

REQUEST FOR PROPOSALS

FOR

NORTH KOHALA

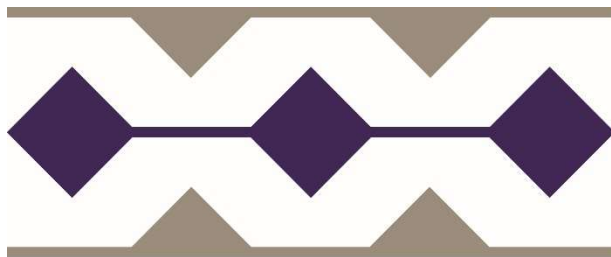
ENERGY STORAGE

ISLAND OF HAWAI‘I

FEBRUARY 28, 2023

Docket No. 2022-0012

*Appendix H – Interconnection Facilities Cost and
Schedule Information*



**Hawai‘i
Electric
Light**

TABLE OF CONTENTS

Section 1 – Cost Responsibilities..... 1

 1.1 – Definitions..... 1

 1.2 – Abbreviations..... 1

 1.3 – Facilities At Proposer Site 2

 1.4 – [Not Used]..... 2

 1.5 – Remote Substation Facilities..... 2

 1.6 – Line Extension from Grid Connection Point (GCP) To Proposer Site..... 3

 1.7 – T&D System Upgrades 3

 1.8 – Company-Owned Fiber..... 3

 1.9 – Telecommunication Facilities..... 4

 1.10 – Control System Acceptance Test (CSAT)..... 4

Section 2 – Interconnection Requirements 4

 2.1 – COIF Requirements 4

 2.2 – Telecommunication Requirements 5

 2.3 – Typical Security Requirements..... 5

 A. Proposer Responsibilities at Proposer Facility 5

Section 3 – Typical Company Durations for Interconnection Projects 5

The information provided in this document can be used to assist Proposers in estimating costs and schedule of potential projects.

SECTION 1 – COST RESPONSIBILITIES

For the purposes of this RFP, the Company will be responsible for the costs of Company-Owned Interconnection Facilities (COIF), subject to any limitations, as described in Section 1. The Company will not be responsible for any costs related to work deemed excessive and/or corrective in nature. The information below will help to clarify the responsibilities of the Company and the Proposer for COIF.

1.1 – DEFINITIONS

1. Betterment – Any upgrading to a facility made solely for the benefit of and at the election of the Company and is not required by applicable laws, codes, Company Standards, and the interconnection requirements in accordance with Tariff Rule No. 19.
2. Company –Hawai‘i Electric Light.
3. Company-Owned Interconnection Facilities – The equipment and devices owned by Company that are required to permit an energy storage facility to operate in parallel with and deliver electric energy to Company’s system and provide reliable and safe operation of, and power quality on, Company’s system.
4. Grid Connection Point – The point that the new interconnection facilities associated with the Proposer’s project interconnects to the Company’s existing electrical grid.
5. Interconnection Agreement – The executed contract between the Company and Proposer (e.g., Energy Storage Services Agreement, Standard Interconnection Agreement, etc.).
6. Point of Interconnection – The point of delivery of energy supplied by Proposer to Company, where the Facility owned by the Proposer interconnects with the facilities owned or to be owned by the Company.
7. Proposer – The developer proposing an energy storage project in response to a Company RFP.

1.2 – ABBREVIATIONS

1. ADSS – All Dielectric Self-Supporting
2. BESS – Battery Energy Storage System
3. COIF – Company-Owned Interconnection Facilities
4. CSAT – Control System Acceptance Test
5. CT – Current Transformer
6. DFR – Digital Fault Recorder
7. DTT – Direct Transfer Trip
8. FS – Facility Study
9. GCP – Grid Connection Point
10. HVAC – Heating, Ventilation, and Air Conditioning
11. IRS – Interconnection Requirements Study (includes both SIS and FS)

12. NDA – Non-Disclosure Agreement
13. OPGW- Optical Ground Wire
14. POI – Point of Interconnection
15. PT – Potential Transformer
16. RTU – Remote Terminal Unit
17. SCADA – Supervisory Control and Data Acquisition
18. SIS – System Impact Study
19. UFLS – Under-Frequency Load Shed

1.3 – FACILITIES AT PROPOSER SITE

1. Proposer shall be responsible for obtaining all permitting and any land rights required that are not provided by Company.
2. Except for costs agreed to be paid by Company under Item 3 below, Proposer shall be responsible for the design, procurement, and construction of all facilities at the BESS site. This may include, but is not limited to:
 - a. Civil infrastructure and site work (grading, trenching, manholes/handholes, conduits, cable trench, concrete pads/foundations, fencing, roadways/driveways, ground grid, lighting, etc.)
 - b. Communications cabinets and infrastructure (poles/towers for antenna/microwave dish, equipment pads, conduits, foundations, HHs, AC power, grounding, etc.)
 - c. Security systems/equipment
 - d. T&D infrastructure drawings showing the route of OH and UG lines and equipment locations at the project site
 - i. Any UG conduits for a T&D line extension that need to extend off the property should stubout at the property line for the Company to connect to
3. Company shall be responsible for costs related to the design, procurement, construction, and testing of electrical COIF at the project site. This may include, but is not limited to:
 - a. Equipment (circuit breakers, transformers, relays, switches, arresters, batteries, HVAC, RTU, DFR, DTT, meters, PTs, CTs, etc.)
 - b. Pre-wired control equipment enclosure/cabinet
 - c. Communications equipment
 - d. Electrical work (bussing, wiring, lightning protection, fiber optic cable, etc.)

1.4 – [NOT USED]

1.5 – REMOTE SUBSTATION FACILITIES

1. Company shall be responsible for all costs. This may include, but is not limited to:
 - a. Betterment
 - b. System upgrades, changes, or replacement of existing facilities (e.g., breaker replacements, relay upgrade, transformer installs, Under-Frequency Load Shed (UFLS) settings, etc.)

Hawaiian Electric Company
Company-Owned Interconnection Facilities Cost and Schedule Information

- c. Site work associated with those system upgrades (grading, trenching, manholes/handholes, conduits, cable trench, concrete pads/foundations, fencing, roadways/driveways, ground grid, lighting, etc.)
- d. Substation structures
- e. New control equipment cabinet or existing enclosure expansion
- f. Equipment (circuit breakers, transformers, relays, switches, arresters, batteries, HVAC, DFR, DTT, meters, PTs, CTs, SCADA equipment, telecommunications routers, etc.)
- g. Electrical work (bussing, wiring, lightning protection, fiber optic cable, etc.)
- h. Telecommunications equipment

1.6 – LINE EXTENSION FROM GRID CONNECTION POINT (GCP) TO PROPOSER SITE

1. Company shall be responsible for the design, procurement, and construction of the line extension between the GCP and the Proposer site. This may include, but is not limited to:
 - a. Overhead electrical facilities (poles, conductor, insulators, crossarms, guy wires, etc.)
 - b. Underground electrical facilities (cables, splices, terminations, grounding, transformers, switchgears, etc.)
 - c. Civil/structural work (design, survey, grading, trenching, conduits, manholes/handholes, concrete pads, concrete pier foundations, pole hole excavation, etc.)
 - d. Vegetation trimming and traffic control
 - e. Betterment
2. Proposer shall be responsible for obtaining all permitting and land rights.

1.7 – T&D SYSTEM UPGRADES

1. Company shall be responsible for all costs related to system upgrades or changes required to accommodate the Proposer's project (e.g., reconductoring or recircuiting of existing lines that do not have the required ampacity, re-fusing or re-programming of protective devices upstream of the GCP, etc.)

1.8 – COMPANY-OWNED FIBER

1. If Company-owned fiber is used to satisfy the communications requirements in the IRS, then the Company shall be responsible for all costs related to the design, procurement, construction, and testing of the ADSS fiber or OPGW from the nearest existing splice point to the Proposer site. This may include, but is not limited to:
 - a. Company fiber-optic cable (ADSS fiber cable or OPGW shieldwire) and associated equipment/hardware (splice boxes, innerduct, vibration dampers, etc.)
 - b. Splicing and Testing of fiber strands
 - c. Pole replacements and additional equipment if needed for additional capacity

Hawaiian Electric Company
Company-Owned Interconnection Facilities Cost and Schedule Information

- d. Civil/structural work outside of Proposer’s project site (design, survey, grading, trenching, conduits, manholes/handholes, concrete pads, concrete pier foundations, pole hole excavation, etc.)
 - e. Vegetation trimming and traffic control
 - f. Betterment
2. Proposer shall be responsible for obtaining all permitting and land rights.

1.9 – TELECOMMUNICATION FACILITIES

1. Company shall be responsible for design, procurement, construction, and testing of Company-owned telecommunication facilities. This may include, but is not limited to:
 - a. Fiber cable to the “meet point” outside of Proposer’s facility and termination at Company’s nearest point of interconnection.
 - b. Microwave radio or wireless radio equipment at the Proposer’s facility and at remote site(s) (e.g., microwave dish/equipment, waveguide, cables, antenna system, etc.).
 - c. Telecommunication service equipment required to provide circuits to support various applications at the Proposer’s facility.
2. Proposer shall be responsible for all costs related to the following:
 - a. A telecommunication cabinet required to accommodate the telecommunication equipment at the Proposer’s facility.
 - b. Telecommunication power at the Proposer’s facility (e.g., battery racks, banks, fuse panels, and associated power system equipment).
 - c. Ordering and installing a 3rd party leased service at the site. This may include, but is not limited to the initial cost to establish leased line(s) required for the project, monthly recurring leased cost of the service(s), and on-going maintenance of the service(s).
3. Proposer shall be responsible for obtaining all permitting and land rights.

1.10 – CONTROL SYSTEM ACCEPTANCE TEST (CSAT)

1. Proposer shall be responsible for all costs related to the CSAT, including all Company costs in support of the Proposer’s CSAT.

SECTION 2 – INTERCONNECTION REQUIREMENTS

Section 2 will provide information on the interconnection requirements and responsibilities.

2.1 – COIF REQUIREMENTS

Please see Attachment 1 for single-line diagram showing the interconnection requirements. Proposers should do their own due diligence for costs to meet the technical requirements and bring the project to commercial operations. Company costs will be the same for all proposed projects.

Company will build COIF up to the switch on the Seller side of the demarcation shown on Attachment 1. Proposer to build facilities to meet at that point.

2.2 – TELECOMMUNICATIONS REQUIREMENTS

Please refer to the RFP for functional requirements for the project. Company will install a fiber-optic cable between Hawi Substation and the project site. Proposer will need to provide/install a patch panel in a communications cabinet at the project site for Company to terminate the fiber cables.

2.3 – TYPICAL SECURITY REQUIREMENTS

Security requirements can vary based on many factors including, but not limited to, location, crime rate, environment, aspects of the surrounding area, terrain, accessibility, layout of the facility, etc. The specific requirements for each facility will be subject to final review during the design and engineering phase. Additional information, including the Company's Physical Security Strategy, is available upon request after execution of an NDA with the Company.

A. Proposer Responsibilities at Proposer Facility

The Proposer shall be responsible to incorporate security components and systems for **their facilities** that consider the Security Guidelines for the Electricity Sector (CIP-014-2): Physical Security, as published by the North American Electric Reliability Corporation (NERC) and that at a minimum, meet the requirements below.

For Company-owned facilities within the Proposer's Facility, Company requires:

1. Standard 8ft high security fence with 3-strand barbed wire V-top.
2. Interior mounted 4' high cattle fencing.
3. All gates will be secured using a proprietary padlock system.
4. Proposer-owned cabinets/enclosures housing Company equipment shall be secured with a lock provided by Company.
5. Company requires 24/7 access to Company facilities within the Proposer facility.

SECTION 3 – TYPICAL COMPANY DURATIONS FOR INTERCONNECTION PROJECTS

The tables below in Section 3 are to be used as a reference when developing an overall project schedule to assist Proposers in setting realistic durations and deadlines for critical milestones. These tables represent typical durations for the Company to complete the listed critical milestones that assist in moving the project through the IRS, Engineering, Procurement, and Construction phases. The durations below do not include time for Proposer to complete items they are responsible for. These high-level typical durations are for planning purposes only and is not intended to cover all project specific requirements. Specific project details can increase or

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

decrease these durations. The detailed project schedule will be determined after the IRS is completed.

Milestone	Company-Build Duration	Notes
IRS Phase		
Model Validation	2-3 months	May increase depending on # of iterations
System Impact Study (SIS)	150 calendar days	Following Model Acceptance
Engineering Phase		
30% Design & Review	40 business days	
60% Design & Review	50 business days	Following 30% Design acceptance.
90% Design & Review	50 business days	Following 60% Design acceptance
Issued for Construction (IFC) Design & Review	30 business days	Following 90% Design acceptance.
Procurement Phase		
Procurement	12-18 months	Procurement of materials typically happens at 60% design completion
Construction Phase		
Construction	10-12 months	Based on scope/complexity of work
Acceptance Testing	30 business days	Approximately 3 weeks after construction completion
CSAT	30 business days	To occur after commissioning of Proposer's Facility. Duration depends on Proposer's ability to meet the Performance Standards.
Notes		
For Company-Build projects, the Engineering Phase includes Company design & review of Company-Owned Interconnection Facilities (COIF) & reviews of Proposer-Owned Interconnection Facilities (SOIF) supporting/impacting COIF.		

DRAFT

Additional notes to be added to the North Kohala Microgrid BESS Project Single Line Diagram

PROPOSED PROJECT NAME:	North Kohala Microgrid BESS
PROPOSED PROJECT SIZE:	5 MW, 30 MWh BESS (Minimum)
CUSTOMER SLD REVISION NUMBER AND DATE:	
HELCO SLD REVISION NUMBER AND DATE:	Revision 0, 09-09-2021
HELCO SUBSTATION:	Hawi
HELCO 34kV CIRCUIT:	3300 Line
HELCO 34kV CIRCUIT BREAKER #:	TBD

Transmission Planning Notes

1. Customer to ensure manual closing of Project breaker XX-1[TBD] shall be allowed for the following conditions under coordination with the Company system operator:
 - a. Hot line (company-side) and hot bus (project-side) with supervised synchro-check for self-energization using grid forming capabilities
 - i. Voltages equal in magnitude and phase, and phase angle difference less than 20°
 - b. Dead-line (company-side) and hot bus (project-side) for black start capabilities
 - c. Hot line (company-side) and dead bus (project-side)
2. There shall be no auto-reclosing on Project breaker XX-1[TBD].

Protection Notes

3. The 34 kV bus at [Name TBD] shall have dual differential bus protection relays which will trip and block close HELCO breakers 52-1 and 52-2, and Project breaker XX-1 via manual lockout relays.
4. All 34 kV lines at [Name TBD] HELCO side shall have dual redundant, high-speed line protection relays with separate and diverse communication channels. The remote ends at the Maliu Ridge, Halaula, and Hawi substations shall have the same.
5. Breaker failure of HELCO 34 kV breaker 52-1 or 52-2 at [Name TBD] HELCO side shall trip and block close Project breaker XX-1[TBD] via separate dedicated lockout relay.
6. Breaker failure of HELCO 34 kV breaker 52-1 (or 52-2, whichever is connected to HRD and Waimea) at [TBD] HELCO side shall trip and block close the Waimea and HRD breakers via a separate dedicated lockout relay.
7. Breaker failure of Project breaker XX-1[TBD] shall trip developer-owned dedicated lockout relay which will trip dedicated lockout relay in HELCO side. Dedicated lockout relay in HELCO side will trip and block close HELCO 34 kV breakers 52-1 and 52-2.

DRAFT

Design Notes

8. All 34 kV CT's are to be xxxx/5 MRCT's with relaying accuracy class C400 unless noted otherwise. MRCT's are to have full distributed windings on all taps and a minimum thermal rating factor of 2.0.
9. HELCO to provide two bi-directional A and B meters that records both import and export power and revenue metering CTs and PTs.
10. The Project will submit design drawings to HELCO for review and comment.
11. The communications for the primary and secondary pilot protection relays and breaker failure communication for the Developer tie line must be on diverse communication routes.
12. For Telecom requirements (such as communications, etc.), refer to the Telecom SLD.
13. For the microgrid control system design and operation philosophy, refer to the Appendix O of the RFP.

System Operations Notes

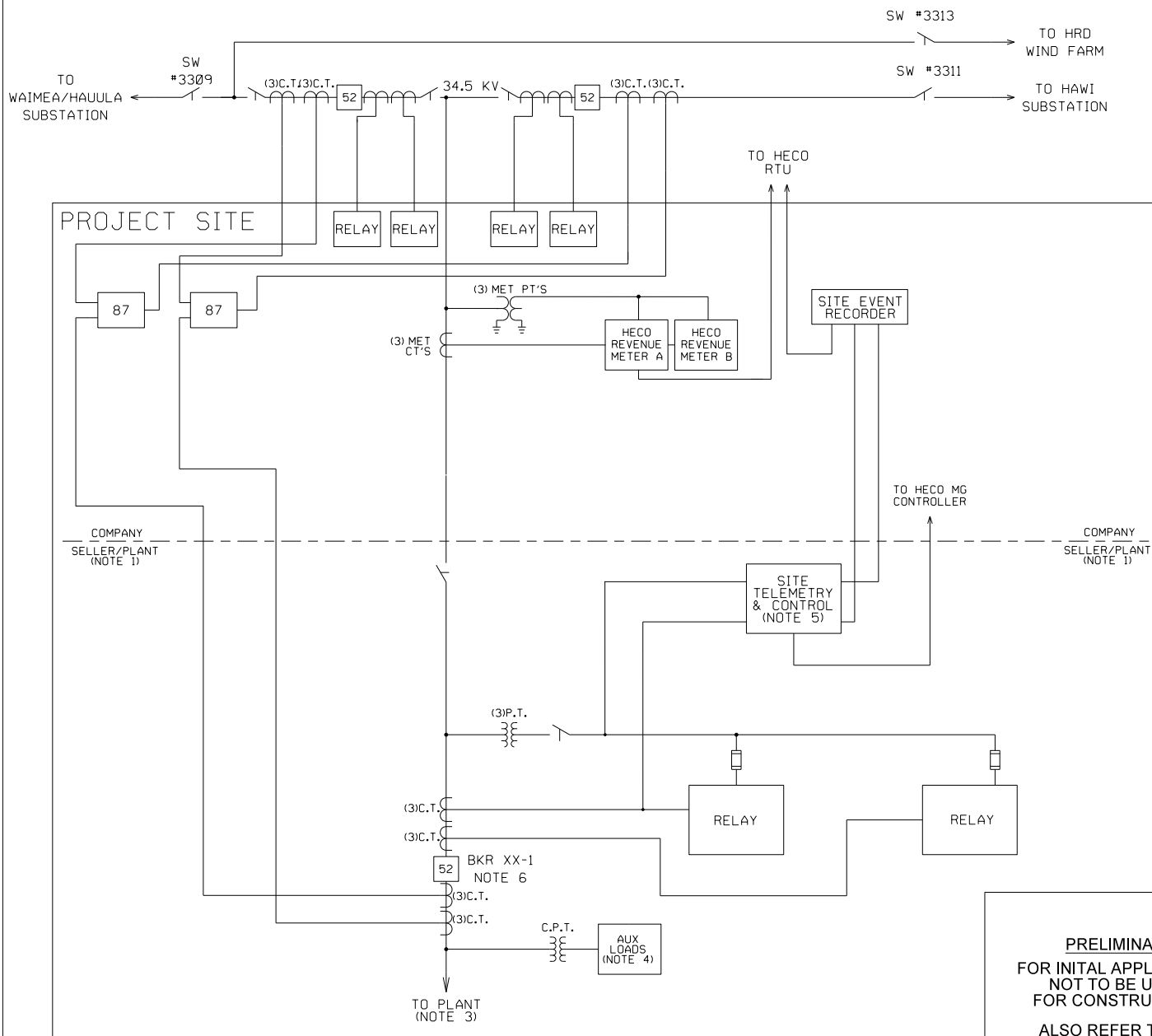
14. Upon simultaneous communication channels failure longer than 6 seconds for the following channels:
 - a. (only applicable if HELCO applies Line Diff Protection) Protection Channels X & Y (as applicable) HELCO-owned protection relay to initiate a "loss of protection communication" alarm to HELCO dispatch.
 - i. After 30 seconds of simultaneous failure the HELCO-owned relays are to provide signal to Project to initiate Project perform a controlled ramp of the plant output to 0 MW net. At zero (0) MW, Project to trip Project breaker XX-1[TBD]
 - b. Telemetry and Control Channels A & B HELCO-owned RTU to initiate a "loss of communication" alarm to HELCO dispatch.
15. The following Developer's inputs shall be provided and direct hard wired to HELCO's recorder:
 - a. Status of all Developer's 35kV breaker
 - b. Status of all lockouts for Developer's breaker
 - c. 34kV voltage (3-ph) at point of interconnection
 - d. 34kV current (3-ph) at point of interconnection
16. HELCO load dispatcher shall be enabled to issue the following to the Facility via SCADA interface:
 - a. Active power set point control signal (analog MW); and
 - b. Voltage (analog kV) set point control signal.
 - c. Frequency Response mode (droop, isochronous, disabled)
 - d. Grid Forming Control (enable/disable)

DRAFT

- e. Transition to islanding Mode (enable/ disable)
 - f. 34kV Project breaker (trip/close)
17. All control values must be retained in non-volatile memory such that will be restored immediately upon return from Plant Controller restart, power outage, loss of communication, etc.
18. The Project will provide the following signals for telemetering to the HELCO RTU:
- a. 34kV line amps (3 phase), watts, vars, and voltage (3 phase)
 - b. Status of the Project breaker XX-1[TBD]]
 - c. Status of all lockouts
 - d. Active Power Control Interface Status indicating Local vs. HELCO
 - e. Latest received active power set point
 - f. Automatic Voltage Regulator Status – Normal or Alarm (regulator On or Off)
 - g. Grid Forming Status (Enabled/Disabled)
 - h. Frequency Response mode (droop, isochronous, disabled)
 - i. Latest received voltage setpoint (kV)
 - j. Status for each inverter
 - k. MW output for each inverter
 - l. MW set point for each inverter
 - m. BESS State of Charge (%)
 - n. Available Maximum Ramp Rate (MW/min)
 - o. Power Production of Facility (MW)
 - p. Number of Inverters Available
 - q. Facility Inverter Availability (%)
 - r. Frequency Droop percent and deadband settings (% & Hz)
19. Each of the following initiates a separate alarm to HELCO load dispatcher:
- a. Protection and RTU Loss of Communication

DRAFT

HAWI MICROGRID BESS SITE



NOTES:

- 1. 24 HOUR ACCESS:
ALL HECO EQUIPMENT MUST BE READILY ACCESSIBLE AT ALL TIMES (24 HOURS/7 DAYS) BY HECO PERSONNEL FOR EMERGENCIES, METER READING, INSPECTION, TESTING, AND MAINTENANCE.
- 2. ONLY ONE (1) SET OF OVERHEAD CONDUCTORS IS REQUIRED TO CONNECT TO THE CUSTOMER BREAKER.
- 3. 34.5KV GROUND SOURCE MUST BE ADDED BY THE PLANT.
- 4. BACKUP AUX POWER SOURCE CAN BE PROVIDED BY COMPANY BUT WILL REQUIRE SEPARATE METERING.
- 5. CRITICAL TELEMTRY DEVICES REQUIRED TO ENSURE THE SAFE AND QUALITY DELIVERY OF ENERGY FROM THE BESS ARE TO BE DESIGNED WITH REDUNDANCY SUCH THAT A SINGLE FAILURE OF ANY DEVICE DOES NOT RESULT IN ANY HAZARD OR POWER QUALITY ISSUE.
- 6. SYNCH-CHECK CAPABILITY IS REQUIRED.

**PRELIMINARY
FOR INITIAL APPLICATION
NOT TO BE USED
FOR CONSTRUCTION
ALSO REFER TO SLD
DESIGN NOTES**

NO.	DATE	REVISIONS	BY	CHK'D	APP'D

**HAWI MICROGRID BESS SITE
INTERCONNECTION SINGLE LINE DIAGRAM**

DESIGNED	DRAWN	DATE 09-09-2021	SCALE NONE	
CHECKED	ELEC. MECH. STRUC.	ENGINEERING DEPARTMENT HAWAIIAN ELECTRIC CO., INC. HONOLULU, HAWAII		
APPROVAL	DRAWING NUMBER			REV 0