DISTRIBUTED ENERGY RESOURCES, DER

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DISTRIBUTED ENERGY RESOURCES, DER

This section describes the minimum requirements for installation of customer-owned storage (e.g., battery) and/or generation (e.g., rooftop solar) in GWP's service territory. This document, in conjunction with other Electrical Engineering Division specifications and construction standards, as well as applicable city, county, state and federal rules and regulations, combine to form the standard to which all new interconnecting facilities for customer generation, within the City of Glendale, shall conform. Standards, rules, and regulations of other agencies with jurisdiction in areas covered by these Electrical Services Requirements are not altered in any way by these standards and guidelines. Any and all questions regarding applicability of various rules and regulations shall always be resolved in favor of the more stringent requirements. Further, GWP may provide an interpretation of its requirements as necessary based on technical limitations or other factors; if provided, that interpretation shall govern. Included single-line diagrams are conceptual only; final diagrams will be approved by GWP. If any section, subsection, or requirement of this document is superseded by law applicable to GWP, the superseding law shall apply to the extent of the conflict but shall not affect any other section, subsection or requirement of this document that can be given effect without the superseded section, subsection or requirement.

Customers shall obtain any governmental authorizations and permits required for the construction and operation of Distributed Energy Resources facilities and shall maintain all facilities in a safe and prudent manner and in conformance with all applicable laws and regulations including, but not limited to, GWP's Distributed Energy Resources requirements. **See Interconnection Diagram drawings, DER-DWG-001, 002, -003, -004, -005, -006, and -007 within this section of the Requirements**.

Definitions

For purposes of these Electrical Services Requirements for Distributed Energy Resources, the following definitions shall apply:

- Distributed Energy Resources (DER): Source of power located close to the load it serves that may be connected to, and may operate in parallel with, the utility's distribution grid. Distributed Generation and Energy Storage Systems are DER.
- Distributed Generation (DG): A generating facility interconnected to the utility grid at the customer side of the utility's service meter. For example, photovoltaic and fuel cell facilities are DG systems.
- Energy Storage System (ESS): The set of methods and technologies used to store energy. A battery backup system is a form of ESS. ESS may be independent or interconnected to the utility grid.
- Distributed Generation + Storage (DG+S): A DG combined with an ESS. The ESS may or may not be interconnected to the utility grid.
- Critical Load: Customer-identified load to be energized by an ESS during a utility outage.

DER Metering & Process

DER installations shall follow the requirements outlined in this document. For commercial and multiple unit DER installations, consult GWP for additional requirements.

For information regarding the DER installation process and solar incentives, refer to the City of Glendale web site at: https://www.glendaleca.gov/government/departments/glendale-water-and-power/solar-education.

Physical Access

All customer equipment specified by GWP, including (but not limited to) disconnect switches, meters, protective equipment, fuses, and other associated equipment, shall be accessible to City personnel under all conditions and at all times. This may require equipment to be located in a publicly-accessible area or for City personnel to be provided access to a secure or controlled area. The City has the right of ingress and egress to examine this equipment, the generation site, the interconnection site, and applicable facilities for any purpose reasonably connected with these Requirements.

Signs and Labels

All signs and labels shall be installed per City of Glendale, Building & Safety requirements.

Maintenance

GWP shall be responsible for maintenance and repair of GWP-installed equipment. Customer shall be responsible for maintenance and repair of customer-installed equipment (including equipment installed by a third-party vendor).

Records

Customers shall maintain and provide to GWP, upon request, records of the customer's DER equipment. These records shall include, but are not limited to:

- Description of maintenance.
- Date and time of maintenance.
- Results, findings, and observations from the maintenance.
- Any repairs, modifications, adjustments, or replacement resulting from the maintenance.

Customers shall also allow GWP access, upon request, to system logs, records, files, data, and any other electronic or physical information related to the maintenance, operation, errors, failures, or events stemming from the generation, energy storage, or associated equipment and systems.

ENERGY STORAGE SYSTEMS (ESS) DER-101

ESS are typically used to provide emergency standby power to Critical Loads during an outage of GWP's utility system, to reduce the amount of energy consumed from the utility during periods of peak consumption, or in conjunction with on-site DG (e.g., rooftop solar, fuel cells).

General Requirements

Customer shall ensure that all ESS shall:

- Be tested onsite to confirm that the system, with the utility side de-energized, provide power only to the customer's Critical Load center and does not backfeed into the main service panel or into GWP's utility system. Prior to GWP approval of the permit application, customer shall provide GWP with equipment specifications describing the various modes of operation. Review of customer's specifications by GWP shall not be construed as confirming or endorsing the design, or as implying any warranty of safety or durability of the customer facility. GWP shall not, by reason of review or failure to review, be responsible for strength, details of design, adequacy, or capacity of the customer facility or said equipment, nor shall GWP's acceptance be deemed to be an endorsement of the customer facility.
- Not locate batteries in the meter room, per NEC requirements.

Independent Energy Storage Systems (IESS)

IESS are defined as stand-alone energy storage systems that do not nominally export energy to the utility grid and that are not combined with a distributed generation system. The primary purpose of the IESS is to energize Critical Loads during an outage of GWP's utility system.

In addition to the General Requirements above, which apply to all systems that incorporate an element of energy storage, customer shall ensure that the IESS shall:

- Be used only to serve Critical Loads on the customer's premises.
- Have safeguards to prevent energy export to GWP's utility system. These safeguards can include an automatic transfer switch (ATS), a manual transfer switch, or a double-throw safety switch listed by the Nationally-Recognized Testing Laboratory (NRTL) for this application. This switch shall be installed by the customer at customer expense and per GWP specifications.

Peak Demand-Shaving Systems

GWP does not currently offer a Peak Demand-Shaving Program but reserves the right to implement this functionality in the future. In addition to the General Requirements above, which apply to all systems that incorporate an element of energy storage, Energy Storage Peak Demand-Shaving Systems shall:

- Be used to monitor and control only the customer's peak energy usage.
- Not have customer-owned CTs (Current Transformers), monitoring devices, or wiring located in any GWP sealed equipment, boxes, vaults, or meters.
- Be utility-interactive and certified by a NRTL to fully comply with IEEE 1547 and either UL 1741 or UL 9540.
- Not allow for the export of energy to the GWP utility system.
- Provide a mechanism for GWP to control the output of the ESS at all times.

Distributed Generation + Storage (DG+S)

ESS typically store energy from GWP's utility system or a customer-owned source of generation (e.g., rooftop solar) to provide emergency power to Critical Loads during an outage on GWP's utility system. In addition to the General Requirements above, which apply to all systems that incorporate an element of energy storage, customer shall ensure that the DG+S shall:

- Comply with the IESS requirements detailed above.
- Not have customer-owned CTs (Current Transformers), monitoring devices, or wiring located in any GWP sealed equipment, boxes, vaults, or meters.
- Be utility-interactive and certified by a NRTL to fully comply with IEEE 1547 and either UL 1741 or UL 9540.
- Not allow for the export of energy to the GWP utility system unless the ESS is an "addition" or "enhancement" to an eligible renewable generation facility meeting the requirements set forth in the latest edition of the California Energy Commission Renewables Portfolio Standard Eligibility Guidebook.

Un-Metered

Solar systems 15kW or smaller installed on Single Family properties do not require a DG meter. A utility AC disconnect is required for all un-metered DG and DG+S systems. The disconnect must be installed within 10' and in line-of-sight from the electrical service meter and main. The disconnect installation shall comply with NEC. Refer to the single line drawings at the end of this DER policy for the approved wiring of the disconnect.

Exception: If a service panel on a Single Family property contains more than two meters, a Distributed Generation meter shall be installed per the "Metered" section of this policy.

Metered

All multi-residential, commercial and single family residences installing DG or DG+S systems greater than 15kW shall be metered by the utility. Duplexes containing more than 2 meters in the same panel shall be metered by the utility.

GWP shall procure and install all meters; as applicable. These meters shall be operated and maintained by GWP. All metered DER installations shall require:

1. One dedicated meter that measures and monitors net generation output ("Distributed Generation Meter"). No customer load shall be connected to the generating system side of the meter.
2. All Critical Loads shall be served by dedicated circuit(s). The Distributed Generation and/or Energy Storage System shall not back feed to the main service panel during a utility outage; the main service panel shall be separated from the Critical Loads by a transfer switch or relay.
3. In the event of an outage, continuous energy shall be provided, capable of providing continuous SCADA data to GWP and of providing remote SCADA control of devices by GWP for a period of 72 hours.

Operational customer-installed devices used to monitor system performance are permitted, subject to the following conditions:

1. Devices shall be collocated on the same side of the utility disconnect switch as its source of power to ensure these devices continue to receive power once the utility disconnect switch is opened.
2. Devices' power source wiring shall not bypass or defeat any utility disconnect switch.

3. Devices' power source and low-voltage data circuits shall not enter or pass through any utility-sealed section.
4. Total device load shall not exceed 100 watts.

Generation Equipment

Generation equipment shall be connected on the customer's electric system on the load-side of the revenue meter per GWP Requirement. Load- and line-side taps are not allowed. This equipment shall be connected on the load side of the customer's main disconnect. No circuit connections, conduits, or conductors are allowed in, or accessed through, any sealed utility compartment.

Exception: Where metering equipment has been specifically designed and pre-manufactured with a line side tap terminating in a section that is accessible to the customer, and has been labeled and certified by the manufacturer for the sole purpose of connecting parallel generating systems.

For synchronous generation, automatic synchronization is required.

Exception: Manual synchronization with relay supervision is acceptable. Generators designed to be started as induction motors will not be permitted to startup if it results in detrimental effects to the utility electric system.

Inverters

Customers shall ensure that installations that require inverters to connect to GWP's utility system shall comply with the following:

- Inverters shall be permanently utility-interactive, as defined by the National Electrical Code, at the point of interconnection to GWP's electric system. During utility outages, inverters may function in an "off-grid" mode to supply power to an outlet on the inverter unit that is accessible only to qualified personnel (per UL 1741), or to charge an Energy Storage System that feeds Critical Loads. In no instance shall the inverter unit's outlet be integrated with the customer's internal wiring system.
- Hybrid inverters, which are often used with DG+S systems to match consumption with generation, are permitted only if any additional "off-grid" outputs (i.e., outputs to backup loads) are never connected in parallel with GWP's utility system.

- Inverters shall be certified by a Nationally Recognized Testing Laboratory (NRTL) to fully comply with UL-1741 and shall include a Certificate of Compliance. The Certificate of Compliance should state that this utility-interactive inverter meets all applicable requirements of the current editions of UL 1741 and IEEE 1547, including testing conformance to IEEE 1547.1.
- DG inverters shall be included in the California Energy Commission (CEC) list of approved inverters, found at http://www.gosolarcalifornia.ca.gov/.
- Inverters shall have safeguards to prevent power flow into a de-energized GWP electric system ("backfeed"). Systems shall produce power output to the utility only when they are connected to an energized utility system. Inadvertent export is allowed for no more than 60 seconds.
- Inverters shall operate as a current source, rather than as a voltage source, so that open-circuited inverters output zero volts.
- Inverters' voltage output will be synchronized with GWP's utility system voltage to produce a current and power flow from the customer to the GWP utility system.

MAXIMUM DER RATINGS DER-103

Except where expressly prohibited by applicable law or as otherwise approved by the City Council, all DER installations shall be limited by the requirements below.

1. The maximum instantaneous generation capability shall be limited to:
    a. 10 kW (self-certification of system size required) (Applies to net energy metering (NEM) systems only)
    b. Larger than 10 kW and up to 1MW: the estimated production of the proposed DER system should not exceed 110% of the customer's kWh usage of the past twelve (12) months. The estimated production of the PV system is calculated by PowerClerk's internal calculator. (Applies to NEM systems only)
        Note: See the section below for determining anticipated annual load in case of newly established accounts and for EV charging allowances.
    c. Larger than 1MW: the estimated production of the proposed DER system should not exceed 110% of the customer's kWh usage of the past twelve (12) months. For PV, the estimated production of the PV system is calculated by PowerClerk's internal calculator. Note: proposed DER system to be discussed with GWP; >1M may not be permitted per system and/or metering requirements. (Applies to NEM systems only)
    d. Non-NEM DER: All non-NEM DER installations of any size must be approved at GWP's option, such as a Power Purchase Agreement (PPA), Independent Electrical Storage System (IESS) or other arrangement.

2. GWP enforces no maximum instantaneous energy storage discharge capability for IESS systems. The IESS shall not back feed into main service panel or utility system.

3. For DG+S systems sized 10 kW or less the maximum overall storage capability shall be limited to 30 kWh. Customers may install up to 30 kWh of storage regardless of DG system size. The Energy Storage System shall not back feed into main service panel or utility system.

4. For DG+S systems larger than 10 kW and less than 1 MW, the maximum overall storage capability shall be limited to 110% of the average daily usage based on 12 months of previous usage utilizing complete billing cycles or 30 kWh whichever is greater; customer seeking to exceed this limit due to planned electrification such as EV chargers, may present further evidence to GWP. This should allow for customers to meet their average load for 24 hours without utility service, for future electrification needs. The Energy Storage System shall not back feed into main service panel or utility system.

    For example, if the total annual usage is 10,000 kWh, then the maximum overall battery capability shall be 30.14 kWh ((10,000 kWh / 365) x *110%)*

5. For DG+S systems larger than 1MW, the maximum overall storage capability shall be discussed with GWP.

6. For DG+S systems 30 kW or greater, GWP does not allow for the export of energy from the DG+S system to GWP's utility system except for inadvertent export. For the purpose of this requirement, inadvertent export is defined as export lasting no more than 60 seconds and only occurs while the DG+S system transitions from utility power to ESS power.

How GWP estimates customer's anticipated annual load in case of newly established accounts (where there is no historic usage) and in case of equipment additions and expansions

- New or Expanded Facility: Applications with new or expanded sites with no electric bill history or where the existing electric bill does not reflect the customer's expected expanded consumption, the application must include a Load Calculation. For systems larger than 30 kW the Load Calculation must be prepared and stamped by a Licensed Electrical Engineer. Copies of building permits for the new construction or expansion will be required.

Allowance for EV charging

- Future energy consumption is considered for new EV with proof of purchase or registration. The average of 0.35 kWh/mile and the estimated annual mileage of 12,500 will be used to determine the additional kWh usage allowed per EV. Thus, 4,375 kWh per EV.

Average kWh/mile	Average Annual Mileage	Considered EV Usage
0.35	12,500	4,375

Source for average kWh/mile: Average Electric Car kWh Per Mile [Results From 231 EVs] (ecocostsavings.com)

Source for average annual mileage: Average Miles Driven Per Year: Why It Is Important - Kelley Blue Book (kbb.com)

SPECIFICATIONS DER-104

Customer DER systems and equipment shall comply with the following:

- Nominal system frequency shall be 60.0 Hz (cycles per second).
- Signal distortion shall be limited to 5% of the RMS value of the utility service voltage and 25% of the waveform.
- Power factor shall be limited as follows:
    - For systems rated less than 1.0 MW, the power factor shall not be less than 85% leading or lagging.
- Output voltage shall match the existing utility service voltage.

TESTING AND COMMISSIONING DER-105

Once customer installation of all equipment has been completed, customer shall test the completed system(s) while GWP personnel witness the tests to validate that the system(s) meet the City's specifications. If the system(s) do not meet the City's specifications, the customer shall disconnect the system(s) and make corrections to meet the City's specifications. Once the corrections have been made, customer shall test the completed system(s) while GWP personnel again witness the tests to validate that the system(s) meet the City's specifications. Customer shall be responsible for paying all GWP fees associated with witness testing. Each witness test shall incur a separate fee.

For customer-installed protective equipment (see DER-109, Protective Schemes), the customer shall have the equipment tested on a biannual basis by an electrical Professional Engineer, registered in the state of California, at customer expense. The customer shall arrange for contracts with, and payments to, the electrical Professional Engineer. Records of the completed tests shall be maintained by customer and provided to the City upon request.

GWP reserves the right to test the customer's equipment and systems before approving the connection to the utility system. GWP also reserves the right to monitor onsite operations of the equipment and systems at any time after the approval has been granted.

Once installed, meters will not be routinely tested. Any customer-requested testing shall be at customer expense. Refer to the GWP Fee Schedule for applicable fees.

Inspections

The requirements established in this document shall be met by the customer and verified by authorized City personnel. All approvals from the various permitting entities shall be secured prior to establishing the interconnection.

ENGINEERING STUDIES DER-106

For any proposed system capable of an instantaneous output of 10 kW or greater, GWP reserves the right to require an engineering study, at customer expense, to determine the impact of the proposed installation on GWP's utility system. Applicable fees for the engineering study shall be charged to the customer based upon the cost to the City and calculated per individual study needs. GWP shall conduct this study to determine the impacts of the proposed new installation and to identify required updates, changes, modifications, and enhancements to utility equipment to ensure the continued safe and reliable operation of the GWP utility system. At GWP's discretion, the study may include, but will not be limited to:

- Voltage and reliability impact to the surrounding customers and to the overall feeder on which the customer is located.
- Impacts to the power factor at various points near the customer.
- Analysis of transformer, fuse, and conductor sizing.
- Impacts to pole loading if additional equipment (e.g., capacitor banks) or larger conductors are deemed necessary.
- Analysis of existing and potential new conduits.
- Analysis of GWP protective relays for relay coordination.
- Analysis of harmonics introduced by, or exacerbated by, the new equipment.

Upon review by GWP engineering staff, if the study determines that updates, changes, modifications, or enhancements to GWP's utility system are necessary to accommodate the customer's proposal, GWP will develop a quote to complete the work. Upon mutual agreement, GWP shall complete the necessary changes, at customer expense, prior to GWP approval of the permits.

The requirements outlined below ensure the safety of customers, City employees, and equipment. In addition to complying with all local, state, and federal laws and regulations, in all cases, DER installations shall comply with the following:

1. Customers shall not:
    - Tamper with, bypass, or deactivate City equipment or protective schemes.
    - Modify any installations that have been approved and permitted by the City.
    - Activate, enable, engage, or otherwise modify any software, firmware, or other programs in a manner that would violate the requirements in this document, any other City policies, codes, and ordinances, or other applicable laws.
    - Reconnect any customer-owned equipment or energy source/sink to the utility after it has been manually or automatically disconnected by the utility.

2. Customers shall:
    - Notify the City of any software, firmware, or similar updates or modifications to any equipment, Programmable Logic Controller (PLC), or control system upgrades or updates.
    - Adhere to all City policies, codes, and ordinances, and other applicable laws, when operating any customer-owned equipment.

DISCONNECTION OF CUSTOMER EQUIPMENT DER-108

Utility-controlled circuit disconnect devices shall be specified by GWP and purchased and installed by customer at customer expense. Customer shall not bypass or override these disconnect devices.

The GWP-specified disconnect shall be pad lockable in the open position within 10' and in line-of-site of main service panel per NEC requirements. GWP prefers a safety switch with a visual air gap to provide visual confirmation of the circuit disconnect. All switches shall be under the sole control of the utility.

> *Exception: A viewing window is required for wall-mounted safety switches if the potential is greater than 600 V and where the maximum short-circuit delivery is greater than 22 kA.*

The line side of the disconnect switch (the fixed, non-moving portion of the switch) shall be connected to the utility system. The load side of the switch (the movable portion of the switch) shall be connected to the customer side consistent with National Electrical Code (NEC) 705.

- For synchronous generating systems: the customer shall install a parallel generator disconnect switch and a generator circuit disconnect switch.
- For induction and inverter-based generating systems: the customer shall install a generator circuit disconnect switch.
- For storage systems: the customer shall install an additional disconnect.

The City reserves the right to disconnect customer DER devices from the GWP utility system, including during (but not limited to) any of the following scenarios:

1. The customer's equipment is adversely impacting GWP's electric system, customer's utility power, or another customer's utility power.
2. Utility equipment, including meters or protective devices, has been bypassed or defeated.
3. The customer has not adhered to all of the requirements in this document, or the customer has violated applicable City policies, code, or ordinances.
4. During emergencies or non-standard operating situations, including during the loss of utility power.

The customer DER devices shall remain disconnected until the adverse scenario has been rectified, as verified by City personnel.

Under non-emergency conditions, GWP shall endeavor to provide written notice 48 hours in advance of scheduled disconnection of customer generation or storage.

PROTECTIVE SCHEMES DER-109

All DER equipment shall be installed with protective schemes to ensure the safe and reliable operation of the utility's electric system. GWP shall conduct an engineering analysis, at customer's expense, to determine the impact of the subject DER installation on GWP electric system. Based on this analysis, GWP shall specify, procure, and install the required protective equipment at customer expense.

The electrical rating (kW or kVA) of the generating equipment shall establish the protection equipment requirements, which shall comply with IEEE 1547, shall be tested by the customer (per IEEE 1547.1 prior to commissioning), and shall include (but will not be limited to):

- Under-voltage (27)
- Over-voltage (59)
- Under-frequency (81U)
- Over-frequency (81O)
- Tripping batteries
- Tripping circuit breakers
- Tripping battery chargers
- Over-current(50/51)
- Sync check (25)
- Ground Fault Protection

GWP shall conduct an engineering analysis to determine the impact of the DER systems on GWP electric system and establish a size range of systems that can be allowed for commercial installations. Based on this analysis, GWP shall procure, and install additional protective equipment, at customer expense, to include (but not limited to):

- Switchgear with vacuum interrupter
- All necessary remote control equipment
- Communication devices and equipment
- Protective devices, relays, CTs, and PTs
- Batteries to power equipment
- Battery charger

Induction generators may require capacitors to correct the power factor to operate within the limits established in this document. Protection schemes must be coordinated to ensure that the capacitors are always disconnected before the induction generator is disconnected.

Customer shall provide a single-phase, 120-volt, 20-amp power supply to the switchgear.

Synchronization of any generation shall be through a City-approved sync check relay.

Protective schemes shall disconnect customer equipment in all situations, including when utility power and storage power are unavailable. Customer shall purchase, install, and maintain a charger-assisted, uninterruptible power supply (UPS) that will provide power to protective equipment for 72 hours in the event of a loss of power. In the event of a loss of UPS power to the protective equipment, the protective equipment shall disconnect in the open (disconnected) state.

Protective equipment shall comply with the following:

- Under-voltage (device 27) – 92 V or lower, with a maximum time delay of 2.0 seconds
- Over-voltage (device 59) – 138 V or higher, with a maximum time delay of 2.0 seconds
- Under-frequency (device 81U) – 59.3 Hz or lower, with a maximum time delay of 2.5 seconds
- Over-frequency (device 81O) – 60.5 Hz or higher, with a maximum time delay of 2.5 seconds
- Over-current (device 50/51) – A short circuit analysis shall be conducted to determine appropriate settings

TELEMETRY DER-110

At GWP discretion, customer shall provide GWP the Electric Metering Devices that are capable of: (i) measuring back-feed kilowatts and generation kilowatts at revenue quality to provide telemetering to the ECC from the Project Substation, (ii) accurately metering back-feed load when generation output goes to zero, (iii) conforming to the DNP 3.0 protocol and meeting N-1 redundancy (which dictates that if any one meter fails, the Electric Metering Devices will allow the missing telemetry data to be alternately sourced or calculated), (iv) storing thirty (30) days' worth of meter data, (v) a live data metering connection through fiber or GWP approved wireless system, accessible using the Inter-Control Center Communications Protocol ("***ICCP***") (as defined by the International Electrotechnical Commission) or other GWP approved protocols to enable the exchange of real-time and historical power system monitoring and control data, including measured values and accounting data, and (vi) connecting to ECC metering interrogation program via primary and secondary communications. Examples of N-1 redundancy compliant architecture include placing backup meters at the same point of metering or installing one meter at each branch (*i.e.*, gross, aux and net) so the missing telemetry data may be calculated as a difference. Notwithstanding such required capabilities, Seller shall ensure that the Electric Metering Devices function in compliance with the guidebook promulgated by the CEC, as amended from time to time, or in compliance with other RPS Law, whichever is controlling.

GWP shall use the Distributed Generation Meter and/or Energy Storage Meter to provide continuous, real-time data to GWP's Dispatch control center located in the Howard substation and to GWP's backup control center at the Utility Operations Center (UOC). This data shall include, but may not be limited to:

- Statuses (e.g., circuit breaker open/closed, on/off, alarms)
- Watts (e.g., kW)
- VARs (e.g., kVAR)
- Power Factor (e.g., PF, leading, lagging)
- Volt-amps (e.g., kVA)
- Voltage (e.g., V)
- Current (e.g., A)
- Watt-hours (e.g., kWh)

GWP shall specify, and customer shall purchase and maintain at customer's expense, equipment for relay protection, real-time metering, monitoring, control, and SCADA at the DG and/or ESS equipment location. GWP shall have the ability to control all equipment – including, but not limited to:

- Enabling/disabling generation functionality and status
- Enabling/disabling energy storage functionality and status
- Enabling/disabling inverter status
- Adjusting and controlling inverter output phase angl

DISTRIBUTED ENERGY RESOURCES, DER

DERS DIAGRAMS

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DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
10/04/2022	3	DERS SELF SPOTTING NO LONGER RELEVANT	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE WATER & POWER

REV. NO. 2
DATE 10/17/18
DRAWN BY: CC
APPROVED: DH

OBSOLETE – DISTRIBUTED ENERGY RESOURCES SPECIFICATIONS (DERS) – RESIDENTIAL

DER-DWG-001
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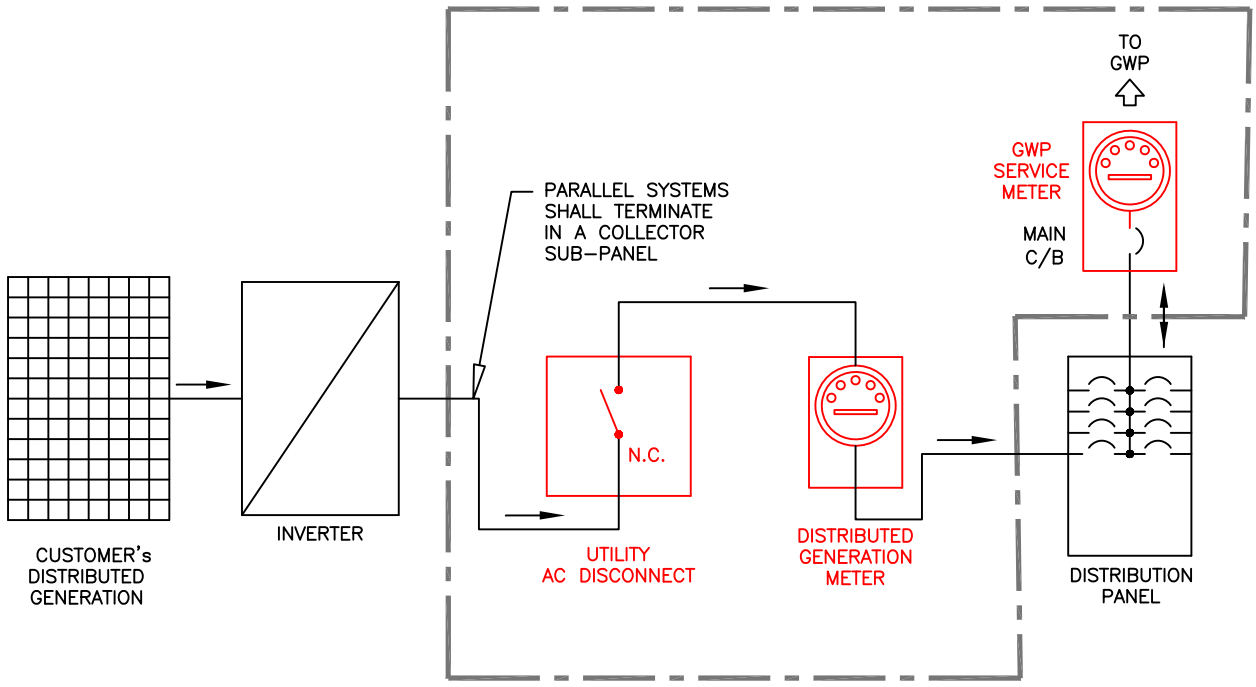
SERVICE PLANNING

SINGLE FAMILY RESIDENCE GREATER THAN 15kW, COMMERCIAL OR MULTI–RESIDENTIAL



NOTE: A DISTRIBUTED GENERATION METER IS REQUIRED FOR.

- SYSTEMS LARGER THAN 15kW ON SINGLE FAMILY RESIDENCES.
- COMMERCIAL PROPERTIES.
- MULTI–RESIDENTIAL PROPERTIES.

UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE–OF–SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/10/2023	11	REVISED NOTE FOR AC DISCONNECT	JP	CB	CB

CITY OF GLENDALE *WATER & POWER*

CITY OF GLENDALE *WATER AND POWER*

REV. NO. 10
DATE 10/18/18
DRAWN BY: VMP
APPROVED: DH

DISTRIBUTED GENERATION METERED INTERCONNECTION DIAGRAM

DER–DWG–002
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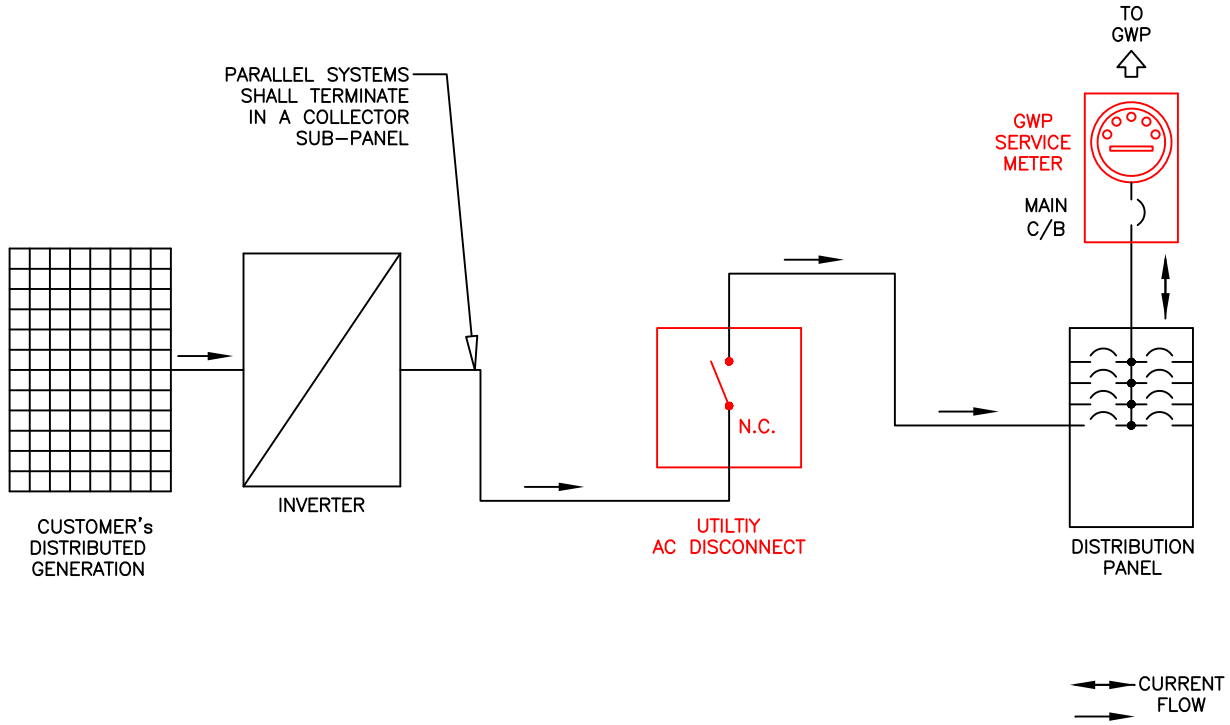
CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE 15kW OR LESS



UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE–OF–SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY.

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/10/2023	11	REVISED NOTE FOR AC DISCONNECT	JP		

CITY OF GLENDALE *WATER & POWER*

CITY OF GLENDALE *WATER AND POWER*

REV. NO. 10
DATE 10/18/18
DRAWN BY: VMP
APPROVED: DH

DISTRIBUTED GENERATION
UN–METERED INTERCONNECTION DIAGRAM

DER–DWG–003
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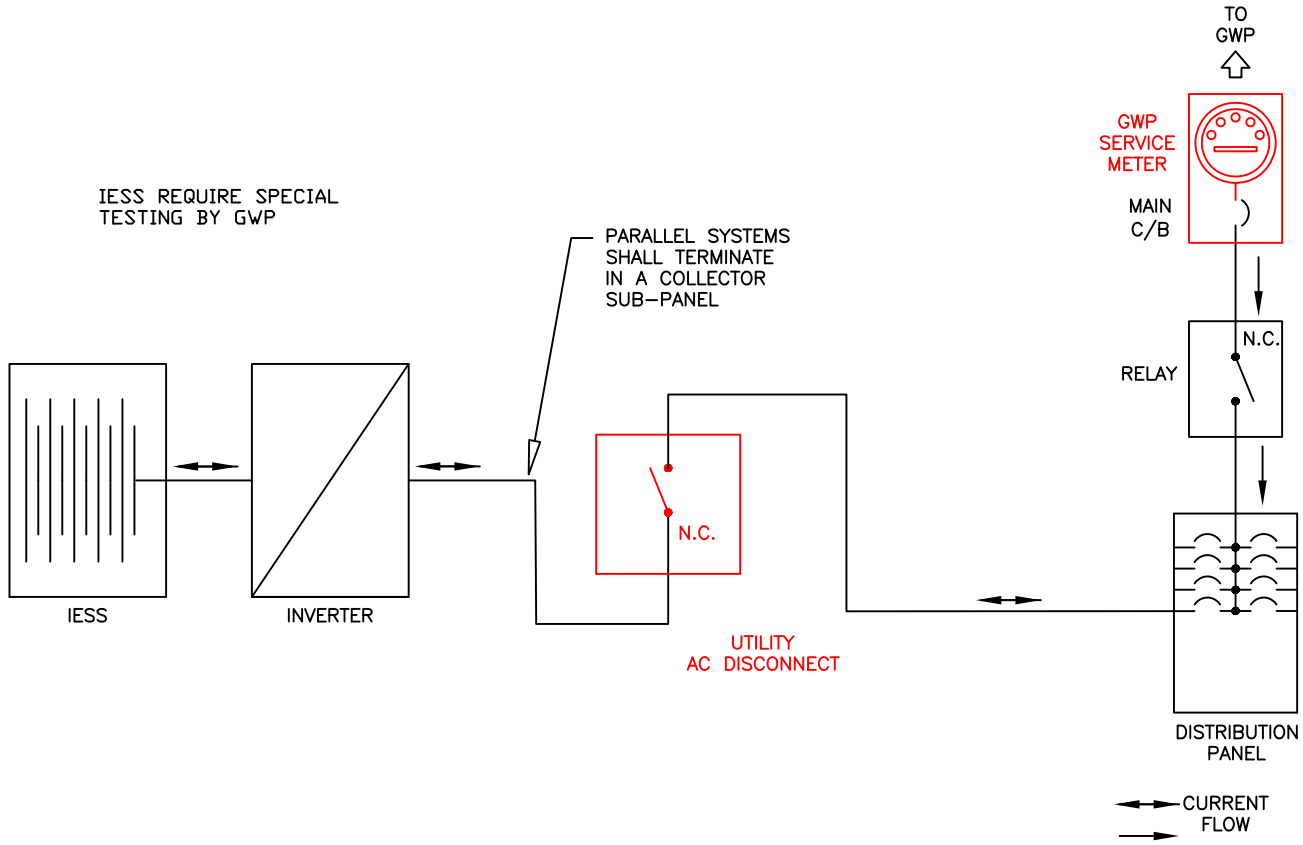
CUSTOMER SERVICE ENGINEERING

INDEPENDENT BACK–UP ENERGY STORAGE WITHOUT DG



NOTE:

THE INDEPENDENT ENERGY STORAGE SYSTEM SHALL NOT BACK FEED INTO THE MAIN SERVICE PANEL OR INTO GWP'S UTILITY SYSTEM.

UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE–OF–SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY.

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/10/2023	4	REVISED NOTE FOR AC DISCONNECT	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

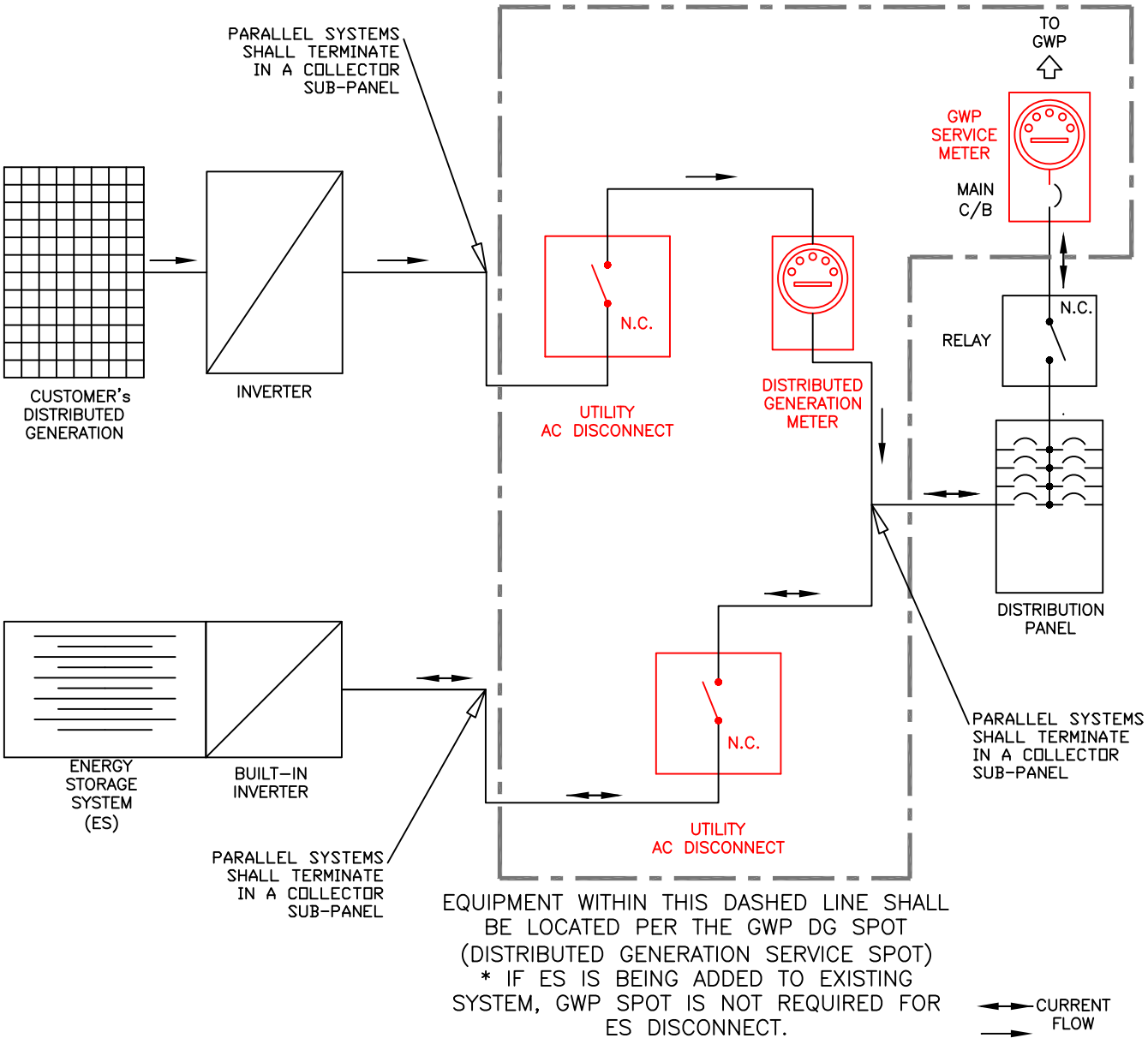
REV. NO. 2
DATE 10/18/18
DRAWN BY: VMP
APPROVED: DH

INDEPENDENT ENERGY STORAGE SYSTEM (IESS) INTERCONNECTION DIAGRAM

DER–DWG–004
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE GREATER THAN 15kW, COMMERCIAL OR MULTI–RESIDENTIAL



NOTE: A DISTRIBUTED GENERATION METER IS REQUIRED FOR.

- SYSTEMS LARGER THAN 15kW ON SINGLE FAMILY RESIDENCES.
- COMMERCIAL PROPERTIES.
- MULTI–RESIDENTIAL PROPERTIES.

UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE–OF–SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
10/04/2022	5	REVISED NOTE FOR DISCONNECT. REMOVED ES METER. REVISED NOTE FOR DG SPOT	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

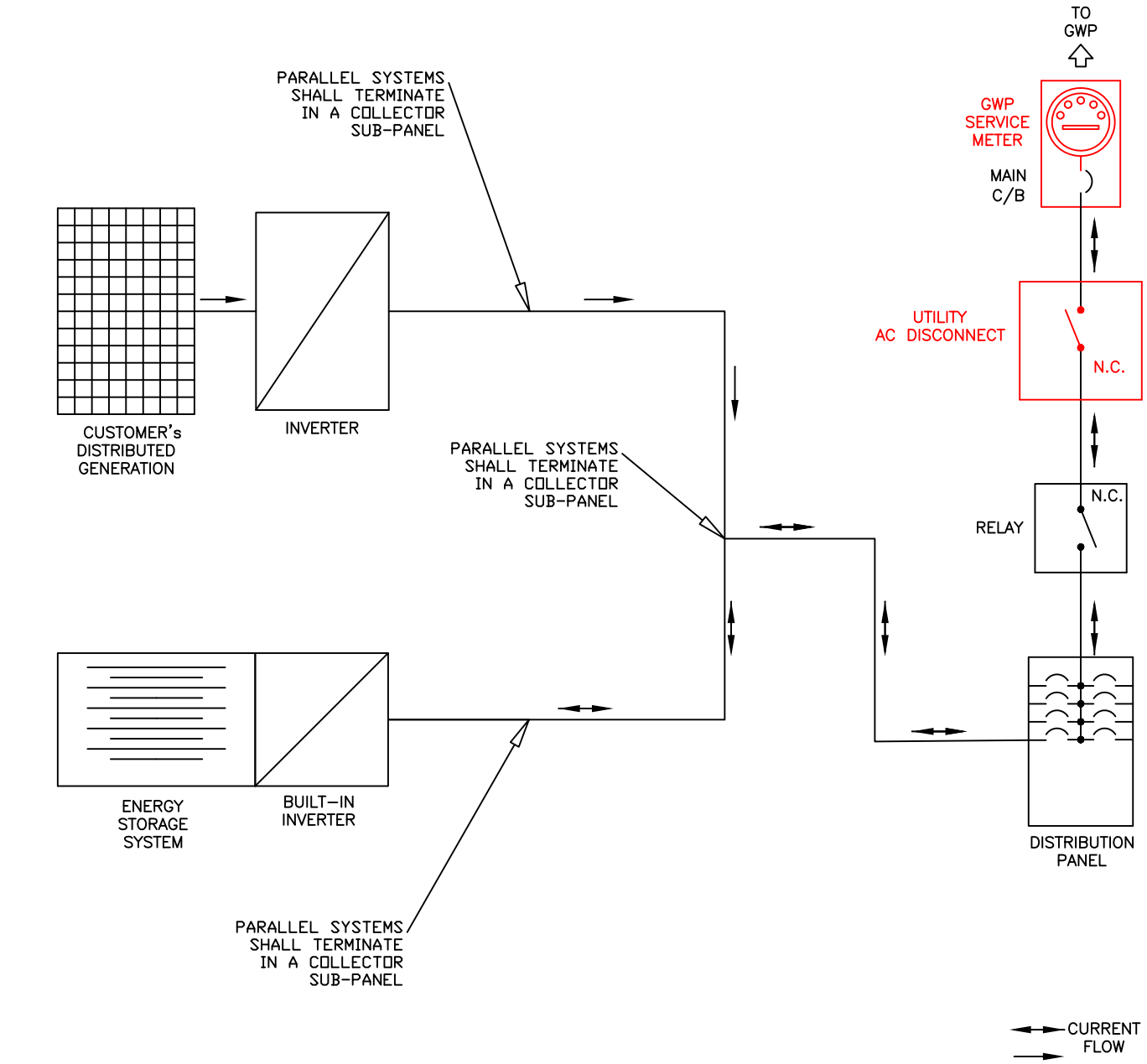
REV. NO. 4
DATE 10/18/18
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
FULL HOUSE BACKUP (1)
METERED INTERCONNECTION DIAGRAM

DER–DWG–005
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE 15kW OR LESS



UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE-OF-SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY.

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/10/2023	5	REVISED NOTE FOR DISCONNECT	JP		

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

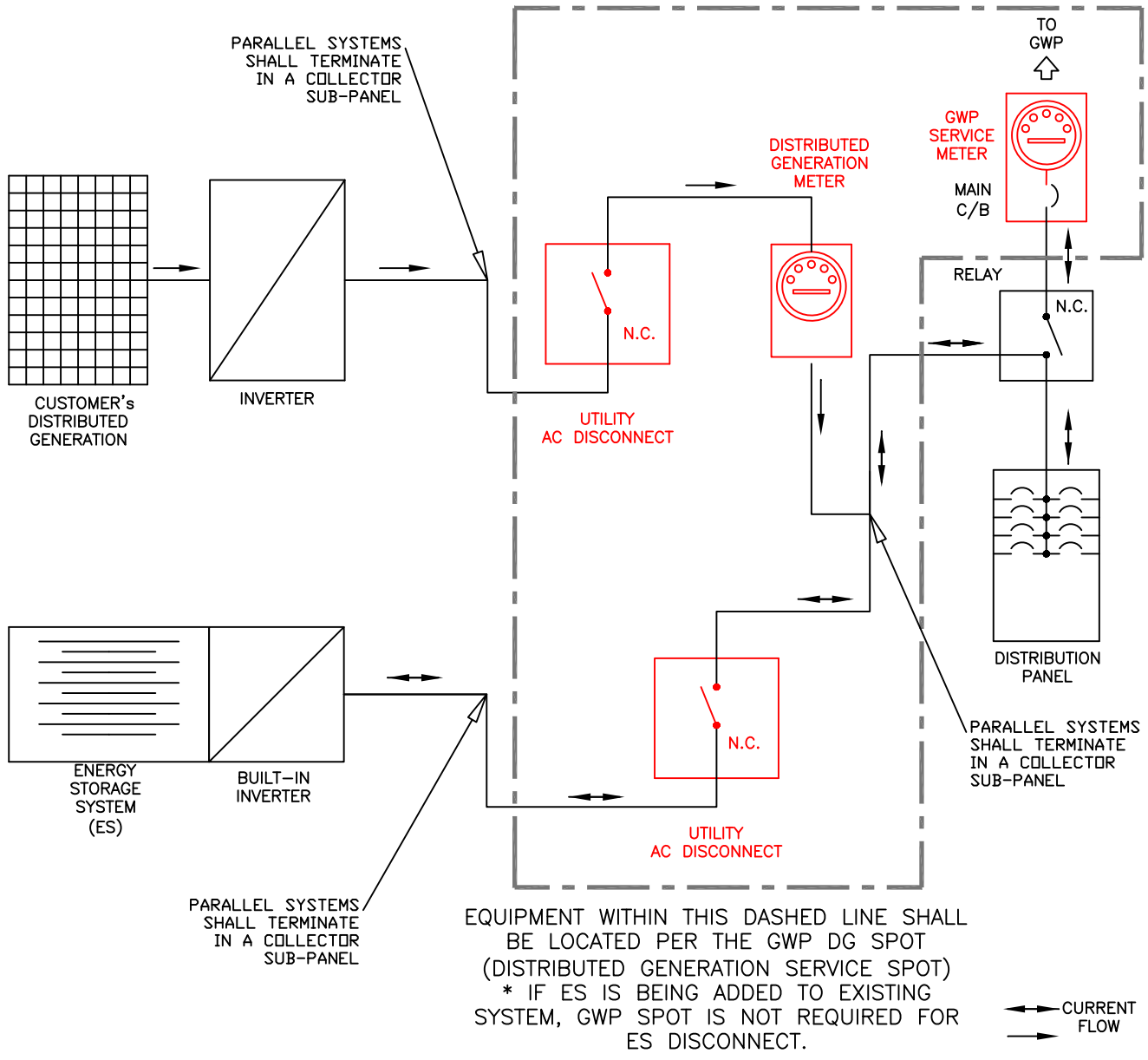
REV. NO. 4
DATE 10/18/18
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
FULL HOUSE BACKUP (1)
UN-METERED INTERCONNECTION DIAGRAM

DER-DWG-006
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE GREATER THAN 15kW, COMMERCIAL OR MULTI-RESIDENTIAL



NOTE: A DISTRIBUTED GENERATION METER IS REQUIRED FOR.

- SYSTEMS LARGER THAN 15kW ON SINGLE FAMILY RESIDENCES.
- COMMERCIAL PROPERTIES.
- MULTI-RESIDENTIAL PROPERTIES.

UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE-OF-SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/11/2023	5	REVISED NOTE FOR DISCONNECT. REMOVED ES METER. REVISED NOTE FOR DG SPOT	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

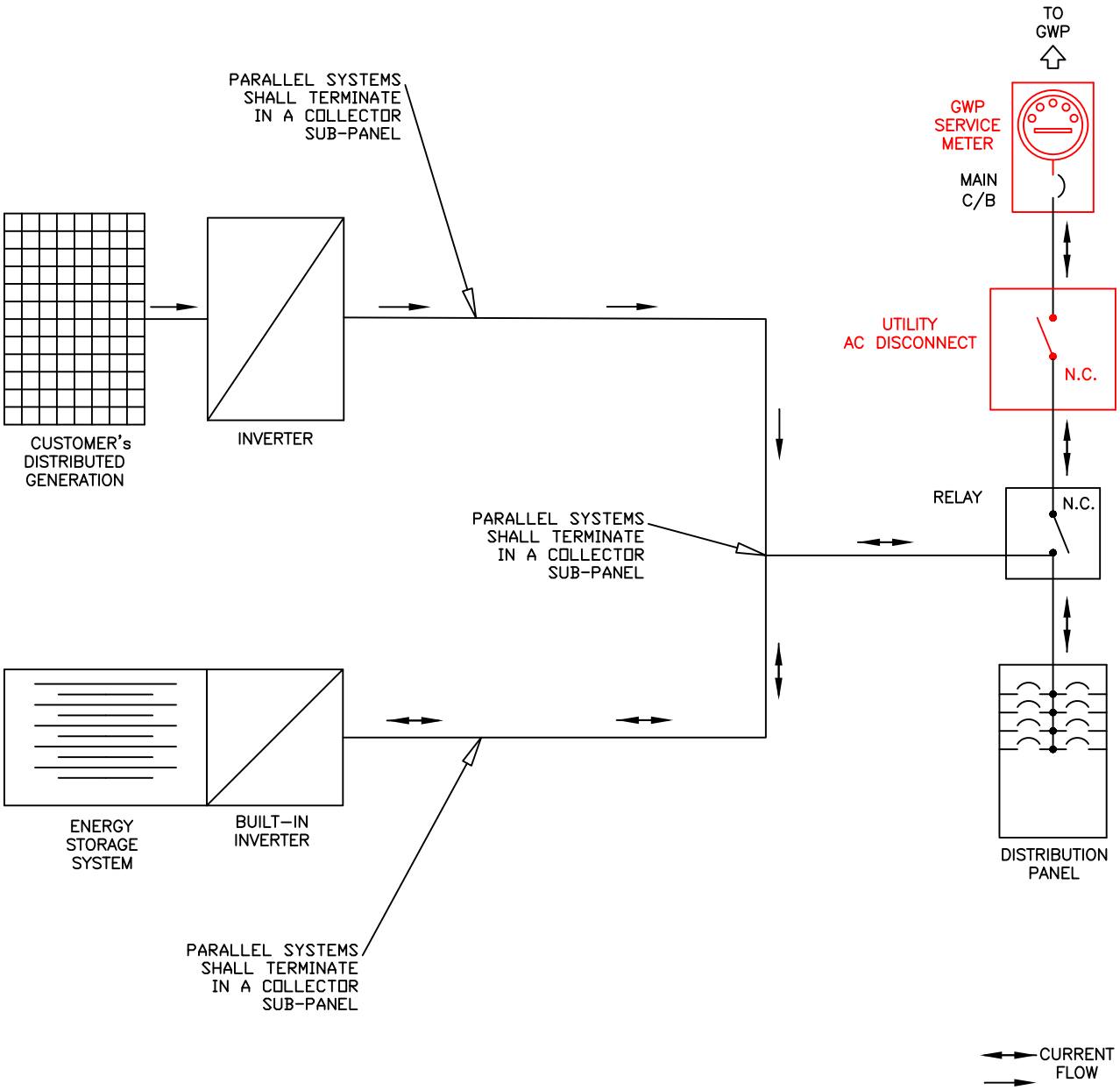
REV. NO. 3
DATE 10/18/18
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
FULL HOUSE BACKUP (2)
METERED INTERCONNECTION DIAGRAM

DER-DWG-007
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE 15kW OR LESS



UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE-OF-SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY.

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/10/2023	6	REVISED DISCONNECT NOTE	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

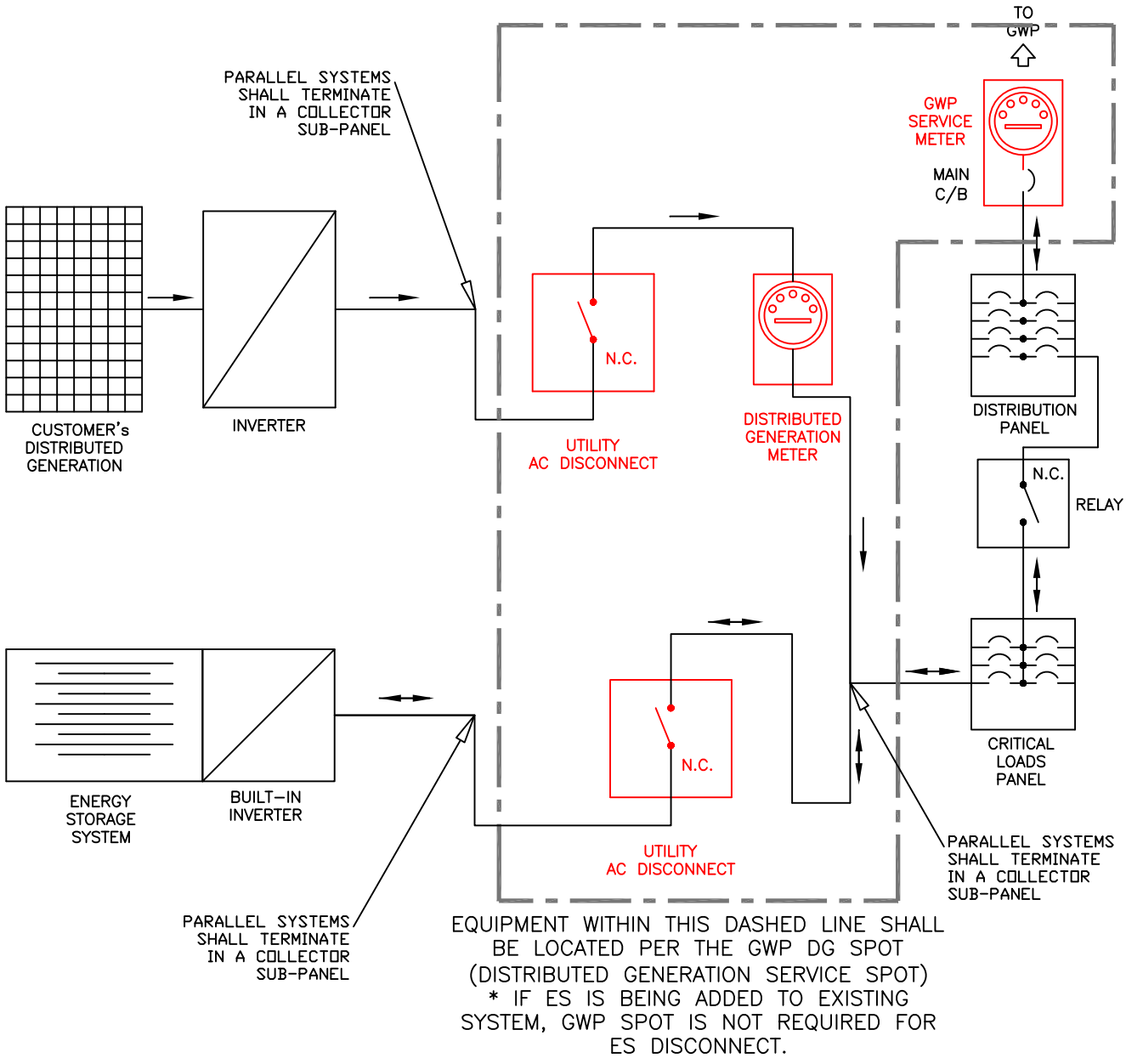
REV. NO. 4
DATE 10/18/18
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
FULL HOUSE BACKUP (2)
UN-METERED INTERCONNECTION DIAGRAM

DER-DWG-008
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE GREATER THAN 15kW, COMMERCIAL OR MULTI–RESIDENTIAL



CURRENT FLOW

NOTE: A DISTRIBUTED GENERATION METER IS REQUIRED FOR.

- SYSTEMS LARGER THAN 15kW ON SINGLE FAMILY RESIDENCES.
- COMMERCIAL PROPERTIES.
- MULTI–RESIDENTIAL PROPERTIES.

UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE–OF–SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/11/2023	5	REVISED NOTE FOR DISCONNECT. REMOVED ES METER. REVISED NOTE FOR DG SPOT	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

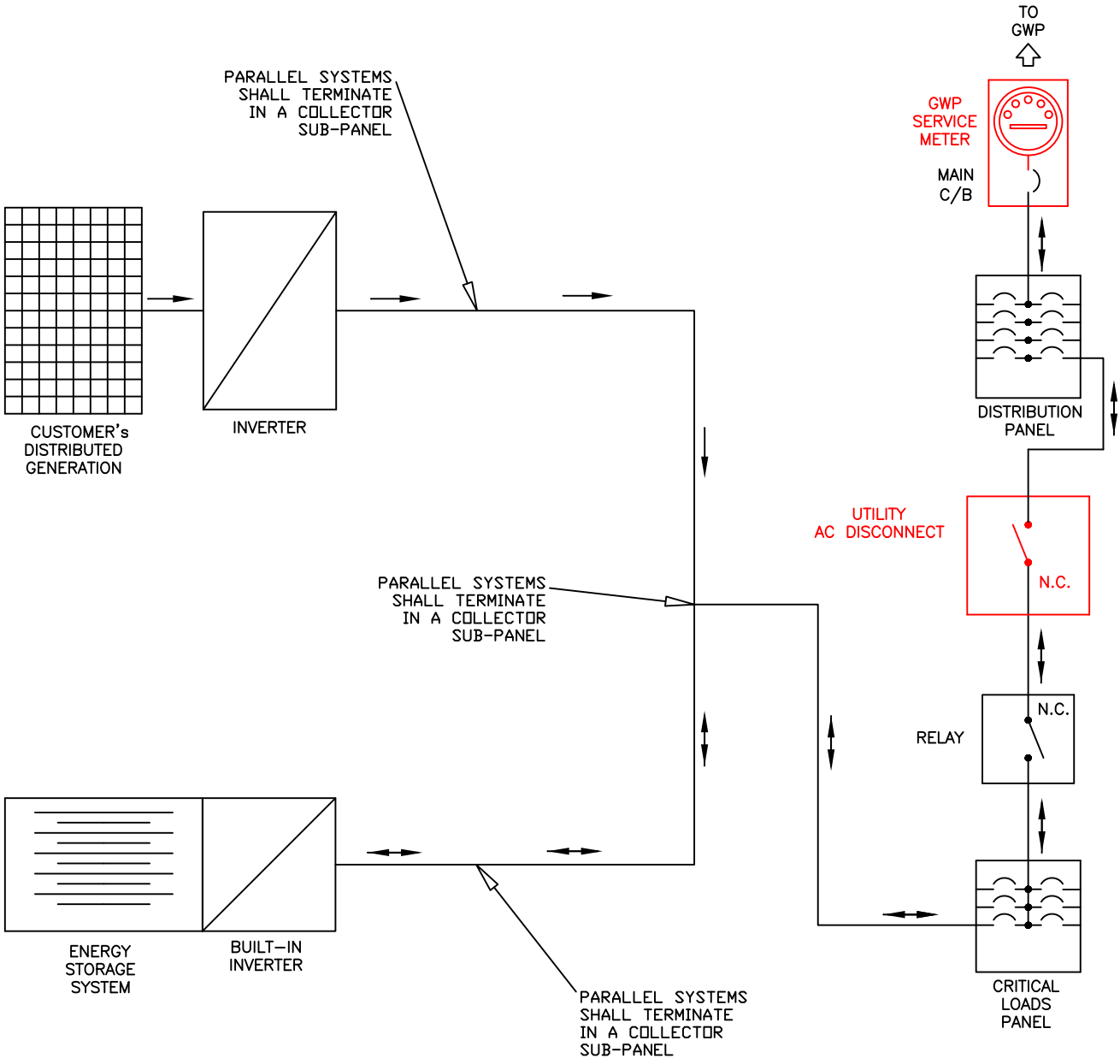
REV. NO. 2
DATE 10/18/18
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
PARTIAL HOUSE BACKUP (1)
METERED INTERCONNECTION DIAGRAM

DER–DWG–009
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE 15kW OR LESS



UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE-OF-SITE FROM MAIN SERVICE PANEL PER N.E.C.

CURRENT FLOW

UNDER THE JURISDICTION OF THE UTILITY.

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/10/2023	5	REVISED DISCONNECT NOTE	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

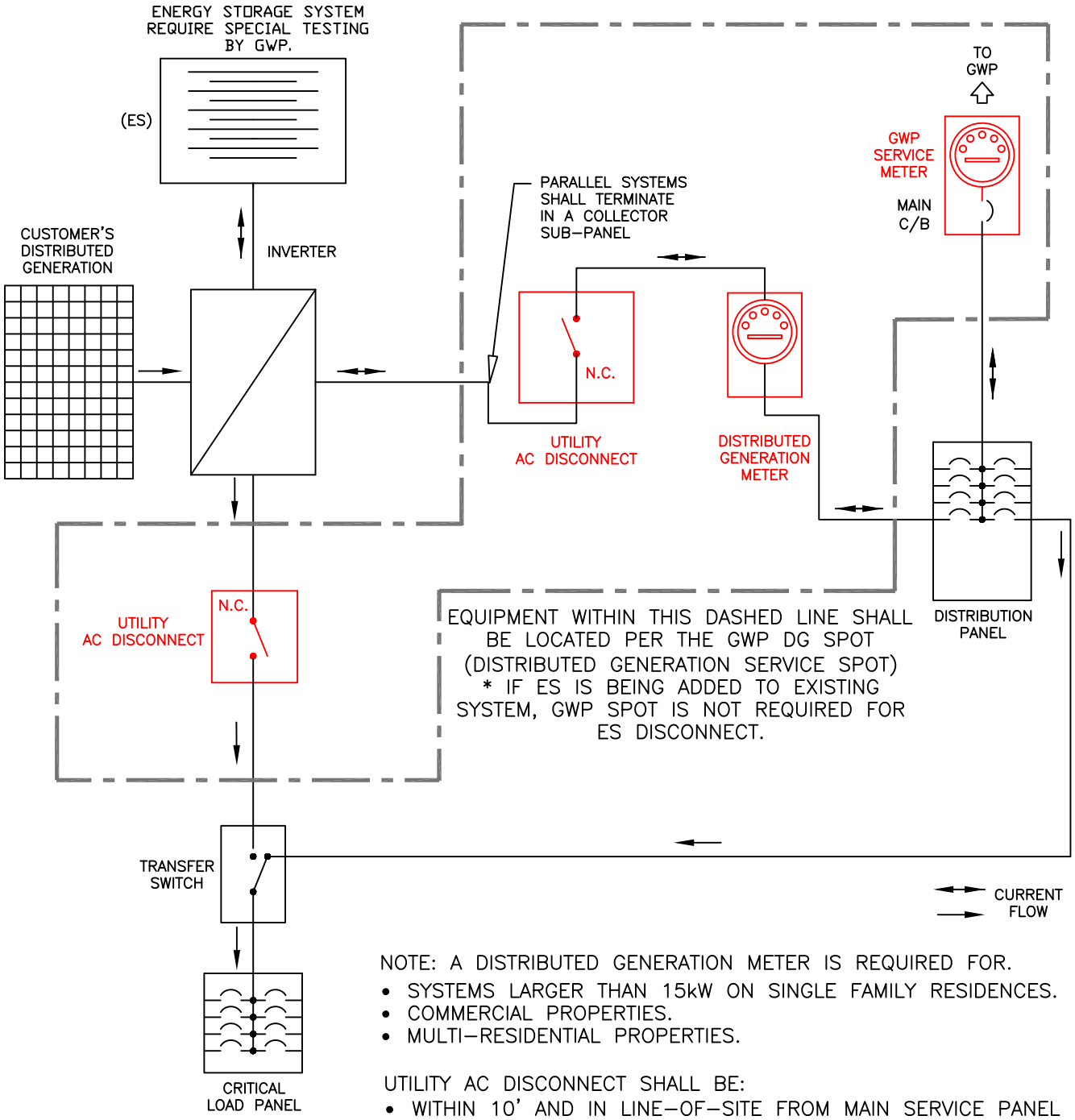
REV. NO. 2
DATE 10/18/18
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
PARTIAL HOUSE BACKUP (1)
UN-METERED INTERCONNECTION DIAGRAM

DER-DWG-010
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE GREATER THAN 15kW, COMMERCIAL OR MULTI–RESIDENTIAL



NOTE: A DISTRIBUTED GENERATION METER IS REQUIRED FOR.

- SYSTEMS LARGER THAN 15kW ON SINGLE FAMILY RESIDENCES.
- COMMERCIAL PROPERTIES.
- MULTI–RESIDENTIAL PROPERTIES.

UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE–OF–SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/11/2023	5	REVISED NOTE FOR DISCONNECT. REMOVED ES METER. REVISED NOTE FOR DG SPOT.	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

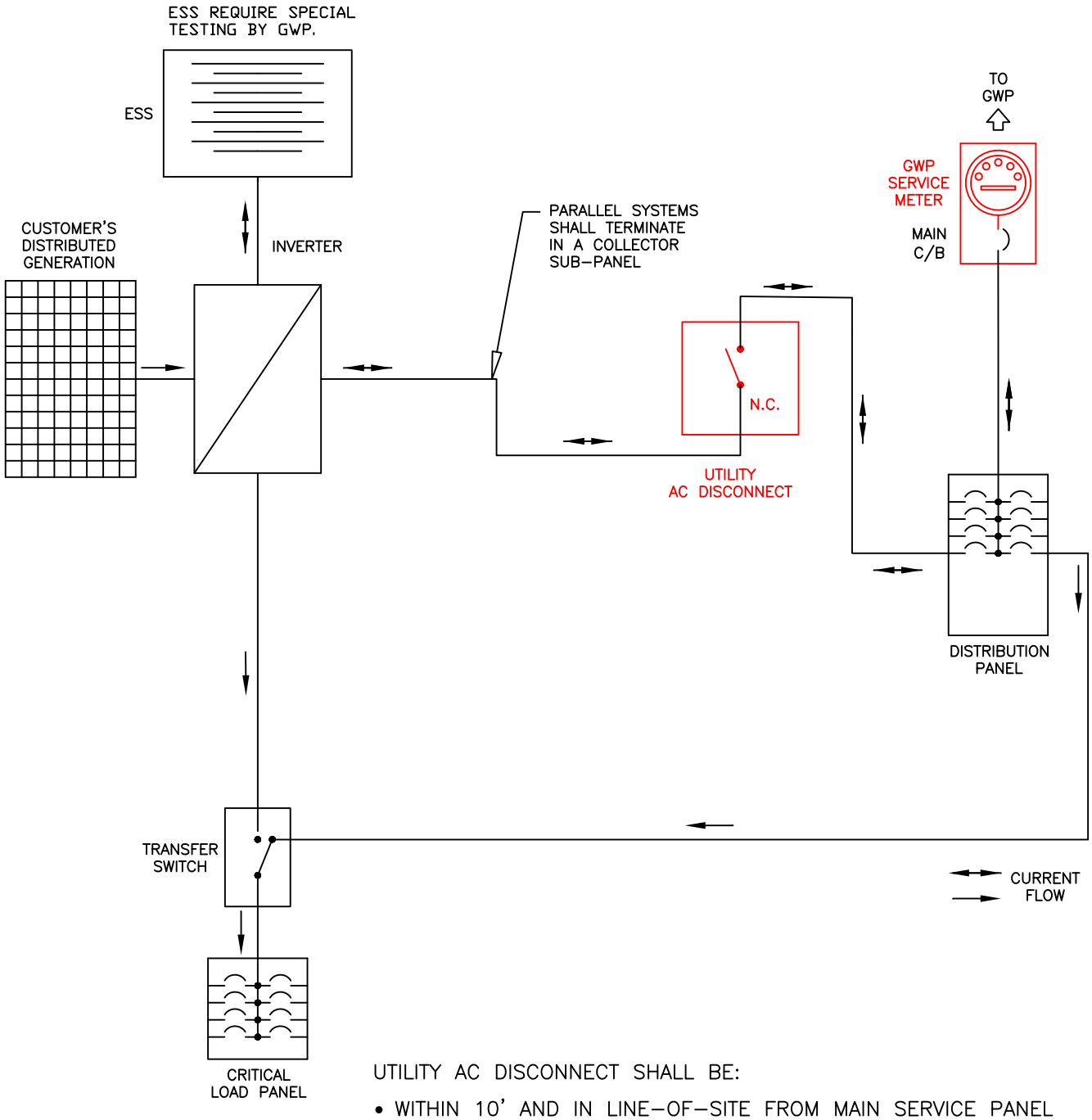
REV. NO. 3
DATE 12/31/2018
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
PARTIAL HOUSE BACKUP (2)
METERED INTERCONNECTION DIAGRAM

DER–DWG–011
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

SINGLE FAMILY RESIDENCE 15kW OR LESS



UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE-OF-SITE FROM MAIN SERVICE PANEL PER N.E.C.

—— UNDER THE JURISDICTION OF THE UTILITY

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/10/2023	5	REVISED DISCONNECT NOTE	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

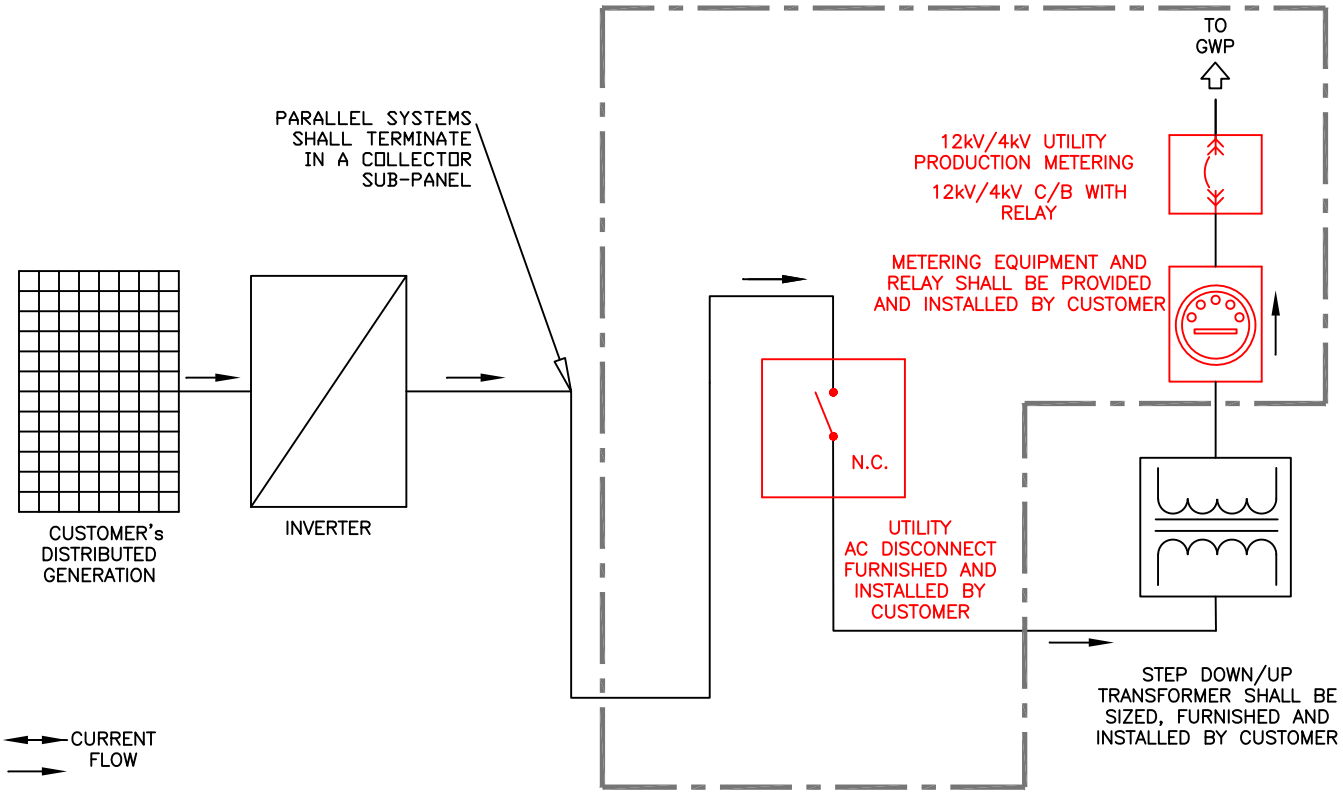
REV. NO. 3
DATE 12/31/2018
DRAWN BY: DT
APPROVED: DH

DISTRIBUTED GENERATION + STORAGE (DG+S)
PARTIAL HOUSE BACKUP (2)
UN-METERED INTERCONNECTION DIAGRAM

DER-DWG-012
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING

INDEPENDENT GENERATION CONNECTED TO GRID



EQUIPMENT WITHIN THIS DASHED LINE SHALL BE LOCATED PER THE GWP DG SPOT. ALL DG EQUIPMENT SHALL BE LOCATED ON CUSTOMER PREMISES.

NOTE:

- ALL MAJOR ELECTRIC SYSTEM COMPONENTS, INCLUDING PV MODULES AND INVERTERS, MUST BE INCLUDED ON THE CEC'S ELIGIBLE EQUIPMENT LISTS, MEET UL 1741, IEEE 1547, AND IEEE 1547.1.6
- PROJECTS SHALL PROVIDE PROPER PROTECTION AS PER IEEE.
- POWER PRODUCTION METERING REQUIREMENTS ARE SUBJECT TO THE CITY'S APPROVAL.
- PROJECT SHALL FURNISH AND INSTALL ALL METERING AND PROTECTION EQUIPMENT, TRANSFORMERS AND DISCONNECTS. CONSULT WITH GWP ELECTRICAL ENGINEERING AT (818)548–3921 FOR TYPE OF EQUIPMENT REQUIRED.
- THE PROJECT SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL THEIR EQUIPMENT AGAINST FAULTS OR OTHER SYSTEM DISTURBANCES.
- SINGLE LINE DIAGRAM IS CONCEPTUAL ONLY; FINAL DIAGRAM SHALL BE APPROVED BY GWP.

UTILITY AC DISCONNECT SHALL BE:

- WITHIN 10' AND IN LINE–OF–SITE FROM DG SERVICE PANEL PER N.E.C.
- CONTAIN A VIEWABLE WINDOW

—— UNDER THE JURISDICTION OF THE UTILITY

These requirements are not intended to be comprehensive. Refer to GWP Electrical Service Requirements for complete requirements.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
07/24/2023		NEW DRAWING	JP	CB	CB

CITY OF GLENDALE WATER & POWER

CITY OF GLENDALE *WATER AND POWER*

REV. NO.
DATE 07/24/2023
DRAWN BY: JP
APPROVED: CB

DISTRIBUTED GENERATION TO UTILITY DIRECT NO CONSUMER LOADS METERED INTERCONNECTION DIAGRAM

DER–DWG–013
PAGE 1 of 1

CUSTOMER SERVICE ENGINEERING