency via a pre-defined P-f droop curve) and via active power setpoint from a third-party controller (via wired communication network). Reactive power control, including power factor adjustment. Ramp rate limitation.
PVINV-13	Protections	Anti-islanding. AC overcurrent. DC reverse polarity. DC insulation resistance.
PVINV-14	Power factor.	Adjustable at least between 0.85 and 1, leading and lagging.
PVINV-15	IP rating.	≥ IP65 if outdoors ≥ IP20 if indoors
PVINV-16	Ambient temperature operational range.	According to environmental conditions
PVINV-17	Humidity operational range.	At least 5% - 99%

3.2.6.7. Battery inverter

(for configurations 1 and 3)

Table 30. Technical specification table for battery inverter

Technical Specifications - Battery Inverter		
ID	**Requirement**	**Value**
BATINV-1	Product standards.	IEC 62109, UL 1741 (US spec), or equivalent
BATINV-2	The years that the manufacturer has been present in the international market.	≥ 5 years
BATINV-3	Nominal Voltage of the ensemble of all inverters	For MV mini-grids: Three-phase, 277/480 Vac. For LV mini-grids: Split phase, 120/240 Vac
BATINV-4	Nominal frequency.	60 Hz
BATINV-5	Nominal battery voltage.	< 1500 Vdc
BATINV-6	Maximum efficiency.	≥ 95%
BATINV-7	Harmonic distortion.	≤ 4%
BATINV-8	Functions	Invert from DC battery to AC to provide loads. Charge battery from AC via respecting the Li-ion BMS charging regulation phases.

		Black-start capability. Shall communicate with the Li-ion BMS.
BATINV-9	Deep discharge protection:	Inverters shall stop all operations other than charging if the battery voltage or SoC is below the minimum permissible threshold.
BATINV-10	Overcharge protection:	Inverters shall stop any charging operation if the voltage of any battery cell exceeds the maximum permissible voltage.
BATINV-11	Overcurrent protection:	The inverter shall not exceed the maximum charging/discharging current reported by the battery manufacturer.
BATINV-12	Cut-off and alarm levels are configurable based on battery voltage or SoC.	Included. (Could also be included in a control device external to the inverter itself).
BATINV-13	IP rating.	≥ IP20
BATINV-14	Ambient temperature operational range.	15°C - 45°C
BATINV-15	Humidity operational range.	≥ 95%
BATINV-16	Communication Control Interface	Modbus TCP, RTU, or equivalent high-level control interface.

3.2.6.8. Battery hybrid inverter

(for configurations 2 and 4)

Table 31. Technical specification table for battery hybrid inverter

Technical Specifications - Battery Hybrid Inverter		
ID	**Requirement**	**Value**
HYBINV-1	Product standards.	IEC 62109 and relevant IEC 61000 parts or equivalent.
HYBINV-2	The years that the manufacturer has been present in the market.	≥ 5 years
HYBINV-3	Technology	Maximum power point tracking (MPPT) of the PV generator. PV generator is DC-coupled within the inverter.
HYBINV-4	Nominal Voltage of the ensemble of all inverters	For MV mini-grids: Three-phase, 277/480 Vac. For LV mini-grids: Split phase, 120/240 Vac
HYBINV-5	Nominal frequency.	60 Hz
HYBINV-6	Battery voltage	< 1500 Vdc
HYBINV-7	MPPT efficiency	> 97%
HYBINV-8	Maximum DC-AC Efficiency	≥ 95%
HYBINV-9	Harmonic distortion.	≤ 4%
HYBINV-10	Functions	Invert from DC battery to AC to provide loads. Charge battery from both PV and from AC, while respecting the Li-ion BMS charging regulation phases. Black-start capability. Shall communicate with the Li-ion BMS.
HYBINV-11	Deep discharge protection:	Inverters shall stop all operations other than charging if the battery voltage or SoC is below the minimum permissible threshold.
HYBINV-12	Overcharge protection:	Inverters shall stop any charging operation if the voltage of any battery cell exceeds the maximum permissible

		voltage.
HYBINV-13	Overcurrent protection:	The inverter shall not exceed the maximum charging/discharging current reported by the battery manufacturer.
HYBINV-14	Cut-off and alarm levels configurable based on battery voltage or SoC.	Included. (Could also be included in a control device external to the inverter itself).
HYBINV-15	IP rating.	≥ IP20
HYBINV-16	Ambient temperature operational range.	-20°C - 45°C
HYBINV-17	Humidity operational range.	≥ 95%
HYBINV-18	Communication Control Interface	Modbus TCP, RTU, or equivalent high level control interface.

3.2.6.9. Battery

Table 32. Technical specification table for Li-ion battery

Technical Specifications - Li-Ion Battery		
ID	**Requirement**	**Value**
Li-1	Product standards.	IEC 62619 and UN38.3 or equivalent.
Li-2	Years that the manufacturer has been present in the market.	≥ 5 years
Li-3	Nominal battery voltage.	≤ 1500 Vdc
Li-4	Chemistry	Li-ion LFP
Li-5	Number of cycles.	≥ 5000 cycles at the design DoD, @T=25°C, @0.25C and 80% SoH EoL. The bidder must provide the curve (number of cycles vs. DoD) demonstrating that the sizing meets the required useful capacity and the specified number of cycles.
Li-6	Self-discharge.	≤ 4%/month @T=20°C
Li-7	Functionalities of the BMS.	- Control and balance of each individual battery cell. - Protections: over-charging, under-charging, over-temperature, over-load, and short-circuit. - Setting of critical threshold levels. - Alarm management system - Blackstart capability
Li-8	BMS integration	The integration of the BMS into the power plant's control and monitoring system shall include at least the following parameters: - SoC - Battery voltage - Battery temperatures - Over or under voltage (min, max, nominal) - Over or under temperature (min, max, nominal)
Li-9	Ambient temperature operational range.	15°C - 45°C
Li-10	Maximum continuous charge rate	Bidder to indicate
Li-11	Maximum continuous discharge rate	Bidder to indicate
Li-12	Communication Protocols	Compatible with Modbus TCP, Modbus RTU, RS-485 (or equivalent)

3.2.6.10. Backup diesel generator

Table 33. Technical specification table for diesel generators

Technical Specifications - Back-Up Generator		
ID	**Requirement**	**Value**

DG-1	Product standards.	ISO 3046, ISO 8528, IEC 60034 or equivalent.
DG-2	Nominal Voltage	For MV mini-grids: Three-phase, 277/480 Vac. For LV mini-grids: Split phase, 120/240 Vac
DG-3	Nominal frequency.	60 Hz
DG-4	Fuel type.	Diesel
DG-5	Diesel consumption at 100% load.	≤ 0.3 L/kWh on average
DG-6	Noise level.	≤ 80 dB at 1m at maximum load.
DG-7	Soundproofing body.	Able to operate at high ambient temperatures of up to 45°C, without losing the efficiency of the cooling system.
DG-8	User interface display parameters.	Voltage, frequency, power, energy, fuel level, coolant temperature, and oil pressure.
DG-9	Automatic start/stop.	Included, to be operated by the control system.
DG-10	Protections	Overspeed, water temperature, oil pressure, under/over voltage, under/over frequency, reverse power.
DG-11	Built-in fuel tank capacity.	Enough to operate for 8h at 80% load.
DG-12	Accessories.	Exhaust pipe. Fuel sensor. All spare parts for the first 1000h of operation.

3.2.6.11. Control and monitoring

Table 34. Technical specification for control and monitoring.

Technical Specifications - Control and monitoring		
ID	**Requirement**	**Value**
CTRMON-1	Devices monitored by the central datalogger	Battery/hybrid inverters, Li-ion BMS, PV inverters, PV charge controllers, backup generator, output feeders to loads.
CTRMON-2	Operating parameters to be measured and recorded by the central datalogger– Battery/hybrid inverter.	AC power, voltage, current and frequency.
CTRMON-3	Operating parameters to be measured and recorded by the central datalogger – Battery.	Voltage, SoC, charge/discharge power, temperature
CTRMON-4	Operating parameters to be measured and recorded by the central datalogger– PV inverters.	AC power, voltage and current. Maximum power during the day.
CTRMON-5	Operating parameters to be measured and recorded by the central datalogger– PV charge controller.	Power, voltage, and current at both the PV and battery sides. Maximum output power during the day.
CTRMON-6	Operating parameters to be measured and recorded by the central datalogger– Back-up generator	Power, voltage, current, frequency, and daily energy
CTRMON-7	Operating parameters to be measured and recorded by the central datalogger– output feeders to the distribution line	Power, voltage, current, and daily energy
CTRMON-7	Operating parameters to be measured and recorded by the central datalogger– output feeders to the street lighting line	Power, voltage, current, and daily energy
CTRMON-8	Operating parameters to be measured and recorded by the central datalogger– Environmental Appropriate sensors such as pyranometers and temperature probes shall be used.	Global horizontal irradiance, ambient temperature, PV module temperature, temperature in the battery and technical room. (For Wonip, this only applies to G1)

CTRMON-9	Operating parameters to be measured and recorded by the central datalogger– Other	Alarms, faults.
CTRMON-10	Data acquisition of operating parameters by the central datalogger, measurement interval	≤ 15 min
CTRMON-11	Data acquisition of operating parameters by the central datalogger, storage capacity in the local storage card	≥ 180 days
CTRMON-12	Data storage by the central datalogger	via USB stick, SD card, or equivalent. All information shall be retrievable in .csv format or equivalent (table).
CTRMON-13	Accessibility of information.	Both on-site (via local HMI screens or laptop connection) and remotely (via an online monitoring platform). All information shall be retrievable in .csv format or equivalent (table).
CTRMON-14	In case of a failure of the remote monitoring platform or the data connection, a simple O&M process shall be ensured by showing at least the following parameters through simple on-site screens and displays in the technical building: - Battery voltage or SoC - Instantaneous power delivered to the grid - Total daily energy delivered to the grid - Total cumulative energy produced since commissioning - Maximum daily power delivered by the PV generator For Wonip at G2, an energy meter shall be installed, showing at least: - Instantaneous power delivered to the grid - Total daily energy delivered to the grid - Total cumulative energy produced since commissioning - Maximum daily power delivered by the PV generator	
CTRMON-15	Energy meter specifications	Accuracy class 1 for active energy; accuracy class 2 for reactive energy; self-power supply; IP20; screen to display the required parameters.

3.2.6.12. Mini-grid controller and fibre optic communication network

For Tol (Wonip): If the Bidder proposes a distributed PV configuration with installations at both G1 and G2, a dedicated underground fibre optic communication network shall be installed between the two sites. The mini-grid controller shall be capable of communicating with and controlling all generation assets located at both G1 and G2.

Table 35. Technical specification table for fibre optics

Technical Specifications -Fibre Optics Cable (Only for Wonip)		
ID	**Requirement**	**Value**
Fiber-1	Fiber type	Singlemode
Fiber-2	Number of fibres	16 or 32
Fiber-3	Installation type	Dedicated conduit.

Fiber-4	Cable protections	Non-metallic Armoured (composite) with anti-rodent protection.
Fiber-5	Redundancy	The fibre links need to be doubled in case of fracture.

Table 36. Technical specification for mini-grid controller

Technical Specifications - Mini-grid controller		
ID	**Requirement**	**Value**
MGC-1	Manufacturer	ComAp
MGC-2	Ambient temperature operational range	5°C - 45°C
MGC-3	Controlled assets	The controller must be able to control both planned and future installations. It shall have enough communication ports to be able to control all components necessary to comply with all the project's requirements, including at least: - PV inverters: the number proposed in the bidder design + 2 extra inverters from potential future installations. - Battery or hybrid inverters: the number proposed in the bidder design + 1 extra inverter from potential future installations. - Gensets: a total of 2
MGC-4	Communication Protocols	Compatible with Modbus TCP, Modbus RTU, RS-485 (or equivalent)
MGC-5	Functional requirements	The controller must fulfil the functional requirements described in the technical specifications.
MGC-6	IP protection	At least IP20
MGC-7	Over-voltage protection	At least type II on all ports that are connected to devices installed outdoors and that could suffer from atmospheric overvoltages.

3.2.6.13. Auxiliary transformer

This component applies only to MV mini-grids, Uman and Tol (Wonip).

This transformer is required to supply the technical building's internal loads with split-phase 120/240 VAC.

Table 37. Technical specification for auxiliary transformer

Technical specifications – Auxiliary transformer for the technical building auxiliary loads (only for MV mini-grids)		
ID	**Requirement**	**Value**
AXUTRAFO1	Product standards	IEC 60076 or equivalent
AXUTRAFO2	Nominal power	≥ 10 kVA
AXUTRAFO3	Primary voltage	277 V
AXUTRAFO4	Secondary voltage	Split-phase 120 V / 240 V
AXUTRAFO5	Nominal frequency	60 Hz
AXUTRAFO6	Max. ambient temperature	50°C
AXUTRAFO7	Min efficiency	92%

3.2.6.14. Step-up transformer

Table 38. Technical specification table for step-up transformers

Technical specifications – Step-up transformer (Only for MV mini-grids)		
ID	**Requirement**	**Value**
TR-UP-1	Product standards.	The transformers shall meet the requirements of the following ANSI standards, including the latest revisions with respect to material, design and test: - C57 Requirements for Distribution Transformers - C68.1 Techniques for Dielectric Tests - C76 Apparatus Bushings
TR-UP-2	Nominal frequency	60 Hz
TR-UP-3	Primary line voltage	277 / 480 V
TR-UP-4	Secondary line voltage	7970 / 13800 V GrdY
TR-UP-5	Number of phases	3 phases
TR-UP-6	Core Material	Cold-rolled grain-oriented silicon steel
TR-UP-7	Winding material	High-Conductivity Copper
TR-UP-8	Feed	Dead-front radial
TR-UP-9	Transformer fluid	Type II non-PCB mineral oil (ONAN)
TR-UP-10	Temperature rise	65ºC rise
TR-UP-11	Mounting	Pad-mounted
TR-UP-12	Insulation class	15kV
TR-UP-13	Basic Impulse Level (BIL)	95 kV
TR-UP-14	No-load tap changer	+/- 5%. 2.5% by step
TR-UP-15	Impedance	<4%
TR-UP-16	No-load losses	<350W
TR-UP-17	Connectors	Elbow Insulated Connectors for High Voltage (HV) and Low Voltage (LV)
TR-UP-18	Environment	The tank, compartment, and all appurtenances shall be resistant to impact and corrosion under normal operating conditions in the island's salt-air environment.
TR-UP-19	Tank	The transformer tank shall be welded from cover to base
TR-UP-20	Base	The base of the transformer (the part that makes contact with the mounting surface) shall be made of Type 304L stainless steel
TR-UP-21	Compartment material	The high and low-voltage compartment, including doors, hinges, base and other parts and accessories, shall be made of Type 304L stainless steel
TR-UP-22	Doors	The transformer shall be supplied with a high and low-voltage door. The HV door can be opened only after the low-voltage door is opened
TR-UP-23	Standing water	No part of the transformer shall allow deformation or the accumulation of standing water. The top of the transformer shall be convex so water will run off the top
TR-UP-24	Fill plug	It shall have a one-inch NPT fill plug and drain valve, and a sampler
TR-UP-25	Oil level indication	An indication shall be provided for signifying the correct oil level at 25 °C if the fill plug is not at this level, and an automatic pressure relief valve
TR-UP-26	LV neutral	The low-voltage neutral shall be fully insulated and provided with a connected, removable neutral ground strap, connected so as not to impair the bolted secondary connections.
TR-UP-27	Terminations	Low-voltage terminals shall be plated for copper cable terminations
TR-UP-28	Nameplate	Shall be permanent and show all required information, including KVA, voltage rating, ratio, BIL, weight, winding material, month and year of manufacture, impedance, high and low voltages,

		material, etc.
TR-UP-29	Fuses	It shall be supplied with primary bayonet-type, oil-immersed fuses with isolation links
TR-UP-30	Fuse replacement	Fuse links shall be replaceable without requiring cutting or grinding of the transformer tank
TR-UP-31	Bidirectionality	The step-up transformer in Tol (Wonip) shall be bidirectional to allow the PV generation in G2 to charge the batteries.

3.2.7. Powerplant installation and civil works requirements

The Bidder does not need to provide proof of the following requirements during the bidding phase. However, these requirements shall be met during the detailed engineering phase and the construction phase of the contract:

Table 39. Powerplant installation requirements

Technical Specifications - Powerplant installation requirements	
ID	**Requirement**
Civil Works	
PP-INST-1	Canopy construction and installation • The canopy shall be anchored to a reinforced concrete foundation, or alternatively, ground screws may be used if site conditions allow. The structural integrity of the concrete foundation shall be justified by a structural calculation. • All components of the canopy structure shall be pre-drilled or pre-cut for easy on-site assembly. Profiles should be pre-cut to the final measurement before anodising, to avoid sharp, uncoated edges. • All structural connections shall be bolted, and no structural members shall be welded to ensure ease of assembly and disassembly. • Bolts, nuts, and other fasteners must be rated for heavy-duty use and should resist loosening due to environmental factors. • No on-site welding, drilling or cutting is permitted. All parts shall be sized to fit all their sections and lengths, and all welded joints shall be inspected and tested to ensure they meet strength and safety standards. • The canopy design shall ensure proper drainage to prevent water accumulation on the roof. The roof slope should match that of the PV modules. • A ladder shall be provided to ensure safe access to the walking area of the canopy. • The foundations for the Canopy shall be designed to handle the load of the structure, PV modules, and maintenance activities. • The height of the foundation shall be elevated at least 60cm above the ground level to avoid direct contact of the canopy structures with salty water in the event of king tides. • The foundation design must consider existing soil characteristics • The canopy structure shall include an integrated rainwater collection system designed to capture and direct rainwater from the roof.
PP-INST-2	Installation of the PV generator on the canopy • Module mounting fasteners must be made of SS-316 stainless steel. • The separation between PV modules and the fastening system must allow for thermal expansion without causing stress that could damage the modules or structure. • Racking connections shall be bolt-locked. Self-tapping screws are not allowed. • Minimum of 6 anchor points per PV module.
PP-INST-3	Material compatibility and the use of dissimilar metals shall be considered. PV modules and mounting hardware (bolts, screws, washers, etc.) shall be well protected from corrosion. Steel-mounting hardware in contact with aluminium hardware is an example of a metal combination with a high potential for corrosion. Dissimilar metals can be separated by washers made of fluorocarbon polymer, phenol, or neoprene rubber.

PP-INST-4	Shadowing. Necessary measures shall be taken to avoid shadows during ± 4h around solar noon, including cutting trees and vegetation if necessary.
PP-INST-5	Technical building construction: • If solid masonry: Shall be based on stones, bricks or concrete hollow bricks. They shall be plastered on the inside and outside, with the inside at least smooth plaster and painted. • If SIPS: The outer layer's material shall be duly corrosion-protected metal, and the inner layer shall be either identical to the outer layer or a plane, non-absorptive, painted board. The material shall be adapted to marine environments. • Roofing: Tilted (minimum 5%). Shall be water and weatherproof over time. Shall include the management of rainwater and run-off water. • The concrete grade used in the foundations must be suitable for local environmental conditions. The Contractor shall provide all necessary structural calculations to the Employer for approval. • Area covered by the foundation shall be at least bigger than the technical building with a 70 cm distance from the wall at the front side and 20 cm for the other sides. Shall consider the soil studies and structural calculations provided by the Contractor. • Floor: finished with waterproof and shock-resistant material. • Output PVC conduits: 3x corrugated PVC conduits shall be installed underground for the future main AC feeders that will power the distribution line. Each conduit shall have a diameter of at least 120mm. The conduits shall run from the technical room (below the main AC board) to an outdoor point located 2m from the technical building's wall. The PVC conduits shall be clearly visible from the outside so that the distribution line contractor can use them to install the main AC cable up to the main AC board. The PVC conduit openings shall be left waterproof. Note that the supply of this AC cable is out of the scope of this contract. • Colour: Both the roof and the exterior walls shall be of bright white colour
PP-INST-6	Technical building - technical room: - The room shall have a secure door with a tamper-proof lock to prevent theft or unauthorised access.
PP-INST-7	Technical building - office room: -It shall include a window. -Includes a desk with at least 2 drawers, an office chair and an office bin. The desk should be about 1.20m wide. -The office room shall have a secure door with a proper lock for privacy and safety.
PP-INST-8	Technical building - storage room: -A metal industrial shelf should be supplied. It should not be smaller than 200 x 200 x 60 cm (high, wide, deep) and have at least 5 shelves, each capable of supporting at least 150 kg. The shelf should be correctly fixed to the wall with construction dowels. -The contractor should submit a sketch of the room occupation indicating the location of the spare parts and of the shelf to justify that the room is big enough. -The room shall have a secure door with a tamper-proof lock to protect valuable tools and spare parts.
PP-INST-9	Technical building - Toilet room: - A little toilet bin and a bathroom cupboard to be fixed on the wall shall be supplied. - A first aid kit should be kept in the cupboard. - Access to the bathroom should be from the outside. - The entrance shall include a lockable door for privacy and security.
PP-INST-10	Technical building - Transformer room: - The floor shall have a non-slip, oil-resistant coating for safety - The transformer shall be installed on a raised platform, which shall be structurally designed to withstand the transformer's full load. - Since the transformer is oil-based, the room shall include a spill containment system to prevent oil leakage from spreading.

PP-INST-10	Technical building openings: • Metal or PVC main access door, lockable, weatherproof, shall open outwards and be equipped with a push-bar inside. • Internal wooden doors (not lockable). They should open toward the building's exit in case of an emergency and include a push bar. • Windows installed on walls that are not exposed to the prevailing wind(s) • Opening windows (Naco-adjustable type) with stainless steel mosquito net, protection grid (intrusion), and metallic protection shutters (sun and heavy rain protection) • Protection (brise-soleil type) above the windows for rain entry
PP-INST-11	Technical building thermal management: • Critical parts (batteries, electronic equipment) shall not be built on a west-facing façade. • The thermal transmittance of the opaque elements of the battery room's envelope shall be less than 0.7 W/(m2K). Extruded Polystyrene (EPS) insulation is not allowed. • The thermal transmittance of the opaque elements of all other rooms' envelopes shall be less than 1.0 W/(m2K). Extruded Polystyrene (EPS) insulation is not allowed. • The thermal transmittance of the windows shall be less than 1.1 W/(m2K) and made of double glazing. • The technical room hosting the electronic equipment shall be thermo-regulated by mechanical air extractors. The openings shall be designed to optimise the flow around the heat-dissipating equipment. The openings shall include filters adapted to the type of dust envisioned. • The battery room shall be air-conditioned. The air conditioner must have a minimum Combined Energy Efficiency Ratio (CEER) of ≥10, ensuring energy-efficient performance that meets or exceeds industry standards for both cooling and standby modes. • The transformer room shall have natural ventilation via properly sized air louvres. The air louvres must be located on two opposite walls (one at the bottom and the other at the top) and sized to dissipate the heat generated by the transformer during service. If natural ventilation is insufficient, the louvres may be equipped with fans to increase airflow in the room. Considering the ambient temperature stated in the environmental conditions, the thermal management study shall prove that the proposed thermal management design (air extractor power, air-conditioning power, ventilation openings, etc): • Keeps the technical room at a temperature of no more than 3 °C over the ambient temperature. • Allows the electronic equipment to provide the required power (the de-rating curves (power vs temperature) of the manufacturers shall be considered). • Prevents the battery room from being above 25ºC.
PP-INST-12	Technical building safety: • The battery room, technical room and transformer room shall have smoke detectors connected to a low-consumption visual and sound alarm. The visual alarm shall be visible from the outdoors. • The battery room, technical room and transformer room shall have CO_2 fire extinguishers. • The temperature inside the battery room shall be monitored to detect an abnormal temperature rise. An alarm system shall be included to warn the operator if the room temperature exceeds a specified value. • During the design phase, the contractor should justify the exit itinerary in case of emergency (all doors should be equipped with push-bars and open toward the exit of the building).
PP-INST-13	Technical building accessories: • One table and two chairs in the technical room. • A cabinet big enough to store the spare parts and O&M tools.

PP-INST-14	Powerplant interior electrical installation: •The technical building shall be permanently supplied by dedicated feeder(s) from the main AC board, independent from the main distribution line output. Supply shall be split-phase 120/240V. • Each room must have a low-consumption LED system. All rooms, except the toilet room and the diesel generator shelter, shall have 2 10 A sockets. • The electrical installation shall be in accordance with the NEC or equivalent. • Low-consumption LED outdoor lighting point at the technical building main entry door.
PP-INST-15	Powerplant water management: • Drainage system must be built separately to avoid water flows that may lead to erosion of foundations. Depending on the terrain slope, drains shall be installed to prevent gullying during the rainy season (e.g., caused by water flowing through the PV modules). • A rainwater collection system shall be installed to collect the rainwater that falls on the canopy's roof, which shall be stored in a 2000 L tank installed below or at ground level. If it is installed at ground level, necessary preventive measures shall be taken to avoid tank damage (e.g. installing it onto a layer of sand). An electric pump of sufficient capacity shall pump from this tank to two water circuits: one that goes to a small 100 L tank to be installed at the technical building's roof (which will provide water to the technical building's toilet, shower and sink by gravity) and another one to an output where a hose can be connected to clean the PV modules. Both circuits shall include manual valves to prevent the pump from operating automatically. The tanks shall be made of UV-resistant material. The pump and the valves shall be installed outdoors, protected by a corrosion-resistant enclosure, so that they are not accessible to the public. • A wastewater system shall be included, consisting of a septic tank for the solids and an infiltration well for the liquids.
General cabling requirements	
PP-INST-16	The cables' cross-sections shall ensure the following maximum voltage drops: - From DC-coupled PV generator to PV charge controllers: 2%, considering the short-circuit current of the PV array at STC conditions. - From PV charge controllers to DC bus: 0.5%, considering the maximum output current of the PV charge controllers. - from DC bus to battery: 0.5%, considering the maximum value between (1) the maximum envisioned charge current and (2) the maximum envisioned discharge current. The first one is determined by the Contractor's design, and the second is determined by the minimum continuous power of the battery inverter as per project requirements. - from DC bus to battery inverter: 0.5%, considering a discharge current corresponding to the minimum continuous power of the battery inverter as per project requirements. - From battery inverter to Main AC board: 1.5%, considering the maximum output current of the charge controllers and the nominal voltage of the battery. - From the AC-coupled PV generator to the Main AC board, via PV inverters: 3%, considering the short-circuit current of the PV array at STC conditions. - From the backup generator to the Main AC Board: 3%, considering the minimum continuous power output of the battery inverter required by the project. The copper resistivity at 90 °C shall be considered.
PP-INST-17	The electrical installation shall follow the latest version of the NEC. If any requirement in this document conflicts with the NEC, the NEC shall prevail.
PP-INST-18	All wiring should be carefully installed and secured with suitable fixings arranged at regular intervals. Cables shall not bear any mechanical load on their terminations.
PV generator	
PP-INST-19	For tilted rooftop PV structures, the fixing system shall be compatible with the metal roof.
PP-INST-20	For tilted rooftop PV structures, waterproofing shall be ensured at the anchoring points via EDPM sealing or equivalent.

PP-INST-21	The separation between the PV modules and the fastening system shall allow thermal expansion without transmitting stresses that could harm their integrity or cause deformation.
PP-INST-22	If the PV generator is installed above 2.5m from the ground, the safety of workers shall be ensured by installing a safety line at the top of the roof/canopy. The PV generator layout on the roof/canopy shall be designed to allow wide enough corridors (>50cm) to carry out O&M tasks on the PV generator. At least one corridor per roof orientation for tilted PV arrays shall be considered.
PP-INST-23	PV combiner boxes shall respect the following provisions: - Flame-retardant enclosure with a protection class of at least IP 65 and IK 07. The door should have a rubber seal and cable glands at the cable insertions. - All cable insertions should pass through a cable gland. The gland should be correctly sized and tightened to the cable's outer diameter. Several cables shall not go through a single gland. - Ventilation holes to evacuate the heat released by the protections and to avoid any condensation. - Designed to avoid any bad electrical contact (use of spring-cage terminal blocks is preferred) - Designed to minimise the risk of short-circuit between different polarities (e.g. physical separation between positive and negative fuse holders (or terminal blocks) with appropriate insulation). - Spacing around protections to facilitate heat dissipation - Use of unipolar double-insulated cables inside the board - Use of Class II insulation - Conformity to IEC 61439. - UV and corrosion-resistant material - Lockable for safety reasons - The DC-switch disconnector shall be accessible from the exterior front side of the board to allow an emergency disconnection. - Shall not be exposed to direct sunlight. - All bolts for electrical connection should be of stainless steel 316.
PP-INST-24	PV fuses shall be gPV type and their current rating, In, shall comply with 1.4 Isc,stc < In < IRM being Isc,string,stc the PV string's short-circuit current at STC conditions, and IRM the maximum current that can pass through the PV module. In shall be derated considering the maximum ambient temperature specified in the Environmental conditions. Their voltage rating shall be ≥ 1.1 x VOC,STC being VOC,STC, the PV string or array open-circuit voltage at STC conditions.
PP-INST-25	The DC switch-disconnector in the PV combiner box shall comply with : - Specified for DC operation - voltage rating shall be ≥ 1.1 x VOC,STC being VOC,STC the PV string or array open-circuit voltage at STC conditions. - nominal current ≥ the sum of all gPV fuses currents Note: A DC circuit breaker can replace the switch-disconnector, providing the functions of switching, isolation and cable protection if the circuit breaker is properly sized and is not polarised.
PP-INST-26	DC SPDs shall have a nominal voltage ≥ 1.1 x VOC,STC and a nominal discharge current ≥ 5 kA, where VOC,STC, is the PV string or array open-circuit voltage at STC conditions.
PP-INST-27	Cable routing for outdoor PV generator cables: • At the PV modules: Both polarities (+ and -) shall run together, as close as possible to the earthing cable to minimise induction loops. They shall be protected from direct sunlight and properly fixed to the structure. • Roof-mounted/Canopy PV towards technical room: PV cables (+ and -) in a corrugated PVC conduit suitable for underground laying with a diameter at least 3 times the sum of all cable diameters. The conduit will be installed underground at a depth of at least 50cm. The conduit should be installed on a 5 cm sand layer. In case of low availability of sand, on-site screening of dug soil is permitted to remove stones (diameter max 15mm) . The conduit should also be covered with a 5 cm sand layer, and on-site screening of dug soil is also permitted to remove stones (diameter max 15mm). The equipotential bonding conductor will be installed in the same trench, at the bottom, at a minimum distance of 5cm from the PVC conduit. A red warning screen shall be installed between the conduit and ground level, with a minimum depth of 20cm.

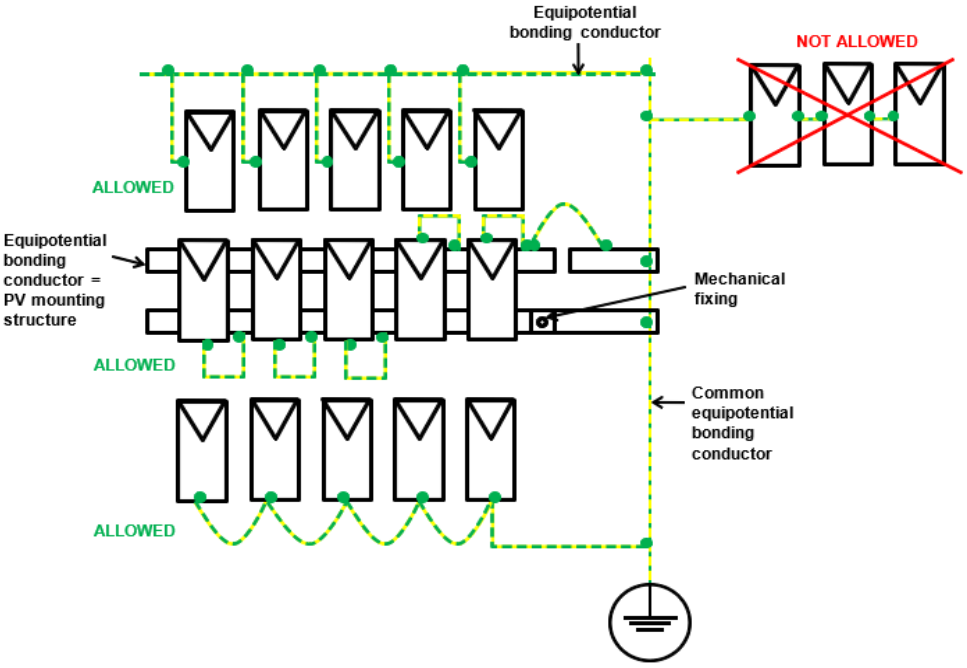
	• Communication cables (e.g. from outdoor PV inverters) should be installed in a dedicated corrugated PVC conduit, separated from power cables. The conduit should be buried to a minimum depth of 40cm, with the same installation conditions as for the corrugated PVC conduit for the PV cables. A green warning screen shall be added between the conduit and ground level, with a minimum depth of 20cm. • Any cable exposed to sunlight shall be protected by UV-resistant conduits or ducts. This especially applies to the exposed cables of the PV generator and at the holes made in the technical building's wall, where rigid pipes, such as PVC evacuation pipes, or metal pipes can be used. • Black UV-resistant cable ties or metal ties shall be used for outdoor cable management. • The cables must not obstruct the drainage of rainwater or be a source of dust accumulation. • The permissible bending radius of the cables shall always be respected. • The passage of cables through roofs or walls must be made through a suitable pipe, maintaining the waterproofing and avoiding the intrusion of insects and animals.
PP-INST-28	PV cables shall be Copper, type H1Z2Z2-K, and shall be TÜV certified according to IEC 62930 and EN 50618.
PP-INST-29	PV connectors shall comply with IEC 62852 and have an IP rating of> IP65. All connectors shall be from the same manufacturer.
PP-INST-30	Under no circumstances is it allowed to cut the PV module cables and to install other than the original connectors.
PP-INST-31	Theft risk. The design shall minimise as much as possible the risk of theft of PV modules (e.g. tamper-proof screws).
PP-INST-32	If the PV inverter is installed outdoors, it shall be installed in a lockable metallic cage to prevent vandalism while ensuring adequate ventilation, and it shall be protected against rain and direct sunlight.
Components inside the technical building	
PP-INST-33	General component installation requirements: • The installation of all equipment shall respect the manufacturer's guidelines. Special attention shall be paid to adequate ventilation and to the minimum separation distances between batteries and electronic equipment (inverters, controllers, etc.). The installation shall facilitate potential future replacements. • Equipment shall be ideally fixed at a height between 1.50 m and 1.80 m. • Electronic equipment shall not be installed near flammable items. Explosive vapours shall be kept away from them. • Electronic equipment shall be installed as close as possible to the battery. • Electronic equipment and battery shall be protected from direct sunlight. • The battery terminals shall be protected with insulator material to avoid accidental short-circuits.
PP-INST-34	Cable routing in the technical room: • Cables will be routed in cable trays with limited crossovers and separate routes for each type of current (DC PV current, DC bus current, AC bus current). • Communication cables should be installed in a dedicated PVC conduit, separated from power cables. • The cables will be arranged in single layer ribbon (no strands, multiple layers, or disorderly arrangement). • The cables making up the earthing connection will run along the same cable trays as the active conductors. • If the cables are unipolar, the routing must be such that the (+) and (-) cables and the equipotential bonding conductor are joined together to avoid induction loops, which can be damaging in the event of lightning overvoltages. • The cable management system must be firmly fixed in a straight line (horizontal or vertical) and at a minimum distance of 30 cm below the lower part of the wall-mounted equipment. • The permissible bending radius of the cables shall always be respected. • If the cables are installed in trenches, the trenches must be covered with anti-slippery steel plates easily removable for maintenance (less than 25 kg/unit, with handles). They should be painted red.
PP-INST-35	If several batteries are connected in parallel to the same DC board, all cable lengths from the batteries to the DC board shall be identical.
PP-INST-36	If several battery inverters are connected in parallel to the same DC board, all the cable lengths from the battery inverters to the DC board shall be identical.
PP-INST-37	If several PV charge controllers are connected in parallel to the same DC board, all the lengths of the cables from the PV charge controllers to the DC board shall be identical.
PP-INST-38	Different circuits cannot be protected by the same overcurrent protection device (e.g. the AC outputs of 2 battery inverters cannot be protected by the same AC breaker)

PP-INST-39	Cables used for the DC battery side shall be Copper, unipolar, type H07 RNF.
PP-INST-40	AC cables shall be Copper, multistranded type H07 RNF.
PP-INST-41	The PV protection board shall respect the following provisions: - Flame-retardant enclosure with a protection class of at least IP 44 and IK 07 - Ventilation holes to evacuate the heat released by the protections and to avoid any condensation. - Designed to avoid any bad electrical contact (use of spring-cage terminal blocks is preferred) - Designed to minimise the risk of short-circuit between different polarities (e.g. physical separation between positive and negative fuse holders (or terminal blocks) with appropriate insulation). - Spacing around protections to facilitate heat dissipation - Use of unipolar double-insulated cables inside the board - Use of Class II insulation - Conformity to IEC 61439. - be installed as close as possible to the PV charge controllers+ - All bolts for electrical connection should be of stainless steel 316.
PP-INST-42	The main DC board shall respect the following provisions: - Flame-retardant enclosure with a protection class of at least IP 44 and IK 07 - Ventilation holes to evacuate the heat released by the protections and to avoid any condensation. -Designed to avoid bad electrical contact (for cables with a cross-section greater than 25 mm2, tubular cable lugs connected to busbars via bolted nuts are required) - Designed to minimise the risks of short circuits between different polarities (e.g. physical separation between positive and negative busbars with an appropriate insulation). - Spacing around protections to facilitate heat dissipation - Use of unipolar cables inside the board - In the case of LV operation (Nominal voltage > 120 Vcc), Class II insulation is required - Conformity to IEC 61439. - Be installed as close as possible to the battery. - All bolts for electrical connection should be of stainless steel 316.
PP-INST-43	The main AC board shall respect the following provisions: • Flame-retardant enclosure with a protection class of at least IP 44 and IK 07. • Ventilation holes to evacuate the heat released by the protections and to avoid any condensation. • Designed to avoid bad electrical contact. • Spacing around protections to facilitate heat dissipation. • Use of unipolar cables within the box. • Use of Class II insulation. • Conformity to IEC 61439. • Additional insulating cover sheet inside the board to protect from direct contact. - All bolts for electrical connection should be of stainless steel 316.
PP-INST-44	The manual transfer switch can be integrated within the Main AC board.
PP-INST-45	DC SPDs shall have a nominal voltage ≥ 1.1 x VOC,STC and a nominal discharge current ≥ 5 kA, with VOC,STC being the PV string or array open-circuit voltage at STC conditions.

PP-INST-46	Communication and control: • All necessary materials for the connection to the internet (3G or 4G) to allow for remote monitoring shall be included. • The communication system should be wire-based (wireless is not allowed). • The irradiance shall be measured either by a pyranometer or by a monocrystalline Silicon-based reference cell, with an accuracy class B or better. • The irradiance sensor shall be placed in such a way that it measures the Global Horizontal Irradiance. • If the communication and control platform has communication circuits that come from outside the technical building (hence more exposed to overvoltages of atmospheric origin), it shall be protected against overvoltages. • Any extra energy meters (apart from those incorporated within electronic components such as PV charge controllers, battery inverters, Li-ion BMS or PV inverters) shall comply with: -Accuracy class II. - power consumption ≤ 2 W - a display that shows the instantaneous voltage, current and power, as well as the cumulative energy in kWh. - Compliance with standards IEC 61326, EN 61000 or equivalent
PP-INST-47	The voltage sense of the energy meters shall be protected by appropriate circuit breakers.
PP-INST-48	In the AC circuits of the battery inverters, PV inverters, and backup generator, tubular cable lugs must be crimped at the ends of all connections within the screw or cage terminals of the equipment and the AC boards.
PP-INST-49	Each electrical board shall have its SLD printed, provided in a separate folder at the door.
PP-INST-50	The following O&M tools shall be supplied and installed in a dedicated place in the storage room: - 2 pairs of safety shoes - 2 helmets - 2 pairs of insulating gloves (1000Vac/1500Vdc) - 1 digital multimeter with DC and AC current clamp (cat III up to 1000 V) - basic set of mechanical tools: screwdrivers, torx keys, wrenches, etc - 1x torque wrench adapted to the torques envisioned in the project - 1 laptop with a card reader adapted to the monitoring card (e.g. SD, microSD, etc) - 1 Crimping pliers for PV connectors - Crimping pliers adapted to the cable lugs and tubular ferrules used in the project. - First aid kit. - Tools necessary to remove the tamper-proof screws (if necessary) - 1x set of stairs per mini-grid, to be able to climb up to the canopy
Diesel generator	
PP-INST-51	Diesel generator shelter fence: • The mesh and supporting structure shall be made of hot-dip galvanised steel or powder-coated steel to ensure corrosion resistance in outdoor conditions. • The mesh material must comply with ISO 1461 standards for galvanisation, with a minimum zinc coating of 80 µm. • Aperture size of the mesh shall not exceed 50 mm x 50 mm to prevent tampering or unauthorised access. • Wire diameter must be at least 4 mm for strength and durability. • The enclosure must have a minimum height of 2.5 meters from the ground. • Fence posts shall be spaced at intervals not exceeding 2.5 meters and anchored into concrete foundations with a depth of at least 50 cm. • The enclosure must include a lockable access gate or door with industrial-grade hinges and a tamper-proof locking mechanism. Gate width should be at least 1.2 meters to allow maintenance equipment access. • The mesh design shall ensure adequate ventilation for the generator and tank to prevent overheating. • All parts of the enclosure shall have a weather-resistant coating (e.g., epoxy or powder coating) for additional protection in coastal or high-rainfall regions. • Ground clearance of the fence must not exceed 10 cm, ensuring intrusion prevention while allowing drainage. • The enclosure must withstand wind loads of up to 208 km/h. • All materials must withstand high humidity and moderate corrosive environments, equivalent to C4

	environmental conditions (ISO 9223). • The enclosure should have an anti-climb design and be painted in neutral or non-reflective colours (e.g., dark green or grey). • Signage must be affixed to the fence, stating "Authorised Personnel Only" and "High-Voltage Equipment Inside," where applicable.
PP-INST-52	Diesel Generator Installation: • Sufficient space (at least 1 meter) shall be maintained around the generator (on each side) to allow for the safe movement of people and equipment maintenance. • The shelter shall provide adequate protection from rain and direct sunlight during the central hours of the day. • Exhaust pipes must be installed to direct fumes away from the canopy, PV modules, and Technical Building, ensuring fumes are safely dispersed and do not affect the equipment. Proper exhaust management systems must be installed to ensure fumes are safely diverted and dispersed. • Cables connecting the diesel generator to the technical building shall be routed underground through dedicated, UV-resistant PVC conduits to ensure protection from environmental elements. • A low-consumption LED lighting point shall be installed under the canopy, near the generator, and powered by the main AC board to facilitate maintenance and ensure visibility during nighttime operations
PP-INST-53	The diesel storage tank should be: •4x 500 L • UV resistant. • Installed on a concrete slab and equipped with a metal or concrete retention system to avoid diesel spillage on the ground. The retention volume should be at least 110% of the diesel volume. • Protected against heavy rains, with the retention bund covered by a roof wide enough to prevent water accumulation. • Protected against direct sunlight during the central hours of the day. • Equipped with a rainwater hydrocarbon filtration system sized for the environmental conditions, ensuring residual hydrocarbons in downstream water do not exceed 5 ppm. The retention valve must include a 2-inch empty valve. • Dimensions shall consider the size of the tank(s) and the movement of people (at least 1 meter around the tank(s)).
PP-INST-54	Cable routing for diesel generator cables: • Cables will be installed in a PVC conduit suitable for underground laying with a diameter of at least 3 times the sum of all cable diameters. The conduit should be installed on a 5 cm sand layer. In case of low sand availability, on-site screening of dug soil is permitted to remove stones (diameter max 15mm). The conduit should also be covered with a 5 cm sand layer, and on-site screening of dug soil is also permitted to remove stones (diameter max 15mm). The conduit will be installed underground at a depth of at least 50cm. The equipotential bonding conductor will be installed in the same trench, at the bottom. A red warning screen shall be added between the conduit and the ground level. • Communication cables should be installed in a dedicated PVC conduit, separated from power cables. • Any cable exposed to sunlight shall be protected by UV-resistant conduits. Rigid pipes, such as PVC evacuation pipes or metal pipes, can be used. • The permissible bending radius of the cables shall always be respected. • The passage of cables through roofs or walls must be made through a suitable pipe while maintaining the waterproofing.
Earthing	

PP-INST-55	General earthing: • The metal frames of the PV modules, the metal PV structures, as well as the masses of the various materials (e.g. electrical boards, electronic equipment, etc) shall be connected to an equipotential bonding system. • Inside the technical building, a general earthing terminal block shall be installed to interconnect the various equipotential connections. This terminal can be installed in a box or in the Main AC board. • The main cable of the earthing system must be type HO7 VK green/yellow with a diameter of 16 mm2, or bare copper cable with a minimum cross-section of 25 mm2. The connection of the metal masses to the equipotential connection shall be made with HO7 VK green/yellow cables, and its cross section shall respect the manufacturer's requirements (minimum of 6 mm2) • The connection of the metal enclosures of Class I components to the equipotential connection must be made using flat zinc-plated or chrome steel lugs directly screwed into the pre-drilled holes provided. • The cables connecting the SPDs to the equipotential connection must be made of copper of type HO7 VK green/yellow with a minimum diameter of 6 mm^2 for Type 2 SPDs and 16 mm^2 for Type 1 SPDs. Their implementation must comply with the 50 cm rule. •All the equipotential bonding system shall be connected to a single earth electrode (which in turn might be comprised of several copper rods, e.g.), located at the earthing pit. •The earth electrode shall be accessible from the earthing pit, built from stone masonry that is in casted cement and smoothened. The pit's height and cover shall be designed for easy maintenance. •The location of the pit shall be chosen to ensure the most humid soil conditions possible (e.g. avoid hilly areas that are easily drained). It shall be composed of porous soil to absorb the water and maintained in a wet condition. •The pit shall contain an equipotential bonding bar that interconnects all earthing conductors (from technical building, from PV generator, etc) with the earth electrode (e.g. several copper rods). A proper grounding electrode clamp, such as a G5 type or U-bolt clamp, shall be used. The bar shall have a single disconnection link for resistance measurements. The bar shall not be in contact with the ground to avoid corrosion. •The resistance to earth shall not exceed 30 Ohms.

PP-INST-56	PV generator earthing: • The PV module must be earthed in such a way as to ensure electrical continuity. • If there are anodised or protective coatings (usually insulating), self-tapping stainless steel screws or stainless steel serrated washers can be used. • To prevent galvanic corrosion, direct contact between copper and aluminium, or between copper and hot-dip galvanised steel, shall be avoided. Bimetallic washers or bimetallic joints shall be used. • If a PV module is removed or if there is a bad connection (incorrect tightening, possible oxidation), it shall not compromise the equipotentiality of the other PV modules. See the allowed earthing methods in the image below. • If there is no lightning rod connected to the PV mounting structure (both ground-mounted & canopy), the equipotential bonding conductor must have a cross-section of at least 6 mm^2 Cu. The supporting metal structure itself may serve as the bonding conductor. • The earthing conductor from the PV generator towards the technical building shall be buried if it is longer than 50 m. In such a case, the conductor shall be made of bare copper with a minimum cross-section of 25 mm^2 to minimise corrosion 
Labelling and tagging	
PP-INST-57	All load cable terminations shall be tagged and labelled properly, specifying at least the load power and electrical voltage (DC or AC). Tags and labels shall be easily recognisable. Positive and negative terminals for DC power cables and busbars shall be clearly labelled in red for positive and black for negative.

PP-INST-58	Signage • Signage shall follow the NEC requirements. • The main equipment, cables and fittings of the installation must be identified and marked with labels that are easily visible and permanently fixed in accordance with the plans and diagrams of the installation: electronic equipment, batteries, diesel generator, electrical boards, cables, switchgear, etc. All equipment identification labels shall be in English. • Safety signage (e.g., *Caution*, *Danger*, *Warning*) shall be provided in both English and Chuukese (Trukese), especially those located at public areas. • "CAUTION: Live DC voltage" label on the front face of the PV combiner boxes, PV disconnect board, DC board, at both ends of DC cabling, on the front face of the PV charge controllers. • Access door to the battery room must be marked with: smoking ban, danger of explosion, risk of electric shocks, and access prohibited except authorised personnel. • Access door to the technical room must be marked with: smoking ban, risk of electric shocks, and access prohibited except authorised personnel.
PP-INST-59	Each battery module shall be identified with at least the following information: • Manufacturer and model • Serial number • Manufacturing date • Nominal voltage (V) • Nominal capacity (kWh)
PP-INST-60	The PV module label should include the following details: manufacturer name, model number, serial number, Isc, Voc, Imp, Vmp, Wp, and maximum system voltage.

3.3. Distribution lines and end-user connections

3.3.1. Specific scope of work

Upon award of the contract, the Contractor is responsible for the following tasks:

1. Site visit prior to the detailed engineering.
2. Detailed engineering design of all the electrical, mechanical and civil works involved.
3. Arrangement of any construction infrastructure required. The Contractor shall provide on-site security in accordance with insurance requirements and all applicable local and international codes and standards.
4. All necessary civil works, including required labour and equipment. The Contractor is responsible for arranging their own power and water supply.
5. Supply and installation of all necessary equipment and materials, taking into account all aspects of the supply chain (purchase, customs clearance of imported goods, storage, transport, handling, packaging, etc.).
6. Commissioning of the distribution line together with the PV generation power plants.

The Bill of Quantities required for each mini-grid is described in Table 40.

Table 40. Summary of distribution line for each mini-grid

	Unit	Uman	Wonip	Moch	Munien	Onoun
Underground MV Cable 35mm2	m	3,583	2,592		-	-
Underground LV Cable 70mm2	m	6,202	4,434	1,969	1,290	5,181
Covered MV conductors for Spacer Cable Systems in OHL	m	771	198	-	-	-

Preassembled LV cable for OHL	m	596	198	-	40	-
Pole assembly accessories for MV and LV OHL	set	37	12	-	2	-
Accessories for transitions between UGC and OHL, including surge arresters	set	4	4	-	2	-
Distribution poles for overhead jumps	unit	21	6	-	2	-
Derivation pillar boxes, including protections	set	-	-	-	-	7
Pillar Boxes for 0–5 customers, including protections	set	52	32	20	17	44
Pillar Boxes for 6–15 customers, including protections	set	24	17	3	4	1
All required terminals and connectors for all the derivation and user pillar boxes	set	76	49	23	21	52
Earthing components for all derivation and user pillar boxes, including earthing rods, earthing cables, welded connection materials, and backfilling materials	set	76	49	23	21	52
Overhead service mains from overhead line to users, including cable and all necessary accessories	set	18	8	-	-	-
Substation step-up transformer (LV switchboard, including all necessary equipment, protection, and underground cabling to connect to the PV inverter, etc.)	set	1	2	-	-	-
RMU for MV network, including accessories and protections	set	1	2	-	-	-
Step-down transformer 25 kVA, including all electrical equipment, protections, and connectors (Split-phase)	set	1	4	-	-	-
Step-down transformer 37.5 kVA, including all electrical equipment, protections, and connectors (Split-phase)	set	4	-	-	-	-
Streetlights, including metallic poles, cables, and connectors	set	40	30	15	20	20
Number of users to be connected	units	342	185	68	91	100

The following tables describe the materials under the scope of work for each user to be connected:

Table 41. Scope of works for each user connection

Description	**Quantity**
Meter Box	1 unit
Wire from the meter box to the load centre panel	6 m
Pipe from the meter box to the hole going inside the house	3m
Load centre panel	1 unit
Wire for the lighting circuit	30m
Wire for outlets circuit	30m
Conduit for lighting and outlet circuits	60m
Junction boxes	4 units
Lamp holders for indoor use, ceiling	3 units
Lamp holders for outdoor use	1 units
LED lamps	4 units

Switches and covers for LED lamps	4 units
Sockets and cover	4 units (2x2)
Grounding rod	1 unit
Grounding Electrode Conductor	5m
Pipe from the meter box to the grounding rod connection	3m

Note: the supply and installation of Cash Power energy meters are not part of the scope of work.

The distribution line and user connection SLDs are presented in Annex C –Single Line Diagrams.

The distribution line layouts and corresponding GIS files are presented in Annex F – GIS Files.

The Employer has undertaken preliminary site investigations to prepare this specification. However, the Contractor is expected to undertake a further detailed site investigation to confirm all quantities of materials, the number and type of connections, the geographic location of connections, the routing of cables, soil types and earthing requirements, and the location of pillar boxes and streetlights. Such investigations are to be undertaken in consultation with island communities, CPUC and signed off on by community representatives. Particular attention should be paid to community impacts, including:

- Placement of pillar boxes within the 'road easement' (i.e. avoiding private land) but not so as to create an obstruction for movement of people, stock or vehicles
- Choice of trenching location to minimise disruption during trenching works
- If using bedding sand, consultations about sites for the extraction of materials are required, which will need to comply with the Environmental requirements of the project. It is anticipated that sand excavated from the trenches can be screened for re-use as backfill.

Based on its site investigations, the selected Contractor is to prepare a GIS map and database of all distribution equipment for the Employer's review and approval.

3.3.2. Distribution line description

An underground distribution configuration has been selected to increase the system's resilience against typhoons. However, certain sections will be overhead due to site-specific constraints, such as difficult terrain and access limitations. The exact locations of these overhead sections are detailed in Annex F – GIS Files.

Most users will be connected through underground service mains, but some will be connected via aerial service drops from overhead lines.

3.3.2.1. LV mini-grids

(for Tol (Munien), Onoun, and Moch)

The LV distribution network operates at split-phase 120V AC (L-N) / 240V AC (L-L), 60Hz. It consists of:

- Main underground split-phase backbone cable for power distribution, with some overhead sections as indicated in the GIS annex.
- Derivation pillar boxes, located along the LV distribution line, including the earthing system.
- User pillar boxes, placed near households, including an earthing system.
- Underground split-phase service mains connecting the user pillar boxes to each user.
- Aerial split-phase service drop connecting the overhead LV distribution line to each user.
- User installation as per "Annex C –Single Line Diagrams", consisting of:
    - Energy meter, installed on its own enclosure at the exterior wall of the user premises.
    - User load centre panel, installed inside the user premises.
    - Interior wiring, including sockets and LED lights.
    - User's earthing system.
- LED streetlights for public lighting.
- All additional equipment and materials required for the safe and efficient operation of the LV distribution network.

The network shall be designed and installed in accordance with applicable standards.

3.3.2.2. MV mini-grids

(for Uman and Tol (Wonip))

The MV distribution network will be three-phase 7970V L-N / 13,800V L-L, 60Hz, with four conductors (3 phases + neutral). It consists of:

- Underground MV distribution network, with some sections overground where underground installation is impractical (as detailed in Annex GIS files).
- Pad-mounted step-up transformers at power generation plants to inject power into the MV grid.
- Single-phase pad-mounted step-down transformers to supply LV users with split-phase 120/240V power.

The LV distribution network is equivalent to the network of the LV mini-grids.

3.3.3. Performance requirements

During commissioning, the Contractor shall perform voltage drop measurements for both the LV and MV distribution networks to ensure proper system performance and compliance with design requirements.

- For LV mini-grids, the Contractor shall measure the voltage drop between the Main AC Board of the power plant and the furthest distribution pillar box.

- For MV mini-grids, the Contractor shall measure the voltage drop between the Main AC Board of the power plant and the furthest distribution pillar box for each step-down transformer.

These measurements shall be conducted when the village's power demand is at its peak, which is expected to occur between 19:00 and 21:00.

The objectives of these measurements is to ensure that the voltage drop remains below 5% across the distribution network.

Moreover, when connecting the different users, the Contractor shall ensure that the distribution lines' phases are as balanced as possible.

3.3.4. Component requirements

The Bidder is required to fill in all the Technical Specification tables provided in this section, also attached in the Excel version in Annex H – Component technical specifications. The Bidder shall indicate whether a requirement is fully compliant (FC), partially compliant (PC) or non-compliant (NC). The Bidder shall write an explanatory note in case the requirement is PC or NC. The Bidder shall indicate which document (and which section within the document, if needed) provides the proof for each requested requirement. The proving document can, for example, be a datasheet, a design drawing prepared by the Bidder, a specific section of the Bidder's Design Report, or others.

3.3.4.1. Distribution poles for overhead jumps

Table 42. Technical specification table for Distribution Poles for overhead jumps

Technical specifications – Distribution Poles		
ID	**Requirement**	**Value**
DL-P-1	Material	Glass Fibre-Reinforced Plastic
DL-P-2	Resin	UV-protected and uniformly pigmented.
DL-P-3	Standard	Compliant with standard ANSI C136.20
DL-P-4	Shape and type	Hollow, circular, truncated-cone structure
DL-P-5	Safety Factor	≥2
DL-P-6	Accelerated Aging Test (UV exposure)	Minimum 5,000 hours, complying with ASTM G154 & ANSI C136.20
DL-P-7	External Surface	Textured, free of exposed fibres, uniform colour, and defect-free.
DL-P-8	Height (m)	12
DL-P-9	Breaking Load (kgf)	2000

3.3.4.2. Pillar boxes

Table 43. Technical specification table for Pillar Boxes

Technical specifications – Pillar Boxes		
ID	**Requirement**	**Value**
DPB-1	Base and cover material.	Polymeric compound, UV stable, impact resistant, flame retardant, suited for a marine environment.
DPB-2	Base and cover – wall thickness.	≥ 4mm

DPB-3	Ingress protection rating.	≥ IP54 (AS/NZS 60529)
DPB-4	Ventilation.	Include openings to minimise condensation of moisture on the internal equipment, maintaining the IP rating.
DPB-5	Type.	Surface-Mounted Pillar boxes.
DPB-6	Key locking system.	Included
DPB-7	Gel Port Connector.	All new cable terminations shall use 'Gel-port' connectors.
DPB-8	Service connections/derivations.	For customer connections, the number of service connections must be between 1 and 5, or between 6 and 15. A minimum of 25% spare capacity within the distribution pillars shall be reserved for future connections. For derivations, the number of connections will depend on the number of required derivations, with a minimum of 2 derivations and an additional spare derivation.
DPB-9	Fuse switch disconnectors/circuit breakers.	The pillar boxes shall be capable of housing service fuse switch disconnectors and/or circuit breakers as required. The rating shall be 32A for customer connections. For derivations, the rating will be calculated within a range of 40A, 50A, or 63A. They must allow for the disconnection of any user or derivation without causing service disruption to other users serviced by the same distribution pillar.
	Standards	IEC 61439 or equivalent

3.3.4.3. Cables

Table 44. Technical specification table for cables

Technical specifications – Distribution Line Cables		
ID	**Requirement**	**Value**
Underground MV cable		
DL-C-1	Number of phases	4 wire, 3-phase +1 neutral
DL-C-2	Conductor material	Aluminium
DL-C-3	Cable size	35mm2, 4 core
DL-C-4	Type	Armoured cable for underground installation. XLPE insulation. PVC sheathed. It is expected that the high-water table will result in water in the underground distribution line trenches. Therefore, cables shall be rated for permanent submersion in salty water.
DL-C-5	Installation	Underground, direct-buried
DL-C-6	Rated voltage	15kV
DL-C-7	Max Operating Temperature	90 degrees
DL-C-8	Certifications	All required certifications as per NEC for underground directly-buried installations under constant submersion in salty water.
Overhead MV cable		
DL-C-9	Number of phases	4 wire, 3-phase +1 neutral
DL-C-10	Conductor material	Aluminium with extruded covering
DL-C-11	Cable size	35mm2, 4 core
DL-C-12	Type	XLPE insulation, PE or XLPE resistant to ultraviolet radiation, abrasion, environmental cracking, and surface discharges (Tracking)
DL-C-13	Installation	Aerial

DL-C-14	Rated voltage	15kV
DL-C-15	Max Operating Temperature	90 degrees
Underground LV cable		
DL-C-16	Number of phases	Split-phase, 3-wire
DL-C-17	Conductor material.	Aluminium
DL-C-18	Cable size	70mm2
DL-C-19	Type	XHHW 3/C, Armoured. It is expected that the high-water table will result in water in the underground distribution line trenches. Therefore, cables shall be rated for permanent submersion in salty water.
DL-C-20	Installation	Underground, direct-buried
DL-C-21	Rated voltage	600V
DL-C-22	Max Operating Temperature	90 degrees
DL-C-23	Certifications	All required certifications as per NEC for underground directly-buried installations under constant submersion in salty water.
Overhead LV cable		
DL-C-24	Number of phases	Split-phase, 3-wire
DL-C-25	Conductor material.	Aluminium
DL-C-26	Cable size	2 x 70 + 1 x 70 mm2
DL-C-27	Type	Preassembled cable for aerial installation. XLPE insulation. Resistant to Ultraviolet radiation
DL-C-28	Installation	Underground
DL-C-29	Rated voltage	0.6/1 KV
DL-C-30	Max Operating Temperature	90 degrees
Underground and overhead LV cable service mains		
DL-C-31	Number of phases	Split-phase, 3 wire
DL-C-32	Conductor material.	Copper
DL-C-33	Cable size	6 AWG
DL-C-34	Type	XHHW 3/C, Armoured
DL-C-35	Installation	Underground or aerial. If underground, direct-buried
DL-C-36	Rated voltage	600V
DL-C-37	Certifications	All required certifications as per NEC for underground directly-buried installations under constant submersion in salty water.

3.3.4.4. Ring Main Units

Table 45. Technical specification table for Ring Main Units

Technical specifications – Ring Main Units		
ID	**Requirement**	**Value**
DL-RMU-1	Rated Voltage	15kV
DL-RMU-2	Standards	IEC62271, IEC-62255, IEC 62271, IEC 61243 or equivalent
DL-RMU-3	Rated Voltage	15kV
DL-RMU-4	Rated frequency	60Hz
DL-RMU-5	Busbar Rated Current	630A
DL-RMU-6	Modular	Yes
DL-RMU-7	Rated Short Time Withstand Current	21kA / 3 Sec
DL-RMU-8	Insulation Medium	SF6
DL-RMU-9	Protection	Relay Protection with Overcurrent protection (50/51)

DL-RMU-10	Dielectric Strength	≥ 95 kV (Power Frequency Withstand)
DL-RMU-11	Maximum Relative Humidity	100%
DL-RMU-12	Communication Protocols	IEC 61850 / Modbus / DNP3 / Ethernet
DL-RMU-13	Enclosure Material	Stainless Steel
DL-RMU-14	Environmental Conditions	The enclosure, compartment, and all appurtenances shall be resistant to impact and corrosion under normal operating conditions in the island's salt-air environment.
DL-RMU-15	Configuration	Ring switches + vacuum circuit breaker. The numbers will be chosen depending on the final design
DL-RMU-16	Circuit breaker operating Mechanism	Spring mechanism / Motorised
DL-RMU-17	Circuit breaker Type	Vacuum
DL-RMU-18	Ring Switch	Three positions (ON, OFF, Earth)

3.3.4.5. Step-down transformers

Table 46. Technical specification table for Step-down transformers

Technical specifications – Step-down transformer		
ID	**Requirement**	**Value**
TR-DOWN-1	Product Standards	The transformers shall meet the requirements of the following ANSI standards, including the latest revisions with respect to material, design and test: - C57 Requirements for Distribution Transformers - C76 Apparatus Bushings
TR-DOWN-2	Nominal frequency	60 Hz
TR-DOWN-3	Primary voltage	7970 V L-N / 13800 V L-L GrdY
TR-DOWN-4	Secondary voltage	Split phase 120 V / 240 V
TR-DOWN-5	Core Material	Cold-rolled grain-oriented silicon steel
TR-DOWN-6	Winding material	High-Conductivity Copper
TR-DOWN-7	Feed	Dead-front radial
TR-DOWN-8	Transformer fluid	Type II non-PCB mineral oil (ONAN)
TR-DOWN-9	Temperature rise	65ºC rise
TR-DOWN-10	Mounting	Pad-mounted
TR-DOWN-11	Insulation class	15kV
TR-DOWN-12	Basic Impulse Level (BIL)	95 kV
TR-DOWN-13	No-load tap changer	+/- 5%. 2.5% by step
TR-DOWN-14	Impedance	<4%
TR-DOWN-15	No-load losses	<200W
TR-DOWN-16	Connectors and protection	Elbow Insulated Connectors for High Voltage (HV) and Low Voltage (LV), incorporating fuses
TR-DOWN-17	Protection HV	6A for 25 kVA transformers 8A for 37,5 kVA transformers
TR-DOWN-18	Protection LV	125A for 25 kVA transformers 200A for 37,5 kVA transformers
TR-DOWN-19	Lifting lugs	Available
TR-DOWN-20	Externally clamped high and low voltage bushings	Available
TR-DOWN-21	Pressure relief valve	Available
TR-DOWN-22	Liquid Temp gauge	Available
TR-DOWN-23	Liquid level gauge	Available
TR-DOWN-25	Drain and sample valve	Available
TR-DOWN-26	Schrader valve	Available
TR-DOWN-27	Ground pads/lugs	Available
TR-DOWN-28	Nitrogen blanket	Available
TR-DOWN-29	Environment	Suitable to be used in corrosive coastal environments: cast-resin enclosure against marine environmental conditions

3.3.4.6. Meters

Note: the supply and installation of Cash Power energy meters are not included in the scope of work.

The Contractor shall provide and install the meter enclosure (meter base) only in accordance with the technical specifications USERMETER-16 and USERMETER-17.

The meter base shall be compatible with CPUC's Cash Power meters, which the employer will purchase and install separately. The technical specifications for the meter and meter base are provided below.

Table 47. Technical specification for energy meters

Technical specifications – Energy Meters		
ID	**Requirement**	**Value**
USERMETER-1	Type.	240V prepaid meters - split phase system
USERMETER-2	Product standards	ANSI C-12.1
USERMETER-3	Recharging type.	Scratch cards, tokens, RF cards or automatically through a remote server
USERMETER-4	Tariff type support.	Energy-based
USERMETER-5	Payment type	Prepayment
USERMETER-6	Rated nominal voltage.	120 V / 240 V
USERMETER-7	Rated nominal frequency.	60 Hz
USERMETER-8	Active energy measurement accuracy.	Class I
USERMETER-9	Base reference current.	≥ 5 A
USERMETER-10	Starting current.	≤ 20 mA
USERMETER-11	Insulation	Class II (double insulation)
USERMETER-12	Interface.	LCD screen and LED indicators or CIU with LCD screen and LED indicators
USERMETER-13	LCD display parameters	Credit balance, daily energy consumption, total energy consumption, power, and alarms.
USERMETER-14	Automatic disconnection.	If overload, if no payment, if tamper event
USERMETER-15	Compatibility	The meter shall be compatible with SUPRIMA architecture and payment method, used by CPUC (see Annex I – CPUC Suprima 5 Overview for IT)
USERMETER-16	Enclosure	The meter shall be provided with its enclosure, made of galvanized steel, corrosion resistant.
USERMETER-17	Enclosure IP rating	NEMA Type 3R, with barrel locks

3.3.4.7. User load centre panel and indoor wiring

Table 48. Technical specification for load centre panel and indoor wiring

Technical specifications – Load centre panel and indoor wiring		
ID	**Requirement**	**Value**
IW-1	Wire from the meter box to the load centre panel	600V Cu XHHW 3/C 6 AWG
IW-2	Pipe from the meter box to the hole going inside the house	Galvanise Pipe 1 ¼, or PVC UV-treated equivalent, including necessary accessories
IW-3	Load centre panel	Galvanised steel, NEMA 1 for indoor use, wall-mounted, ≥4 spaces, including: 1x Main breaker, 32A 240V 2P 1x breaker, 10A 120V 1P (lighting circuit) 1x breaker, 20A 120V 1P (socket circuit) ≥ 2 free spaces
IW-4	Wire for the lighting circuit	600V Cu XHHW 2/C 14 AWG
IW-5	Wire for the outlet circuit	600V Cu XHHW 3/C 12 AWG
IW-6	Conduit for lighting and outlet circuits	PVC 1 ¼ , including accessories
IW-7	LED lamps	5W ≥400 lumen 3000-4000 K ≥30000 hours lifetime ≥2 years warranty
IW-8	Switches and covers for LED lamps	120V 15A
IW-9	Sockets and cover	120V 15A
IW-10	Grounding rod	Copper-clad (8 ft, 5/8inch diameter)
IW-11	Grounding Electrode Conductor	6 AWG bare copper
IW-12	Pipe from the meter box to the grounding rod connection	Galvanise Pipe 1 inch, or PVC UV-treated equivalent, including necessary accessories

3.3.4.8. Streetlights

Table 49. Technical specification table for streetlights

Technical specifications – Streetlights		
ID	**Requirement**	**Value**
DL-SL-1	Light type	LED
DL-SL-2	Power rating	50 W
DL-SL-3	LED Output	≥ 110 Lm/W
DL-SL-4	Lifespan	50,000 h
DL-SL-5	Colour temperature	5,000 K
DL-SL-6	Ingress Protection rating	≥ IP 65, IK 10
DL-SL-7	Type	Pole-mounted, corrosion-resistant

3.3.5. Installation and civil works requirements

The Bidder does not need to provide a proof of the following requirements during the bidding phase. However, these requirements shall be met during the detailed engineering phase and the construction phase of the contract:

Table 50. Distribution line installation requirements.

Technical Specifications - Distribution line installation requirements	
ID	**Requirement**
DL-INST-1	Underground power cables MV and LV: •The cables shall be installed at a minimum depth of 80cm from the ground level. •The cables shall be installed inside a bedding layer composed of sand with particle size ≤ 5mm. The bedding layer shall cover from 70cm to 90cm below ground level. •The back-fill layer from ground level to 70cm depth shall be made of compacted soil. •Warning marker tapes made of polyethylene shall be installed along the entire length of the line, at a depth of 30cm from the ground level. • Cable junctions shall be done via resin-filled straight-through joints. The conductors are joined with mechanical connectors and then the plastic mould is installed and filled with resin to provide insulation, waterproofing, and mechanical protection. These junctions shall be placed in manholes to ease accessibility, with a manhole area of 60 cm x 60 cm and 90 cm depth.
DL-INST-2	MV overhead line Spacer Cable • Poles shall be made of Glass Fibre-Reinforced Plastic (GFRP), ensuring durability, corrosion resistance, and compliance with structural requirements. • Spacers shall be three-phase Hendrix spacers, ensuring proper conductor separation and mechanical stability on Glass Fibre-Reinforced Plastic (GFRP) poles. • The pole shall be buried at a depth of 10% of its total height plus an additional 50 cm, with proper compaction to ensure stability. • The span length between poles shall be in the range of 35m to 45m. The sag calculations and mechanical tension limits shall be performed to ensure compliance with environmental conditions. • Warning marker signs shall be placed at each pole in visible locations.
DL-INST-3	LV overhead line Preassembled cable • When only an LV network exists, poles shall be made of Glass Fibre-Reinforced Plastic (GFRP), ensuring durability, corrosion resistance, and compliance with structural requirements. • When only an LV network exists, the pole shall be buried at a depth of 10% of its total height plus an additional 50 cm, with proper compaction to ensure stability. • Poles may carry both MV and LV networks, ensuring proper separation between conductors and compliance with safety regulations. • The span length between poles shall be in the range of 35m to 45m, with sag calculations and mechanical tension limits adjusted according to environmental conditions. • Warning marker signs shall be placed at each pole in visible locations

DL-INST-4	Step-down transformers • MV and LV network design shall ensure accessibility at locations where step-down transformers are installed or where MV derivations are present. • All MV phases shall be accessible at these locations to allow for future changes in phase connections or the installation of additional step-down transformers. • MV and LV transition points and derivations shall be designed with sufficient clearance and space to accommodate future modifications and maintenance. • Connection points shall be clearly marked and documented, ensuring ease of identification for future expansion or reconfiguration.
DL-INST-5	LV Earthing Requirements • LV earthing shall be installed at each pillar box at the end of every branch line. • LV earthing shall be installed at each branch connection pillar box (on the main distribution line). • LV earthing shall be installed at pillar boxes at intervals not exceeding 80m on all main and branch distribution lines. • LV earthing shall be installed at both ends of the cable when individual cable lengths exceed 80m. • The earthing resistance at each LV earthing location shall be ≤ 25 ohms. • The grounding electrode conductor must be an 8 AWG copper conductor. • The rod-type grounding electrodes must be 2.44m (8ft) in length and at least 15.87mm (5/8 in) in diameter. The shall not be accessible to minimise theft risks. • The neutral screen of LV cable sheaths, including Service Mains, shall be bonded at each pillar box. MV Earthing Requirements • MV earthing shall be installed at every MV pole with transformers or switchgear. • MV earthing shall be installed at MV poles with surge arresters, or transition points between underground and overhead line networks. • MV earthing shall be installed every 200m along the MV overhead line when using covered conductors and when there are no other LV earthing points nearby. • The grounding system for MV and LV shall be interconnected to maintain a common reference potential. • The grounding electrode conductor must be an 8 AWG copper conductor. • The rod-type grounding electrodes must be 2.44m (8ft) in length and at least 15.87mm (5/8 in) in diameter.
DL-INST-6	Transitions between overhead lines and underground networks, or vice versa, shall include all necessary equipment and accessories, including surge arresters, connections, and terminations. • Transition structures shall be designed to ensure mechanical stability and electrical continuity between overhead and underground networks. • Cables must be securely anchored at the transition point using approved terminations. • Connections between overhead conductors and underground cables must be performed using insulated, weatherproof terminations that meet IEC/IEEE standards. • Covered MV conductors shall terminate at a weatherproof outdoor termination. • Surge arresters shall be installed at the transition pole to protect underground cables from transient overvoltages. • Cables emerging from the ground must be enclosed in a mechanical protective sleeve (e.g., HDPE or steel conduit) extending at least 3m above ground level to prevent damage.
DL-INST-7	Creek's crossings: • In situations requiring crossing a river or creek, the distribution network can be adapted with the most appropriate solution according to the situation (conduits or overhead jump) to allow crossing the river or creek.

DL-INST-8	Fibre optic network: •Optical fibre cables shall be installed in a dedicated high-density polyethylene (HDPE) conduit to ensure protection against mechanical damage and environmental factors. • The conduit shall be made of HDPE with a minimum inner diameter of 40mm, suitable for fibre optic cable installation, allowing for easy pulling and future expansions. • The separation between power cables (MV and LV networks) shall be determined in accordance with international standards (IEC/IEEE) to prevent electromagnetic interference and ensure operational safety. • The conduit shall be buried at a minimum depth of 60 cm in standard conditions and 80 cm at road crossings or in areas subject to heavy loads. • Bends in the conduit shall have a minimum bending radius as specified by the cable manufacturer to prevent excessive stress on the fibre optic cable. • Warning marker tape shall be placed at least 30 cm above the conduit along the entire installation route for easy identification and protection against accidental excavation. • Fibre optic cable pulling shall be performed using controlled tension to avoid excessive stress or damage to the fibre strands. • The conduit and cable route shall be clearly marked and documented, ensuring easy identification for future maintenance or expansions.
DL-INST-9	Transformers: • Pad-mounted dead-front looped transformers shall be suitable for corrosive coastal environments, featuring a cast-resin enclosure designed to withstand marine environmental conditions, including high humidity, salt spray, and corrosive elements. • Elbow Insulated Connectors shall be used for High Voltage (HV) and Low Voltage (LV) terminations, ensuring safe and reliable operation. • HV fuses shall be incorporated inside the transformer enclosure to provide overcurrent and fault protection. • LV fuses shall be integrated into the transformer to provide short-circuit and overload protection. • Concrete foundation shall be elevated at least 60 cm above ground level to prevent water ingress and flooding in coastal areas, and shall be designed to withstand the project's wind-speed requirements and environmental loads • The precise transformer location shall be determined by the contractor during the pegging mission. • All exposed metallic components shall be corrosion-resistant, using stainless steel • Grounding shall be installed using copper-clad rods (2.44m/8ft length, 15.87mm/5/8 in diameter), ensuring a low-resistance ground path. • All metallic parts of the transformer shall be bonded and connected to the network grounding system. • Adequate working clearance shall be maintained around the transformer to ensure safe operation and maintenance. • Transformers shall be electrically protected in accordance with applicable standards to ensure safe and reliable operation. • Warning and identification labels shall be installed to indicate high-voltage hazards and phase identification. All the signage shall be provided in both English and, when in public areas, also in Chuukese (Trukese). • Transformers shall have a durable, weather-resistant label with the following inscriptions: -Manufacturer name, Model and kVA rating, Unique identification number (ID) Testing and commissioning shall include Insulation resistance tests, Dielectric withstand tests, Loop continuity verification, and Grounding resistance checks before energisation
DL-INST-10	Phase balancing: Load imbalance shall be minimised during installation works to ensure efficient power distribution and network stability. • At the MV line, when connecting a transformer to one of the three MV phases, phase imbalance shall be minimised by estimating the power demand of each transformer and distributing the loads accordingly. • At the LV line, phase imbalance shall be minimised when connecting user loads to L1 or L2, ensuring even distribution of the total load across the two phases in the split-phase system. • Regular load assessments shall be conducted to verify proper load distribution and mitigate potential imbalances. • If a significant imbalance is detected after construction, load reallocation strategies shall be implemented to redistribute connections and maintain phase loading.

DL-INST-11	Pillar boxes: •Pillar boxes shall be located at the edge of an existing road/path near the cluster of buildings that are going to be connected to the pillar. •Concrete foundations shall be included in order to comply with the design wind speed of the project. •Pillar boxes shall be elevated at least 60cm from the ground level to prevent ingress of water during flooding conditions. •The minimum bend radius of cables shall be maintained to avoid damage during installation. •Ventilation holes shall be covered with a mesh to prevent debris and insects from entering. •Drainage holes shall be included at the base to allow water to escape while preventing water ingress. • Pillar boxes shall have a durable, weather-resistant label with the following inscriptions: Manufacturer name, ID, including the transformer number (for MV lines) and the pillar box number. •Pillar boxes shall have a durable, weather-resistant warning label indicating against electrical risk both in English and Chuukese (Trukese). •Adequate internal space shall be provided for future load expansion and additional connections.
DL-INST-12	Underground service mains •Service mains shall be installed in compliance with applicable standards, ensuring a safe and reliable electricity supply to consumers. • For underground service mains, cables shall be installed using direct burial methods, with a minimum burial depth of 60 cm in standard conditions and 80 cm in road crossings or heavy-load areas. • The minimum bending radius of service cables shall be maintained as per manufacturer specifications to prevent mechanical stress and insulation damage. • Service mains shall be routed with minimal sharp bends and obstructions, ensuring accessibility for future maintenance. • Connection points shall be properly insulated and waterproofed, using weatherproof enclosures to prevent moisture ingress and insulation failure. • Joints and terminations shall be made using approved connectors, ensuring low electrical resistance and high mechanical strength. • Service mains shall be clearly labelled at both ends, indicating phase identification and connection points. • Earthing of service mains shall be performed according to applicable standards. • Testing and commissioning shall include insulation resistance tests, continuity checks, and voltage drop verification before final connection to the network.
DL-INST-13	Overhead service drops • Service drops shall be installed in compliance with applicable standards, ensuring a safe and reliable electricity supply to consumers. • Overhead service drops shall be securely fastened to insulated supports, ensuring mechanical stability and proper clearance from obstacles. • For mechanically strong user houses, service drop cables can be directly fixed to the user's wall using a dead-end clamp and strain hook. • For mechanically weak user houses, each user connection shall be made via a receiver pole of at least 5m in height, installed next to the user's house to provide adequate mechanical support. • Service drop cables shall not be in contact with sharp edges, ensuring protection against insulation damage. • The minimum ground clearance shall be at least 4 meters when possible. • Connection points shall be properly insulated and weatherproofed, using UV-resistant enclosures to prevent moisture ingress and insulation failure. • Joints and terminations shall be made using approved connectors, ensuring low electrical resistance and high mechanical strength. • Service drops shall be clearly labelled at both ends, indicating phase identification and connection points. • Earthing of service drops shall be performed according to applicable standards. • Testing and commissioning shall include insulation resistance tests, continuity checks, and voltage drop verification before the final connection to the network.

DL-INST-14	User installation: • All segments of the service lines that are installed outdoors shall be installed in an appropriate conduit. • The user installation shall comply with drawing SLD-LV-DL • The meter enclosure shall be mounted on the exterior wall of the user premises, at least 150cm from the ground level. • The hole in the wall necessary to connect the meter enclosure to the indoor load panel centre shall be waterproof. • The load centre panel shall be installed at least 150cm from the ground level. • The junction boxes necessary to derive the different internal circuits shall be installed at least 200cm from the ground level. • LED lights shall be properly fixed - free-hanging lights are not allowed. • The final location of the equipment (lights, switches, sockets, junction boxes, etc) will be decided upon negotiation with the users. • The meter enclosure shall be provided with a durable, weather-resistant warning label indicating electrical hazard. The label shall be clearly visible and written in both English and Chuukese (Trukese).
DL-INST-15	Streetlighting: • Street lights shall be installed on poles with a height of at least 6m • Street lights shall operate automatically from 6:00 p.m. to 6:00 a.m. • The exact location of the street lights shall be determined in coordination with the community. • Each street light shall be equipped with a weatherproof junction box, housing a properly sized circuit breaker at the level of the luminaire to allow individual disconnection from the LV network. • The mounting height and positioning of the luminaire shall be designed to ensure uniform illumination. • The electrical connection shall be made using weatherproof, insulated connectors, ensuring durability and protection against environmental factors. • After installation, testing shall be performed, including functionality tests, insulation resistance tests, and verification of proper circuit breaker operation.

3.4. Solar home systems

3.4.1. Specific scope of work

After the contract award, the successful bidder is responsible for the following tasks:

1. Site visit prior to final detailed engineering.
2. Detailed engineering design of all solar home systems (SHSs).
3. Supply and installation of all necessary equipment and materials, taking into account all aspects of the supply chain (purchase, customs clearance of imported goods, storage, transportation, handling, packaging, etc.)
4. Commissioning of each SHS.

The indicative bill of quantities for each mini-grid is shown in the table below (the description of the SHSs can be found in Section 3.4.2):

Mini-grid Site	SHS type 1	SHS type 2	SHS type 3	SHS type 4	Total
Uman	0	0	7	0	7
Wonip	0	0	0	0	0
Moch	0	0	0	0	0

Tol (Munien)	0	0	1	0	1
Onoun	0	0	0	0	0

After the on-site visit, changes in the quantity of each SHS per site will be accepted based on the final user needs, provided that the total quantity of each SHS category does not exceed 25%.

3.4.2. Description

SHSs are an integrated set of compatible and manufacturer-tested components, consisting of at least:

- One or more PV modules on a galvanized steel pole with concrete footing
- A cabinet which integrates:
  - A lithium-ion (Li-ion) battery
  - Power electronics
  - A Cash Power energy meter to be provided by the Employer (refer to Section 3.3.4.6)
  - Electrical protections panel for the different circuits
- An appliance kit
- Interconnection wiring, accessories, and dedicated earthing system.

The SHS must be capable of autonomously supplying AC power to a specified number of household appliances for a designated number of hours per day throughout the year.

SHS are divided into four categories, each corresponding to a specific daily energy package. Each SHS category is defined by its PV power capacity, battery storage capacity, and a unique set of household appliances.

Table 51. Equipment description table for SHSs

SHS type	LED lamp	Radio	TV	Refrigerator	Freezer	Daily available energy (Wh/d)
SHS1	4	1	0	0	0	≥ 250
SHS2	6	1	1	0	0	≥ 750
SHS3	8	1	1	1	0	≥ 2000
SHS4	10	1	1	1	1	≥ 4000

The PV and battery capacities to be installed depend on the efficiency of household appliances, the specifications of the battery and the charge controller, and the self-consumption of the components included in the SHSs. A lower efficiency can be compensated for by a larger PV capacity, and vice versa.

It is the responsibility of the successful bidder to propose the design they consider most cost-

effective, provided the minimum functional and technical requirements are met.

Bidders must demonstrate that the proposed system will power all household appliances for the required daily operating hours. The system will have to satisfy 100% of the needs during the least sunny month of the year. Bidders will use the irradiation value provided in Section 1.6.2 to perform the calculations.

The estimated power of each SHS is given in the table below:

Table 52. PV capacity and battery capacity for SHSs

	PV capacity (Wc @STC)	Battery useful capacity (Wh)
SHS1	80-150	200 – 400
SHS2	200-300	500 – 700
SHS3	500-700	1500 – 2000
SHS4	1000-1500	3000 – 4500

3.4.3. Functional requirements

- All SHSs must supply electricity main AC output at either 120V or 120/240V split-phase, with nominal frequency 60 Hz. All household appliances must be compatible with the proposed solar SHS.
- The lifespan of all components within the SHS must exceed five years.
- Each SHS must include an integrated system that stops powering the loads when the State of Charge (SoC) falls below the manufacturer's recommended threshold.
- The SHSs must provide necessary safety protections against wiring short circuits and polarity reversals.
- The cabinet shall be lockable so that the user cannot access to the interior components.
- The user shall be able to visualize the energy meter screen and the State of Charge of the battery, as well as to switch on/off the different AC circuits.

The functional requirements for daily operating hours that each solar kit must support are illustrated below.

DC household appliances	Functional requirements
LED Lamps	6 hours of operation at a brightness of 200 lumens
Radio	4 hours of operation
TV	4 hours of operation
Refrigerator	24 hours of operation at an indoor temperature of 5 °C and an ambient temperature of 30 °C
Freezer	24 hours of operation at an interior temperature of -10 °C and an ambient temperature of 30 °C

Others	50 Wh/day/additional kit dedicated to other equipment not included in the kits (For example, charging phones)

3.4.4. Component requirements

The following table sets the minimum requirements for the SHSs.

Table 53. Technical specification table for SHSs

Technical Specifications - Solar Home Systems		
ID	**Requirement**	**Value**
SHS-1	PV module technology	Polycrystalline or monocrystalline silicon.
SHS-2	Battery technology.	Li-ion LFP
SHS-3	Battery nominal DC voltage.	≤ 48Vdc
SHS-4	Certificates.	PV modules: same as PV-1 Battery: same as Li-1 Inverter: same as BATINV-1
SHS-5	Cabinet	Corrosion resistant galvanized steel or aluminum, class II isolation, IP44. Lockable door.
SHS-6	Installation of photovoltaic modules.	The PV module shall be mounted on a galvanized steel pole anchored in a reinforced concrete footing, at a height of at least 2m from the ground level and with a tilt of 10 degrees.
SHS-7	Parameters to display	The battery charge status must be indicated at least qualitatively (e.g., high, medium, and low).
SHS-8	Circuits	At least three different AC circuits. The circuits shall be protected via circuit breakers and a main 30 mA RCD.
SHS-9	LED lamps - Brightness	≥ 200 lumens
SHS-10	LED lamps - Efficiency	≥ 90 lumen/Watt
SHS-11	LED lamps - Lifetime	≥ 20,000 hours
SHS-12	LED lamps - Colour rendering index (CRI)	>80
SHS-13	TV - Screen dimensions	≥ 15''
SHS-14	Refrigerator - total volume of the interior	≥ 50L
SHS-15	Refrigerator - interior temperature	at least 10C
SHS-18	Refrigerator - refrigerant	CFC-free
SHS-19	Refrigerator and freezer - ambient temperature	10C / 43C (SN-T climate class)
SHS-20	Nominal voltage and frequency.	120V or 120/240V Spilt-phase. Nominal frequency: 60 Hz.
SHS-21	Labels and signage	All equipment identification labels shall be in English. Safety signage (e.g., Caution, Danger, Warning) shall be provided in both English and Chuukese (Trukese)

3.5. Spare parts

The Contractor is responsible for supplying the following spare parts:

Table 54. Minimum spare parts to be supplied.

Component	Quantity
PV modules	≥ 2% of the total number
PV connectors	≥ 5% of the total number
PV power plant fuses, type gPV	≥ 5% of the total number
PV power plant fuses, other types	≥ 5% of the total number
PV power plant SPDs	1x extra SPD for each different SPD installed
PV power plant cables	≥ 5 % of each different cable installed
Air conditioning filters	2 sets
PV inverters	1 per model
Diesel generator consumables (filters, oil, refrigerant, etc)	All the necessary items for the first 1000 h of operation, per site.
Service mains cables	≥ 3% of the total number
Energy meters with enclosures	≥ 5% of the total number
Distribution line fuses	≥ 5 % of each different fuse installed
LED Streetlights (excluding poles)	≥ 3% of the total number
User energy meters	≥ 3% of the total number
Solar Home Systems	3

3.6. Warranties

Bidders shall prove the following minimum warranties:

Table 55. Component warranties

Technical Specifications - Minimum Warranties		
ID	**Requirement**	**Value**
WRR-1	PV module product warranty	≥ 12 years
WRR-2	PV module performance warranty.	Maximum STC power degradation of 8% during the first 10 years and 18% during a period of 25 years
WRR-3	PV structure product warranty	≥ 10 years
WRR-4	PV charge controller product warranty.	≥ 5 years
WRR-5	PV inverter product warranty.	≥ 5 years
WRR-6	Battery inverter product warranty.	≥ 5 years
WRR-7	Hybrid inverter product warranty	≥ 5 years
WRR-8	Hybrid controller product warranty	≥ 1 year
WRR-9	Li-ion battery product warranty	≥ 5 years
WRR-11	Back-up diesel generator product warranty.	≥ 2 years
WRR-12	Pillar box product warranty	≥ 1 year
WRR-12	SHS product warranty	≥ 1 year

WRR-13	User energy meter product warranty	≥ 1 year
WRR-15	Auxiliary transformer product warranty	≥ 2 years
WRR-16	Step-up transformer product warranty	≥ 2 years
WRR-17	Step-down transformer product warranty	≥ 2 years
WRR-18	RMU product warranty	≥ 2 years

The Contractor is responsible for the defect's liability period of 24 months after the Time for Completion.

The Contractor shall guarantee a functional internet connection for the remote monitoring platform, including the costs associated with the internet connection during a 24-month period.

4. Project phases

4.1. Overview

Note: The information in this section and the required deliverables are provided for bidders' reference and apply only to the winning Contractor. The required deliverables at the bidding stage are specified in Section 6.

The following table presents an overview of the project phases and the associated deliverables.

Table 56. Overview of the project phases and deliverables

Phase	Deliverables
Start of works	D1 – Site visit report D2 –Monthly Construction Schedule D3 – Construction Environmental Health and Safety Plan D4 – Construction Quality Insurance Plan D5 – Deliverable list for the detailed engineering D6 – Environmental and Social Management Plan (ESMP)
Detailed engineering	D6 – Detailed engineering design report, including technical annexes
Supply and transport	D7 – BoQ D8 – Component's certifications and Factory Acceptance Test proposal D9 – Factory Acceptance Test report D10 – List of containers with all necessary certifications
Installation	D9 – Weekly progress report D10 – Installation Completion Report.
Commissioning	D11 – Commissioning protocol D12 – Commissioning test report D13 – "As-built" Engineering Design Report
Operational acceptance	D14 – Monitoring report
Training	D15 – Training plan D16 – Training materials D17 – O&M manual
O&M	D18 – O&M plan D19 – Final O&M report
End of works	D20– Definite project completion act

4.2. Start of works

The Contract starts with an inception site visit. The Contractor shall visit the sites within three weeks after signing the contract. During this visit, all necessary data for detailed engineering shall be collected. This includes, but is not limited to, the site marking of the entire installation, a session with the CPUC's local staff to agree on all the action points etc.

The Contractor shall send a detailed construction plan, including the dates of tasks and milestones (Gantt Chart), as well as all procedures to be followed during construction works. This

Gantt Chart should be updated monthly.

During the start-of-works phase, the contractor should present for approval a detailed list of deliverables (drawings, calculation notes, etc.) required for the proper execution of the detailed engineering.

The Contractor shall ensure that the construction plan follows the Employer's and CPUC's Occupational Health and Safety Requirements for Contractors. The Contractor is responsible for the supply and proper use of all required personal protective equipment, as well as for implementing the safety protocols during the project.

4.3. Detailed engineering

After the inception site visit, the Contractor has 2 months to provide the first version of the detailed engineering, which shall result in the Detailed Engineering Design Report and all the applicable technical annexes as per the tables below.

At least the following documents shall be included:

Table 57. Requirements for detailed engineering deliverables

PV GENERATION POWER PLANT – DETAILED ENGINEERING DELIVERABLES	
Type	**Description**
Detailed engineering design report	It shall demonstrate that the system complies with all technical specifications stated in this document, including all necessary drawings and calculation notes mentioned below.
Civil engineering drawing set	Shall include at least the following list of drawings: ▪ PV powerplant layout drawing (geo-referenced CAD), showing the exact location of all main components: PV generator, technical building, diesel generator shelter, etc. ▪ Technical building structural drawings, showing all construction details (foundations, openings, roofing, etc). ▪ Diesel generator shelter structural drawings, showing all construction details (foundations, openings, roofing, etc). ▪ Powerplant water management drawings, including drawings of the drainage system, rainwater collection system, wastewater and sewage system.
Installation drawing set	Shall show the physical details of the installation of all equipment, including at least: ▪ Technical building installation drawings, showing the details of all components installed within the technical building, internal electrical installation, water circuits, etc. ▪ Diesel generator shelter installation drawings, showing the details of all components installed within the shelter. ▪ PV generator installation drawings, showing the details of the PV structure and its foundations, PV modules clamping system, cabling, earthing, etc. ▪ Electrical board physical drawings, showing its construction details and the layout of the different devices within the board (protections, busbars, cables, etc). ▪ Earthing installation drawings, showing the details of all earthing connections.
Detailed electrical drawing set	Shall include at least the following list of drawings: ▪ Single Line Diagrams ▪ Earthing SLD ▪ PV string diagram, showing the interconnection of the different PV strings to the PV charge controllers, PV inverters and/or hybrid inverters. ▪ Electrical boards SLD

	▪ Communication diagram
Calculation notes	Shall include at least: ▪ Structural calculation notes for the PV mounting structures, technical building and diesel generator shelter. ▪ Cable sizing calculations, showing compliance with applicable standards with respect to cable ampacity and protection sizing, as well as compliance with the minimum voltage drops required in the project for each circuit. ▪ The expected performance specifications, including detailed simulations of the electrical output per day and per month, and including shading losses calculations, using standard PV software such as PVsyst, Helioscope, or equivalent.
Other	▪ Details of the equipment testing and testing procedures. ▪ The complete manufacturer's documentation (datasheets, manuals, warranties) of all components.
DISTRIBUTION LINE – DETAILED ENGINEERING DELIVERABLES	
Type	**Description**
Detailed engineering design report	It shall demonstrate that the system complies with all technical specifications stated in this document, including all necessary drawings and calculation notes mentioned below.
Mechanical drawing set	Shall include at least the following list of drawings: ▪ Distribution line layout (geo-referenced CAD), showing the exact location of all main components: PV generation power plant, transformers, pillar boxes, cable routes, service drops, user locations, overhead jumps, etc. The drawing shall clearly specify the following: ▪ For overhead sections: Pole construction and installation details, for each type of pole, including foundations, a list of mounting accessories, earthing, guy wire anchoring, etc. ▪ Transformer installation drawing. ▪ Service mains installation drawing. ▪ Street lighting installation drawing. ▪ Trenching installation drawings.
Electrical drawing set	Shall include at least the following list of drawings: ▪ SLDs (distribution line, user connection). ▪ Load centre panel: SLD and installation drawing showing all components. ▪ User earthing installation drawing. ▪ User indoor wiring installation drawing.
Calculation notes	Shall include at least: ▪ Mechanical calculation notes for the overhead lines and pillar boxes. ▪ Cable sizing calculations, showing compliance with applicable standards with respect to cable ampacity and protection sizing, as well as compliance with the minimum voltage drops required in the project for each circuit.
Other	▪ Details of the equipment testing and testing procedures. ▪ The complete manufacturer's documentation (datasheets, manuals, warranties) of all components.

The Employer will formulate its comments and opinions on the Detailed Engineering Design Report and determine its completeness.

After the Employer's technical advisor (Owner's Engineer) reviews and provides comments, the contractor will have a maximum of 2 weeks to update the detailed engineering. It is estimated that the Owner's Engineer will provide feedback to the contractor in a maximum review time of:

- 1 month for the first review of the Detailed Engineering Design Report.
- 1 week for the updated versions of the Detailed Engineering Design Report.

The review time will start when the contractor has provided all necessary documents for the detailed engineering for the first submission and has submitted all necessary updates after the Owner's Engineer update. To improve efficiency in the engineering phase, the contractor can, with the Employer's approval, prioritise the submission of the most critical documents for the correct project implementation.

All material (specified in this document or not) shall be approved by the Employer prior to procurement.

4.4. Supply and transport of equipment and materials

The Contractor shall deliver one complete Bill of Quantities (BoQ) per site, including all necessary items for the construction of the systems. The document will be revised by the Employer before the start of the supply phase.

The Contractor shall provide certificates of conformity for each container sent (if any), issued by an internationally recognised independent company, which shall be approved by the Employer.

The Contractor shall inform the Employer when the equipment will arrive at the installation sites. The Contractor and the Employer will conduct an acceptance inspection of the equipment before commencing installation works.

4.5. Installation

The Contractor will write a weekly progress report for each site, specifying the current status of construction works, the supervision procedures, and milestones and setbacks compared with the construction plan. Problems encountered on site and safety events should also be mentioned in this report.

4.6. Pre-commissioning

Before conducting the official commissioning, the Contractor shall submit a **commissioning protocol** proposal to the Employer. The commissioning protocol shall include:

1. A description of the necessary tests to prove that the system complies with all specifications set in this document.
    a. For each test, the protocol shall explain the methodology that will be followed, including the required test conditions (environmental conditions, setup conditions, e.g.), the tools needed, the test procedure and the expected outcome of the test.
2. A description of the measurement equipment that will be used to perform the tests, as well as their measurement precision.
3. The configuration settings of all components.

The pre-commissioning phase will commence only after the Employer has approved the commissioning protocol.

During the pre-commissioning phase, the Contractor shall:

- Run all tests on every component as per the approved commissioning protocol.
- Document results for each test, including any malfunctions or issues found. If any faults are identified during testing, the Contractor shall correct them and re-test the component.
- Prepare an intermediary report that includes the results of the pre-commissioning phase. This report will detail the outcomes of all tests performed and any corrective actions taken.

The intermediary report shall be submitted to the Employer for review. The Employer will then schedule the official commissioning within a specified time period (30 days) after submission of the pre-commissioning intermediary report. The 30 days will start after the report is approved.

4.7. Commissioning

The commissioning phase will begin after the submission and approval of the **pre-commissioning intermediary report**.

During the commissioning phase:

- The Employer will conduct verification tests based on the previously approved commissioning protocol. These tests may include randomly selected tests to confirm the validity of the pre-commissioning results. The Employer and the Owner's Engineer will inspect and verify the accuracy of the pre-commissioning tests by performing their own assessments.
- The Contractor shall support the Employer during this verification process by providing all necessary assistance, documentation, and access to the system components. The contractor should provide the necessary tools and personnel to conduct them in the presence of the Employer and the Owner’s Engineer.

The Contractor shall fix any malfunction identified during the tests and repeat the tests until they are passed satisfactorily.

The commissioning phase will finish upon approval of the Commissioning Test Report, which contains the results of all inspections and tests undertaken, and the test certificate, comprising a test sheet for the parameters included.

Moreover, the Contractor shall deliver a new **Engineering Design Report** that updates those items that may have been modified during the previous installation and commissioning phases. The report shall also contain a new set of “as-built” drawings.

4.8. Operational acceptance

After commissioning, an operational acceptance period of 2 months will follow.

The Contractor shall provide a monitoring report that proves that the system complies with all requirements. It shall include at least:

- Energy and power flow analysis, showing the hourly, daily and monthly data of power produced by PV, battery, diesel generator, as well as the energy demand.
- Description of the battery usage, showing daily charge/discharge curves.
- Description of the operations carried out (configuration, settings, element replacements, etc.)

4.9. Training

Bidders shall describe a training plan for the Employer to be conducted upon commissioning of the mini-grids. The training shall cover all the necessary topics for the handover of the mini-grids to the CPUC. The training must have a minimum duration of 40 hours and be conducted in English. It shall be offered to 5 to 10 staff appointed by the CPUC, including some technicians, as well as to the local operators in each village, if any. Training material is to be provided to the participants.

Prior to execution of the training, the Contractor shall provide the following to the Employer:

- O&M documentation, such as the O&M manual and all component documentation (datasheets, manuals, warranties, etc).
- Training plan, detailing the agenda for each day, Contractor's staff involved in the training, etc.
- Training materials that cover the content to be taught at each session.

The training shall not take place before the Employer approves the abovementioned deliverables. The O&M manual, which will set the fundamentals for the training, shall include at least the following information:

- The fundamental principles of the design and operation of the mini-grids.
- Description of each component installed in the mini-grids.
- Principles of protection of people and equipment, description of safety measures to be taken during O&M, emergency procedures, etc.
- Control and monitoring, including a description of how to monitor and analyse the main system's key performance indicators and draft templates for the monthly O&M reports. The monthly O&M reports shall include at least:
    - Monthly values:
        - Total monthly energy demand.
        - Total energy provided by the PV generator.
        - Total energy provided by the diesel generator.
        - Total number of users connected.
        - New users connected during this month.
    - Daily values:
        - Daily energy demand.
        - Daily energy provided by the PV generator.
        - Daily average PV generator Performance Ratio.
        - Daily energy provided by the diesel generator.
        - Daily minimum, maximum and average state of charge of the battery.
    - Unscheduled down-times and their duration.
    - List of faults and alarms.
    - List of O&M tasks undertaken.
- The required preventive O&M tasks and their frequency (e.g. daily, monthly, quarterly, yearly). Each task shall be accompanied by a detailed description of the procedure to be

followed (including photos if necessary), the required tools, the required skill level (e.g. basic, electrician or engineer), the associated health and safety risks, the required consumable items, the expected outcome of the task and a description of the corrective measures in case the outcome is not the expected. The corrective measure description shall also include the detailed description of the procedure, required tools, required skill level, associated health and safety risks and required consumable items.

- Corrective O&M: troubleshooting of common failures, including practical examples.

A preliminary agenda is shown in the table below.

Table 58. Preliminary training agenda

Day	Contents	Location
1	Fundamental principles for a successful O&M for both LV and MV mini-grids: - Description of the mini-grids, main components, and operational aspects - control and monitoring - protection of people and equipment - general preventive O&M tasks that apply to all mini-grids	1 of the 5 mini-grids
2	Deep dive into the particularities of the LV mini-grids. Hands-on session on control and monitoring. Hands-on session on preventive and corrective O&M.	1 of the 3 LV mini-grids
3		
4	Deep dive into the particularities of the MV mini-grids. Hands-on session on control and monitoring. Hands-on session on preventive and corrective O&M.	1 of the 2 MV mini-grids
5		

The Contractor shall adapt the training to three different technical levels. The first level shall cover basic O&M tasks that do not require technical expertise (e.g. cleaning of PV modules). The second level shall cover more technical tasks (e.g., replacing basic electrical components). The third level is the most technical and covers all aspects of the mini-grid's engineering and construction. The objective of the training is to provide a certification process at three levels:

- certified mini-grid operator.
- certified mini-grid technician.
- certified mini-grid manager.

At the end of the training period, certificates and authorisations to perform maintenance and repair activities on the system will be issued to personnel who meet the requirements.

The Contractor is responsible for the costs of accommodation, training materials (e.g., screen, projector, etc., as applicable), and coffee break/catering services.

4.10. Operations and maintenance

The Employer has its own field staff responsible for day-to-day O&M; therefore, the Contractor does not need to permanently station personnel on-site.

The Contractor will be responsible for the following tasks:

- Coordinate remotely with the Employer staff to ensure O&M activities are completed, and track compliance by reviewing the monthly O&M reports, providing feedback and recommendations for improvement when necessary.
- Provide a hotline for corrective O&M remote assistance to the Employer's staff for troubleshooting, diagnostics, and technical support. If corrective actions involve equipment manufacturers, the Contractor shall proactively manage and guide the required interactions with the manufacturers, ensuring the Employer's staff is always informed.
- Three site-visits, at months #8, #16, and #24 of the O&M period. During each visit, 2 days per mini-grid shall be accounted for, thus a total of 10 days of effective work at the islands. The Contractor will conduct an on-site assessment of mini-grids' performance, verify and perform all necessary preventive maintenance tasks, and perform corrective O&M tasks only for issues covered under the defect liability period. During these visits, the Contractor shall conduct a one-day refresher training for the Employer staff to reinforce maintenance procedures, troubleshooting methods, and system management best practices. After each visit, the Contractor shall provide a report listing all findings, including an analysis of the systems' performance, issues encountered and recommendations.

Note: The Contractor's price for site visits shall exclude transport costs from Weno to the sites. These will be covered by the Employer.

5. Personnel requirements

The Bidder must demonstrate that it will have the personnel available for the key positions, with qualifications and experience that meet the following minimum requirements:

Table 59. Personal requirements.

No.	Position	Total Work Experience (years)	In Similar Works Experience (years)
1	Project Manager	10	5
2	Construction Manager	10	5
3	Electrical Engineer/Solar PV Specialist	10	5
4	Civil Engineer	7	5
5	Construction supervisor	3 to 5	1 to 3
6	Quality Control Inspector	7	5
7	Health and Safety Officer	7	5
8	Community Liaison Officer	7	5
9	Environmental Specialist	7	5

Note: A single professional may cover two positions, provided that they have the necessary qualifications and proven experience for both roles. The Bidder must provide clear documentation in the bid submission demonstrating that each individual meets the required experience and qualifications for each position.

5.1. General requirements

The proposed personnel must have the necessary qualifications and demonstrated experience in the design, construction, installation, and safe operation of solar PV/diesel hybrid power generation systems integrated with Battery Energy Storage Systems (BESS). The Bidder must provide detailed CVs and experience records of the proposed personnel in the bid submission.

If, during construction, any key personnel is substituted by a new member, the Contractor shall communicate this change in advance for the Employer's approval.

5.2. Key personnel roles and experience

1. **Project Manager**: Overall project oversight, coordination of all activities, resource and budget management, and ensuring regulatory compliance.
    - Minimum 10 years of work experience, with at least 5 years managing energy access projects to deploy solar PV, diesel and battery storage mini grids of 100 – 500 kWp capacity in rural or remote locations. Previous experience managing electrical construction projects in remote islands is required.
    - Experience in managing projects across at least three different countries, with a preference for experience in FSM or countries with similar conditions.
    - Postgraduate degree in Engineering, Project Management, or a related field.
    - Must be fluent in English.

2. **Construction Manager**: Responsible for overall construction management and coordination in the 5 islands, ensuring that construction follows design specifications and safety standards.
   - On-site management, ensuring construction adheres to design specifications, safety, and timelines.
   - Minimum of 10 years of work experience, with at least 5 years in construction management of energy access projects to deploy solar PV, diesel and battery storage mini grids of 100 – 500 kWp capacity in rural or remote locations.
   - Bachelor's degree in civil or mechanical engineering.
   - Must be fluent in English.
3. **Electrical Engineer**: Designs the electrical system, including generation, and control systems, ensuring compliance with technical and safety standards.
   - At least 5 years of experience in the design, construction, and commissioning of solar PV power plants with battery energy storage and diesel back-up mini grids.
   - Bachelor's degree in electrical engineering. A postgraduate degree renewable energy-related field is a plus.
   - Must have participated in the construction and commissioning of at least 2 mini grid projects of PV capacity above 100 kWp and BESS of 500 kWh or more, including experience in electrical design, grid integration, and power system optimization.
   - Comprehensive understanding of relevant standards and codes for solar PV-BESS diesel generator hybrid mini grid installations, including IEC, NEC, and local electrical codes.
   - Must be fluent in English.
4. **Civil Engineer**: Oversee the structural components of the project, including foundation work, maintenance of access roads, and infrastructure for solar panels, diesel generators, and battery systems.
   - Minimum of 7 years of work experience, with 5 years in similar projects.
   - Bachelor's degree in civil engineering.
   - Specific experience in civil engineering works for the construction of at least two (2) ground-based and two projects of raised structure PV solar power plants, including experience with rooftop PV installations and associated structural reinforcement methods.
   - Must be fluent in English.
   - Proven experience in civil engineering works for solar power plant construction.
   - Certifications and diplomas must be submitted as part of the bid.
5. **Construction supervisor** (3 in total): responsible for the day-to-day organization and coordination of the construction works in the islands.
   - Minimum 3 years of work experience in case of having an Engineering Degree, or minimum of 5 years of work experience if not degree-qualified .
   - Minimum 1 year of work experience in a similar project in case of having an Engineering Degree, or minimum of 3 years of work if not degree-qualified.
   - Must be fluent in English.

6. **Quality Control Inspector**: Ensures that all construction work meets quality standards, including material quality and installation practices.
    - Minimum of 7 years of work experience, with 5 years in quality control for similar energy or infrastructure projects.
    - Bachelor's degree in engineering, Quality Management, or a related field.
    - Must be trained to work with ISO 9001 standards
    - Proven experience in conducting quality assurance and oversight in construction projects, preferably in energy or infrastructure sectors.
    - Must be fluent in English.
7. **Health and Safety Officer:** Ensures compliance with health and safety regulations to minimize risks on site, with a particular responsibility to manage social risk requirements including risks associated with sexual exploitation and abuse and sexual harassment (SEA/SH).
    - Minimum of 7 years of work experience, with 5 years in health and safety for construction or energy projects.
    - Bachelor's degree in occupational health and safety, Environmental Engineering, or related field. Recognized certifications in health and safety (e.g., NEBOSH, OSHA, or equivalent) are also accepted, or
        - Proven experience as a health and safety professional in construction or energy projects, with a strong track record of ensuring compliance and managing safety risks.
        - Demonstrable experience in managing health and safety in complex construction environments.
    - Must be fluent in English.
8. **Community Liaison Officer**: Engages with the local community to ensure cooperation and minimize disruptions and address any concerns from the community.
    - Minimum of 7 years of work experience, with at least 5 years in community engagement.
    - Bachelor's degree in social sciences, communications, or related field. A formal degree is preferred but not required.
    - Must be fluent in English.
9. **Environmental Specialist**: Ensures that the construction process adheres to environmental regulations.
    - Minimum of 7 years of work experience, with 5 years in environmental management for energy or similar infrastructure projects.
    - Bachelor's degree in environmental science, Engineering, or related field.
    - At least 5 years of experience working on projects in rural or remote areas, with a focus on understanding and mitigating environmental impacts that are culturally sensitive.
    - Demonstrated experience in developing, implementing, and monitoring EMPs for infrastructure or energy projects, with a strong emphasis on minimizing ecological damage.

- Proven track record in conducting environmental monitoring and auditing during project execution, with experience in reporting environmental performance and proposing corrective measures when necessary.
- Must be fluent in English.

5.3. Required personnel presence on site

The following table describes the minimum required presence in Chuuk of each required personnel. However, the involvement of the personnel is expected to be continuous during the entire contract duration.

Table 60. Required minimum personnel presence in Chuuk

No.	Position	Minimum required presence in Chuuk
1	Project Manager	Presence 25% of the time in Chuuk each year during the entirety of the contract.
2	Construction Manager	80% of the time from the start of construction preparation. • Inner lagoon: one visit per month during construction. • Outer lagoon: one visit per quarter during construction.
3	Electrical Engineer/Solar PV Specialist	Compulsory presence during: • Inception visit (for engineering design data collection) • Test and commissioning phase.
4	Civil Engineer	-
5	Construction supervisor (x3)	80% of the time from the start of construction preparation.
6	Quality Control Inspector	80% of the time from the start of construction.
7	Health and Safety Officer	80% of the time from the start of construction preparation. • Inner lagoon: one visit per month during construction. • Outer lagoon: one visit per quarter during construction.
8	Community Liaison Officer	80% of the time from the start of construction preparation. • Inner lagoon: one visit per month during construction. • Outer lagoon: one visit per quarter during construction.
9	Environmental Specialist	80% of the time from the start of construction preparation. • Inner lagoon: one visit per month during construction. • Outer lagoon: one visit per quarter during construction.

6. Required deliverables within the technical proposal of the bid

This section presents the list of required deliverables that shall be submitted with the original bidding offer. The documents shall be presented in English and shall refer to the Deliverable ID as defined in the first column of Table 61.

Table 61. Deliverables to be included in the bidding offer.

<table>
<tr><th>DELIVERABLE ID</th><th colspan="2">DESCRIPTION</th><th>DOCUMENT FORMAT*</th></tr>
<tr><td>O0
Deliverable checklist</td><td colspan="2">Complete the checklist as per Annex 0 – Offer deliverables checklist.</td><td>Excel and PDF</td></tr>
<tr><td>O1
Schedule of Prices tables</td><td colspan="2">Complete the Schedule of Prices tables; see the attached table in Annex E – BoQ.</td><td>Excel and PDF</td></tr>
<tr><td>O2
Design Report</td><td colspan="2">The report shall describe the design of the proposed solution and shall demonstrate that it meets or exceeds the requirements presented in this document.</td><td>PDF</td></tr>
<tr><td>O3
Minimum Design Requirements table</td><td colspan="2">Table attached in Annex G – Design requirements shall be filled in.</td><td>Excel and PDF</td></tr>
<tr><td>O4
Component technical specification tables</td><td colspan="2">Tables attached in Annex H – Component technical specifications shall be filled in.
All necessary information to prove the compliance with the requirements shall be included in the bid offer, either in deliverable O2, O5, or other.</td><td>Excel and PDF</td></tr>
<tr><td rowspan="5">O5
Drawings</td><td colspan="2">Set of detailed drawings covering, at least:</td><td></td></tr>
<tr><td>O5.1</td><td>PV generation plant layout, indicating the locations of main components (PV modules under 3 different structures, outdoor equipment such as PV inverters or electrical boards, technical building, diesel generator shelter), and power/communication routes.</td><td>PDF</td></tr>
<tr><td>O5.2</td><td>PV supporting structures, including details of the foundations, for the three different types of structures.</td><td>PDF</td></tr>
<tr><td>O5.3</td><td>Single Line Diagrams of the power generation plant, including communications.</td><td>PDF</td></tr>
<tr><td>O5.4</td><td>Technical building layout drawing, showing the proposed construction elements, distribution of the different rooms and the components inside them (power conversion equipment, batteries, boards, auxiliary equipment, etc)</td><td>PDF</td></tr>
<tr><td>O6
Materials supporting documentation</td><td colspan="2">The following table shows the major components:
<table>
<tr><th>Location</th><th>Component</th></tr>
<tr><td rowspan="13">Power generation plant</td><td>PV module</td></tr>
<tr><td>PV support structures</td></tr>
<tr><td>PV charge controller</td></tr>
<tr><td>PV inverter</td></tr>
<tr><td>Battery inverter</td></tr>
<tr><td>Hybrid inverter</td></tr>
<tr><td>Li-ion battery</td></tr>
<tr><td>Control and monitoring devices</td></tr>
<tr><td>Back-up diesel generator</td></tr>
<tr><td>PV cable</td></tr>
<tr><td>DC and AC cable</td></tr>
<tr><td>Fiber optic cable</td></tr>
</table></td><td>PDF</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">
<table>
<tr><td></td><td>Mini-grid controller</td></tr>
<tr><td></td><td>Transformers</td></tr>
<tr><td>Distribution line</td><td>Poles</td></tr>
<tr><td></td><td>Distribution pillar boxes</td></tr>
<tr><td></td><td>AC cables (all types)</td></tr>
<tr><td></td><td>RMUs</td></tr>
<tr><td></td><td>Step-down transformers</td></tr>
<tr><td></td><td>User load centre panel</td></tr>
<tr><td></td><td>Street lighting</td></tr>
<tr><td>Solar Home Systems</td><td>SHS kit</td></tr>
</table>

For the above-mentioned major components, Bidders shall provide:
- Technical data sheets, demonstrating that the components meet or exceed the requirements.
- Manufacturer's Authorisation (only for the battery, PV charge controller, battery/hybrid inverter, control and monitoring devices).
- Product warranty and performance certificates.
- Any other information necessary to fully describe the solution.
</td><td></td></tr>
<tr><td>O7
Construction plan</td><td colspan="2">Bidders shall provide a description of the approach and activities required for the supply, installation and commissioning of the works. The proposal shall include:</td><td></td></tr>
<tr><td></td><td>O7.1</td><td>Site Organization and Method Statement. Description of how the Bidder intends to implement the project during the construction phase. It shall also describe proposed measures in terms of:
- Management plan
- Personnel
- Proposed subcontractors
- Health, Safety and Environmental (HSE) management strategies.
- Risk assessment and management
- Quality assurance and quality control
- Sustainable procurement
- Code of conduct for Contractor's personnel
- Equipment and tools</td><td>PDF</td></tr>
<tr><td></td><td>O7.2</td><td>Detailed Schedule. It shall cover the design, shipment, mobilization and construction schedules. The Detailed Schedule shall include major project milestones for both phases of the project. They should show at least:
- M0. Signing of Contract
- M1. Site visit.
- M2. Detailed Engineering Design.
- M3. Supply and transport of equipment and materials.
- M4. Completion of works and installation of equipment and materials.
- M5. Commissioning.
- M6. Completion of training services.
- M7. Completion of O&M period.</td><td>PDF</td></tr>
<tr><td>O8
Rated criteria table</td><td colspan="2">Rated criteria table
Table attached in Annex J – Template Rated Criteria Table shall be filled in.
Detailed evaluation criteria and scoring methodology can be found in Section III.
Bidders shall provide a short narrative supporting their claims, references in their technical proposal of elements supporting that claim and will annex to that document any supporting document that can be used to verify that claim.
This document will be used as a basis for the scoring of the technical part of the proposals.</td><td>PDF</td></tr>
</table>

*Document formats coming from equivalent freeware or open-source alternatives are also accepted.

7. Annexes

Annex 0 – Offer deliverables checklist
Annex A – Detailed Information on PV Sites
Annex B – PV Layouts
Annex C –Single Line Diagrams
Annex D – Canopy Reference Drawings
Annex E – BoQ
Annex F – GIS Files
Annex G – Design requirements
Annex H – Component technical specifications
Annex I – CPUC Suprima 5 Overview for IT
Annex J – Template Rated Criteria Table
Annex K – Geo-technical assessments
Annex L – Roof reinforcements

Preliminary Environmental and Social (ES) Risks, Impacts, and Contractor Expectations

The Environmental and Social Assessment for the ARISE Project in Chuuk has identified several key ES risks and impacts that must be effectively managed by the Contractor. The Employer requires that all Contractors implement robust measures, consistent with the World Bank Environmental and Social Standards (ESS), to avoid, minimise, and mitigate these risks. The summary below outlines the Employer's expectations.

These requirements do **not** replace or override the detailed provisions that will be included in the bidding documents; rather, they highlight priority areas of focus.

1. Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH)

Contractors shall implement stringent measures to prevent, detect, and respond to SEA/SH risks, including:

- Enforcing a **zero-tolerance policy** for SEA/SH.
- Mandatory **Code of Conduct** for all workers, including subcontractors.
- Worker training on acceptable behaviour, reporting mechanisms, and sanctions.
- Confidential, survivor-centred grievance and response procedures.
- Measures to prevent inappropriate interactions between workers and community members, especially women, youth, and vulnerable groups.

2. Labour and Working Conditions (ESS2)

Contractors must ensure safe, fair, and lawful working conditions, including:

- Transparent recruitment and prohibition of forced or child labour.
- Fair wages, working hours, and non-discrimination.
- Worker accommodation (if any) meets international good practice.
- A functioning **Worker Grievance Mechanism**.
- Compliance with occupational health and safety (OHS) requirements, including PPE, training, and incident reporting.

3. Environmental Protection and Pollution Prevention (ESS3)

Contractors shall implement measures to prevent pollution and protect environmental quality, including:

- Proper storage, handling, and disposal of hazardous materials.
- Spill prevention and emergency response procedures.
- Dust, noise, and vibration control measures.
- Waste minimisation, segregation, and lawful disposal.
- Measures to prevent contamination of soil, groundwater, and marine environments.

4. Biodiversity Conservation and Natural Resources (ESS6)

Contractors must:

- Avoid or minimise impacts on sensitive habitats.
- Implement species-specific mitigation measures (e.g., timing of works, lighting controls, noise minimisation).
- Comply with restrictions related to protected areas
- Support biodiversity monitoring as required by the ESMP.
- Prohibit hunting, disturbance, or collection of wildlife by workers.

5. Community Health and Safety (ESS4)

Contractors must safeguard nearby communities through:

- Traffic and access management plans.
- Measures to control dust, noise, and construction hazards.
- Safe management of excavations, equipment, and temporary works.
- Emergency preparedness and response procedures.
- Clear communication with communities regarding construction schedules and risks.
- Clear protocols to clear and manage UXO risks.

6. Site Security and Worker Conduct

Contractors shall:

- Prevent unauthorised access to the site.
- Ensure security measures do not infringe on community rights or safety.

7. Hazardous Materials and Safety Management

Contractors must:

- Maintain an inventory of hazardous materials.
- Implement safe storage, labelling, and handling procedures.
- Train workers in chemical safety and emergency response.
- Ensure safe transport and disposal of hazardous waste.

8. Resource Efficiency and Pollution Control

Contractors are expected to:

- Optimise water and energy use.
- Reduce emissions and waste generation.
- Implement erosion and sediment control measures.
- Prevent discharge of pollutants into waterways, coastal areas, and marine habitats.

9. Cultural Heritage (ESS8)

Where relevant (e.g., if materials or personnel move between project sites), contractors must:

- Respect tangible and intangible cultural heritage.
- Implement **Chance Finds Procedures**.
- Engage respectfully with traditional leaders and communities if heritage issues arise.

10. Compliance with ESMP and Contractor ESMP (C-ESMP)

Contractors shall:

- Prepare and implement a **Contractor ESMP** consistent with the ESMP and bidding documents.

- Assign qualified ES specialists to oversee implementation.
- Report regularly on ES performance, incidents, and corrective actions.
- Cooperate fully with Employer and World Bank supervision missions.,