Basic Micro Embedded Generation Network Access Standard

UE-ST-2008.1

Disclaimer

The master document is controlled electronically.
Ensure latest version prior to use.

Based on document template: UE-TP-5140 Standard Revision 190826.
Document controlled in accordance with UE-ST-1750 INMS Document Management Standard.

Document Control

Reviewer	Title	Signature
Darshana Paranagama	Principal Engineer Complex Customer Connections	Darshana Paranagama Darshana Paranagama (Dec 18, 2019)
Robert Simpkin	Secondary Assets Manager	Robert Simpkin Robert Simpkin (Dec 19, 2019)
Roshanth Sivanathan	Principal Engineer Network Planning	Rosh Sivanathan Rosh Sivanathan (Dec 20, 2019)

Approver	Title	Signature
Rodney Bray	Network Planning and Strategy Manager	Rodney Bray Rodney Bray (Dec 20, 2019)
Craig Savage	General Manager Asset Management	Craig Savage Craig Savage (Dec 20, 2019)

Version	Amendment Overview	Author
1	Supersedes UE-ST-2008 Incorporates ENA National DER Grid Connection Guidelines – Technical Guidelines for Basic Micro EG Connections	Sarah Lim Technical Consultant Sarah Lim Sarah Lim (Dec 18, 2019) Kaisui Tnay Engineer Complex Customer Connections Kaisui Tnay Kaisui Tnay (Dec 18, 2019)

Table of Contents

Table of Figures

List of Tables

1. Introduction

This document provides the technical requirements for the equipment and installation of basic micro embedded generation (EG) connections to United Energy's (UE) distribution network. This document has been prepared based on present network conditions and will be updated on a regular basis to reflect network changes. This document complies with the ENA National Distributed Energy Resources (DER) Connection Guidelines for Basic Micro EG Connections, with the exception of UE specific requirement deviations presented in Appendix A: Deviations from the National DER Connection Guidelines.

This document shall be read in conjunction with UE-PR-2008 EG Customer Connection Procedure. UE-PR-2008 details the EG connection services offered and the application process.

1.1 Purpose of document

The purpose of this document is to provide proponents of basic micro EG connections information about their obligations for connection to and interfacing with the UE distribution network.

A basic micro EG connection type is defined in Table 1; provided:

a. it is intended to be connected to and capable of operating in parallel with any part of the LV distribution network and includes small HV EG connections

b. it is not shared by more than one National Meter Identifier (NMI)

c. it meets all other technical requirements set out in this document

d. a Certificate of Electrical Safety (CES) is issued for the installation and provided to UE

e. it consists of only an Inverter Energy System (IES)

Figure 1 illustrates the requirements set out in Table 1 with a typical basic micro EG arrangement.

Any connection that does not comply with the above will need to go through the negotiated connection process. Please refer to UE-PR-2008 to determine the relevant connection process.

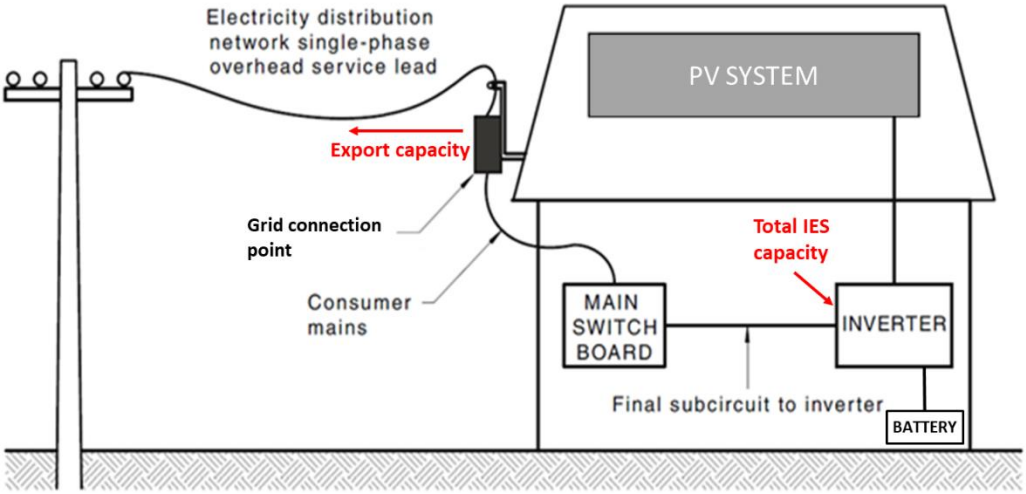

Figure 1: Typical basic micro EG arrangement

Table 1: Basic Micro EG capacity

	Rural Single Wire Earth Return (SWER) Supplied Connections (see note 3)	Single Phase Connection	Two Phase Connection	Three Phase Connection
Maximum Total IES Capacity of all systems at grid connection point (based on continuous inverter rating)	Up to the maximum rating of the main circuit breaker and total capacity of ≤ 30kVA	Up to the maximum rating of the main circuit breaker and total capacity ≤ 30kVA	Up to the maximum rating of the main circuit breaker and total capacity ≤ 30kVA	10kVA per phase
Maximum Export Capacity of Micro EG System **Per Phase** Refer to Section 4.3.1	5kW	10kW	10kW	10kW

Notes:

1. A basic micro EG connection satisfies both the maximum total IES capacity and export capacity requirements shown in Table 1
2. The above table is subject to technical requirements as set out in Section 4, in particular the phase balance requirements as per Section 4.7 for two phase and three phase connections.
3. Refer to Appendix E: SWER Locations in UE Network for detailed map of SWER locations.Table 10 lists those locations on the UE network that utilise SWER.

Examples below illustrate the capacity requirements shown in Table 1.

Example 1:

Jane wishes to install a single phase 7.5kVA solar inverter and 2.5kVA battery inverter. This gives a total IES capacity of 10kVA. She is able to obtain a CES for her installation and meets all other requirements as set out in this document. Jane can request for a basic micro EG connection because the maximum that can be exported from this system is less than the 10kW threshold.

Example 2:

Mary wishes to install a single phase 10kVA solar inverter and 5kVA battery inverter. This gives a total IES capacity of 15kVA. She is able to obtain a CES for her installation and meets all other requirements as set out in this document. Mary can request for a basic micro EG connection only if she limits the export of her system to 10kW with an export limiting device.

Example 3:

Ravi is a three phase customer. Ravi wishes to install a 30kVA three phase solar inverter and 30kVA three phase battery inverter. This gives a total IES capacity of 60kVA. Ravi wishes to export limit his system to 10kW per phase. However, Ravi's total capacity exceeds 30kVA. As per Table 1, Ravi **cannot** request for a basic micro EG connection. Ravi will have to request a negotiated LV EG connection.

1.2 Scope

This document applies to basic micro EG systems with grid connected inverters. It applies to both new connections of basic micro EG systems and modifications to existing basic micro EG systems.

It excludes the following:

a. EG units covered by UE's LV EG Connection Technical Requirements (refer UE-ST-2008.2)

b. EG units covered by UE's HV EG Connection Technical Requirements (refer UE-ST-2008.3)

c. Electric vehicles, unless the on-board battery storage system is capable of exporting to the network (in which case the requirements in this document shall apply)

d. DER systems that do not generate electricity, including demand response / demand management systems, unless they impact on the ability of the basic micro EG system to meet the technical requirements

1.3 Obligations

UE has developed this standard to meet its obligations to ensure the safe and reliable operation of the distribution system for operating personnel, customers and the general public.

The obligations of proponents are:

a. Fully comply with UE's technical requirements (this document) as well as all relevant national standards, industry codes, legislation and regulations. In the event of an inconsistency, the legislation and/or regulation shall prevail, followed by UE's technical requirements, followed by national standards and industry codes.

b. Not connect additional inverters, make any modifications whatsoever or install additional micro EG units, including ESS, without prior written agreement from UE.

c. Fully comply with UE's model standing offer (refer Appendix C).

d. Ensure the requirements in the design, installation, operation and maintenance of the basic micro EG system are met in full.

2. Definitions and Abbreviations

2.1 Definitions[1]

Basic micro embedded generation connection	*A connection between a distribution network and a retail customer's premises for a micro embedded generating unit, for which a model standing offer is in place* or an equivalent model offer is in place in jurisdictions not subject to Chapter 5A of the National Electricity Rules.
Central protection	Central protection is the protection required by AS/NZS 4777.1:2016 (grid connection of energy systems via inverters) installed to perform the functions of: coordinating multiple inverter energy system installations at one site, providing protection for the entire inverter energy system installation and islanding protection to the connected grid as well as preserving safety of grid personnel and the general public. Can this be re-written?
Embedded generating unit	*A generating unit connected within a distribution network and not having direct access to the transmission network.*
Embedded generating system	A system comprising of multiple embedded generating units.
Distributed Energy Resources	Power generation or storage units that are connected directly to the distribution network.
Generating unit	*The plant used in the production of electricity and all related equipment essential to its functioning as a single entity.*
Generation	*The production of electrical power by converting another form of energy in a generating unit.*
Generator	*A person who owns, operates or controls a generating unit.*
Inverter energy system	A system comprising of one or more inverters together with one or more energy sources (which may include batteries for energy storage), and controls, which satisfies the requirements of AS/NZS 4777.1:2016 and AS/NZS 4777.2:2015.
Low voltage	The mains voltages as most commonly used in any given distribution network by domestic and light industrial and commercial consumers (typically 230V).
High voltage	Any voltage greater than 1kV AC.

[1] Definitions in italics are consistent with the definitions under the National Electricity Rules

Micro embedded generation connection	*Means a connection between an embedded generating unit and a distribution network of the kind contemplated by Australian Standard AS 4777 (Grid connection of energy systems via inverters) currently up to or equal to 200kVA.*
Market generating unit	*A generating unit whose generation is not purchased in its entirety by a retailer (and receives payment for generation through the National Electricity Market or Wholesale Electricity Market).*
Model standing offer	*A document approved by the Australian Energy Regulator as a model standing offer to provide basic micro embedded generation connection services or standard connection services which contains (amongst other things) the safety and technical requirements to be complied with by the proponent. This definition also applies to an equivalent model offer for jurisdictions not subject to Chapter 5A of the National Electricity Rules.*
Proponent	A person proposing to become a generator (the relevant owner, operator or controller of the generating unit (or their agent)).
Registered generator	*A person who owns, operates or controls a generating unit that is connected to, or who otherwise supplies electricity to, a transmission or distribution system and who is registered by the Australian Energy Market Operator as a Generator under Chapter 2 of the National Electricity Rules.*
Site generation limit	The generation threshold that the embedded generating system cannot exceed, measured downstream of the connection point (in kW).
Small generation aggregator	*A person who has classified one or more small generating units as a market generating unit.*
Small registered generator	*A generator who elects to register a generator with the Australian Energy Market Operator as a market generating unit who would otherwise be entitled to an exemption to register based on size.*
Standard connection	*A connection service (other than a basic micro embedded generation connection service) for a particular class (or sub-class) of connection applicant and for which an Australian Energy Regulator approved model standing offer is in place or for which an equivalent model offer is in place in jurisdictions not subject to Chapter 5A of the National Electricity Rules.*
Single Wire Earth Return	Parts of the electrical distribution network that use a single high voltage overhead conductor to supply single-phase or split-phase electric power with higher network impedances, and with distribution supplying low voltages to premises.
Technical requirements document	The document produced by each Distribution Network Service Provider setting out their requirements for proponents to enable a grid connection, to which these guidelines apply (this document).

2.2 Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AS/NZS	A jointly developed Australian and New Zealand Standard
CBD	Central Business District
CEC	Clean Energy Council
DER	Distributed Energy Resources
DNSP	Distribution Network Service Provider
EG	Embedded Generation or Embedded Generating
ESS	Energy Storage System
HV	High Voltage
IEC	International Electrotechnical Commission
IEEE	The Institute of Electrical and Electronic Engineers
IES	Inverter Energy System
LV	Low Voltage
kV	Kilovolt
V	Voltage
Var	Volt-ampere reactive
W	Watt
MV	Medium Voltage
NEM	National Electricity Market

NER	National Electricity Rules
NMI	National Metering Identifier
SWER	Single Wire Earth Return

2.3 Terminology

The following terminology has been used in this document:

- The word “shall” indicates a mandatory requirement to comply with this document.
- The word “may” indicates a recommendation that will not be mandatorily imposed on the proponent.
- The word “should” indicates a requirement that may be mandatorily imposed on the proponent based on connection specific safety or operational requirements.

3. Relevant Rules, Regulations, Standards and Codes

3.1 Standards and Codes

This section lists all the Australian and international standards and industry codes which shall apply to the design, manufacture, installation, testing and commissioning, and operation and maintenance of all plant and equipment for basic micro EG connections to the distribution network. The latest version of the Australian and international standards and industry codes shall be used.

In the event of any inconsistency between Australian and international standards and industry codes and UE's technical requirements, UE's technical requirements shall prevail.

Table 2: Applicable Standards and Codes

Standard	Title
AS/NZS 3000	Electrical installations (known as the Australian/ New Zealand Wiring Rules)
AS/NZS 4777	Grid connection of energy systems via inverters (multiple parts)
AS/NZS 5139	Electrical installations – Safety of battery systems for use with power conversion equipment
AS/NZS 5033	Installation and safety requirements for photovoltaic (PV) arrays
AS/NZS IEC 60947.6-1	Low-voltage switchgear and control gear – Multiple function equipment - Automatic transfer switching equipment
IEC 62116	Utility-interconnected photovoltaic inverters – Test procedure of islanding prevention measures
IEEE Standard 1547	IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems

3.2 Legislation and Regulation

This section lists all the relevant legislation and regulations which shall apply to the design, manufacture, installation, testing and commissioning, and operations and maintenance of all plant and equipment for basic micro EG connections to the distribution network. The latest version of the legislation and regulations shall be applicable.

In the event of any inconsistency between legislation and regulations and UE's technical requirements, the legislation and regulation shall prevail.

Table 3: Applicable Legislation and Regulations

Document Title	Description
National Electricity Rules Chapter 5A	Electricity Connection for Retail Customers
Victorian Electricity Distribution Code	Regulates the distribution of electricity, connections to distribution networks, and the transfer of electricity between distribution systems so that they are undertaken in a safe, efficient, and reliable manner
Electricity Industry Guideline 15 - Connection of Embedded Generation	Provides arrangements for connecting embedded generating units to distribution systems
Victorian Service and Installation Rules	Provides industry agreed technical requirements that meet all legislative and code requirements for the supply and metering related aspects of any connection to the Victorian electricity supply networks
Victorian Electrical Safety (Installation) Regulations	Provides details on regulatory obligations for electricity installation works in Victoria

4. Technical Requirements

This section details the technical requirements for basic micro EG connections.

4.1 Labelling and Signage

The labels and signs on the installation, including cables, shall be as per AS/NZS 4777.1:2016, AS/NZS 3000:2018 and AS/NZS 5033:2014. Site specific labelling for additional energy sources and operating procedure for the energy sources shall be installed at each isolation point that has a possibility of energy feedback from the IES.

4.2 Maximum System Capacity

Refer to Table 1 for details of maximum system capacity.

4.3 Generation Control

4.3.1 Export Limits at Connection Point

The maximum export limit of basic micro EG connections is as per Table 1: Basic Micro EG capacity.

The export limit is to be interpreted as “soft limit”. Soft limit is a limit that will cause the IES to reduce its output, preventing ongoing export greater than the limit. The requirements for “soft limit” shall be as per AS/NZS 4777.1:2016.

Where an export limit is implemented, the proponent shall provide confirmation that the export limit is functioning correctly.

The export limit of the proponent’s basic micro EG system is not guaranteed in perpetuity, but rather it is ultimately dependent upon distribution network characteristics which may change over time. UE therefore reserves the right to revise down the export limit of the proponent’s basic micro EG system if it adversely affects the distribution network. Any augmentation cost to revise the export limit of the proponent’s basic micro EG system will be borne by the proponent.

4.3.2 Site Generation Limit Downstream of Connection Point

This section is intentionally blank.

4.4 Inverter Energy System

The IES shall comply with the following requirements:

1. IES shall only comprise of inverters that are approved/registered with the Clean Energy Council (CEC) as approved grid connected inverters.
2. IES shall be tested by an authorised testing laboratory and be certified as being compliant with AS/NZS 4777.2:2015 with an accreditation number
3. IES shall only comprise of inverters that are tested by an authorised testing laboratory and certified as being compliant with IEC 62116:2014 for active anti-islanding protection as per AS/NZS4777.2:2015.
4. IES shall only comprise of inverters installed in compliance with AS/NZS 4777.1:2016.
5. IES shall only comprise of inverters that have both volt-var and volt-watt response modes available.

All CEC approved grid connected inverters are compliant with the above requirements. Please check the CEC website for a list of approved inverters.

4.5 Network Connection and Isolation

Network connection and isolation requirements shall be as per AS/NZS 4777.1:2016 and AS/NZS 3000:2018.

A safety risk may arise in the event a land owner of multiple (adjacent) land titles sells one title to a new owner but retains the basic micro EG system connection as shown in Figure 2. A basic micro EG system located on another land title may reasonably be assumed to be **NOT** connected to the point of supply of the neighbouring land title. This may result in a safety incident due to unintentional incorrect isolation of the basic micro EG system while electrical works are carried out in the neighbouring land title. Hence, if the land owner of the multiple land title sells one of the land titles, the land owner of the land title with the basic micro EG system shall apply for a unique National Meter Identifier (NMI). In the meantime, the basic micro EG system shall be disconnected from the distribution network.

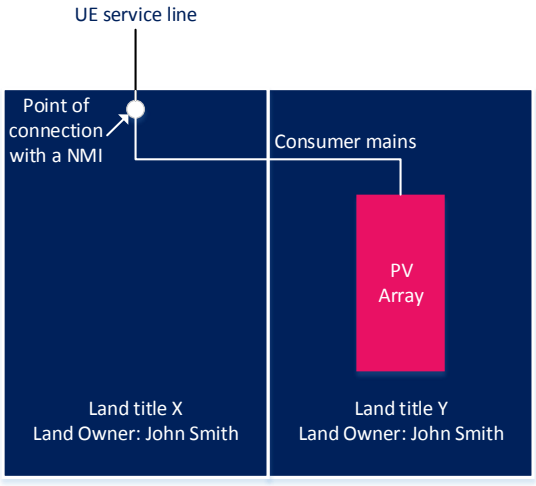

Figure 2: Multiple land titles under the same land owner

4.6 Earthing

The earthing requirements shall be observed:

1. For IES, shall be as per AS/NZS 4777.1:2016 and AS/NZS 3000:2018
2. For ESS, shall be as per AS/NZS 5139:2019 and AS/NZS 3000:2018

4.7 Protection

The protection requirements shall be in accordance to AS/NZS 4777.1:2016 and as follows for each connection type:

Table 4: Protection requirements

Network Connection	Single Phase Connection (includes SWER)	Two Phase Connection	Three Phase Connection
Inverter Integrated Protection Requirements	Inverter integrated protection according to AS/NZS 4777.2:2015	Inverter integrated protection according to AS/NZS 4777.2:2015	Inverter integrated protection according to AS/NZS 4777.2:2015
Phase Balance Protection Requirements	None	Where phase balance protection is not incorporated as part of the inverter protection, a separate phase balance protection device shall be installed. Phase balance protection setting for current imbalance between phases is 21.7A (5kVA at 230V) with a delay of 30s. Refer to Clause 3.4.4.2 of AS/NZS 4777.1:2016	Where phase balance protection is not incorporated as part of the inverter protection, a separate phase balance protection device shall be installed. Phase balance protection setting for current imbalance between phases is 21.7A (5kVA at 230V) with a delay of 30s. Refer to Clause 3.4.4.2 of AS/NZS 4777.1:2016

Note: Central protection is not required for basic micro EG connection. Section 3.4.4.3 of AS/NZS 4777.1:2016 requires central protection for total IES capacity greater than 30kVA. As the basic micro EG connection has a maximum total IES capacity of 30kVA, it will therefore not require central protection.

4.7.1 Inverter Integrated Protection

The inverter integrated protection requirements shall be as per AS/NZS 4777.1:2016 and AS/NZS 4777.2:2015 for basic micro EG connections. The passive anti-islanding protection shall be as per Table 5. Active anti-islanding protection shall be as per AS/NZS 4777.2:2015.

Table 5: Protection functions as per AS/NZS 4777.2:2015

Protection function	Protective function limit	Disconnection time
Under voltage (V<)	180V	2s
Sustained over voltage (V>) (based on average value over a period of 10min)	258V	3s
Over voltage 1 (V>)	260V	2s
Over voltage 2 (V>>)	265V	0.2s
Under frequency (F<)	47Hz	2s
Over frequency (F>)	52Hz	0.2s
Fstop-CH	49Hz	Not Applicable
Fstop	52Hz	Not Applicable
Reconnection delay	> 60s	

4.7.2 Interlocking

Interlocking is to be determined based on proponent's site specific requirements.

4.8 Operating Voltage and Frequency

The operating voltage and frequency range requirements can be found in Table 5 of section 4.7.1.

UE nominated sustained over voltage set point, Vnom_max is 258V. This is within the 244 - 258V range specified in AS/NZS 4777.2:2015.

Voltage rise requirement is as per Appendix F.2 (i) of AS/NZS 4777.1:2016 and is to be calculated at the point of supply.

Figure 3 shows the application of the voltage rise requirements for a typical basic micro EG installation.

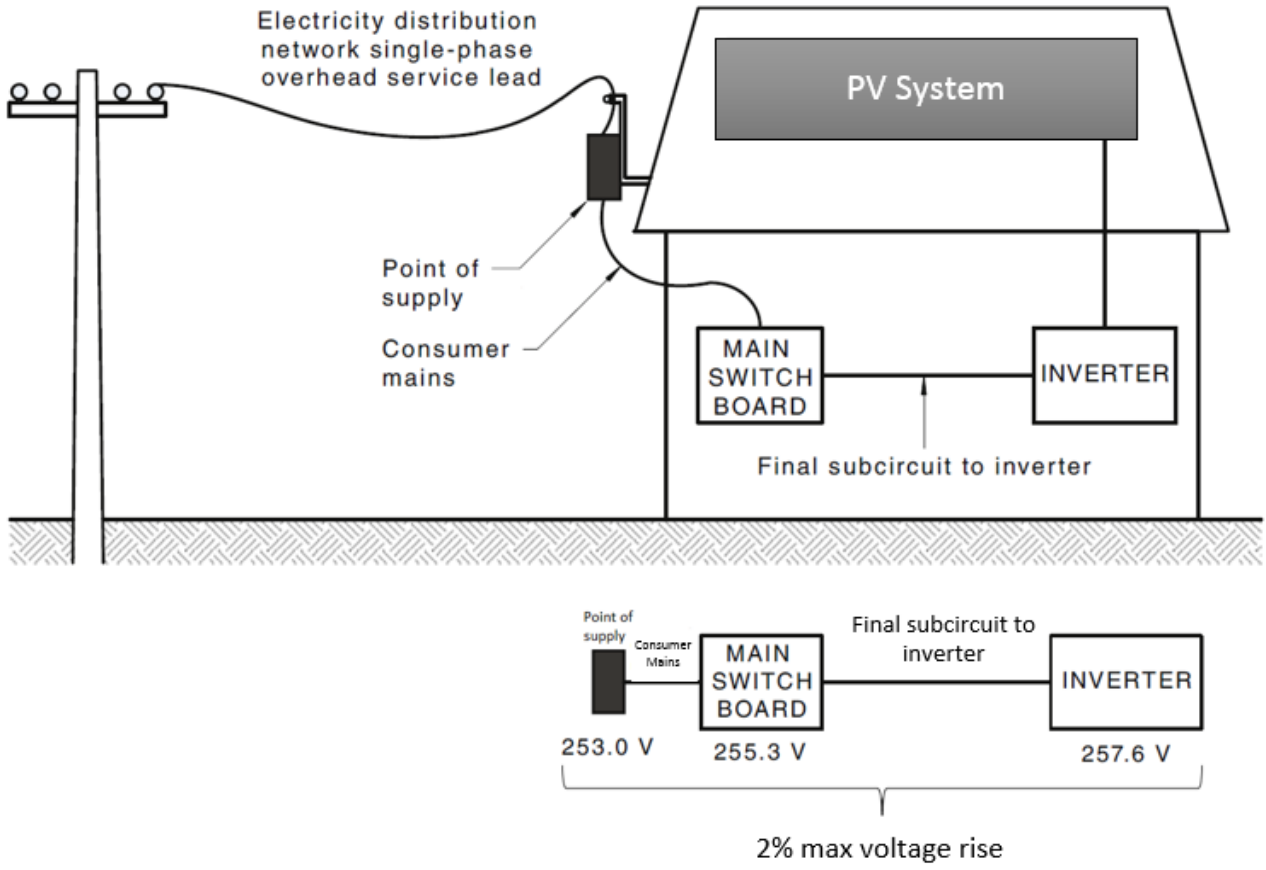

Figure 3: Application of voltage rise requirement for a typical installation (sourced from AS/NZS 4777.1:2016)

4.9 Metering

Metering shall be installed as per Victorian Service and Installation Rules.

4.10 Power Quality

AS/NZS 4777.2:2015 compliant inverters have inbuilt power quality response capability to either maintain the power quality at the point of connection or provide support to the distribution network. All inverters connected to the distribution network shall have the volt response (both volt-watt and volt-var response modes) enabled. Fixed power factor response mode shall not be enabled. By enabling volt response modes, the inverter is able to dynamically respond to voltage changes at the inverter terminals without adversely affecting the voltage within an electrical installation.

4.10.1 Volt-Watt response mode

The volt-watt response mode varies the power output of the inverter in response to the voltage at its grid terminal. The response curve required for the volt-watt response mode is defined by the volt response reference values and corresponding power levels in Table 6.

Table 6: Volt-watt response maximum set point values for reference voltages

Reference	Volt reference value	Volt (per unit)	Maximum value (P_{output}/P_{rated})%
V1	207	0.90	100%
V2	220	0.96	100%
V3	253	1.10	100%
V4	259	1.13	20%

4.10.2 Volt-Var response mode

The volt-var response mode varies the reactive power output of the inverter in response to the voltage at its grid terminal. The response curve required for the volt-var response mode is defined by the volt response reference values and corresponding var levels in Table 7.

Table 7: Volt-var response set point values for reference voltages

Reference	Volt reference value	Voltage (per unit)	Values for VAR level (var % rated VA)
V1	208	0.90	44% lead
V2	220	0.96	0%
V3	241	1.05	0%
V4	253	1.10	44% lag

“Lead” indicates the inverter is providing VARs to the distribution network whereas “lag” represents the inverter is absorbing (sinking) VARs from the distribution network.

4.10.3 Energy storage charging response mode

Where an inverter is connected to an energy storage device, the inverter shall vary the power imported from the distribution network to charge the energy storage device based on the voltage at the inverters terminal. The response curve required for this response mode is defined by the volt response reference values and corresponding power levels in Table 8.

Table 8: Response for Energy Storage Devices when charging

Reference	Volt reference value	Voltage (per unit)	Maximum value (P_{import}/P_{rated})%
V1	207	0.90	0%
V2	220	0.96	100%
V3	250	1.09	100%
V4	265	1.15	100%

4.11 Communications Systems

UE does not require the proponent to provide any remote monitoring data to UE for Basic Micro EG systems. However, proponents shall install remote monitoring of their IES systems to ensure that the proponent is promptly notified of issues with their IES systems. Remote monitoring of IES systems by the proponent may be achieved via use of the IES manufacturer's software applications.

4.12 Data and Information

4.12.1 Static Data and Information

The static data and information shall be provided by the proponent to UE as listed in Appendix D: Static Data and Information. The data will be provided to AEMO's Distributed Energy Resource Register (DERR).

4.12.2 Dynamic Data and Information

This section is intentionally blank.

4.13 Cybersecurity

The Basic Micro EG settings shall be secured against inadverdent or unauthorised tampering. Changes to the Basic Micro EG settings shall require the use of tools (e.g. special interface devices and passwords) and special instructions not provided to unauthorised personnel.

4.14 Technical Studies

No technical studies are required to be submitted by the proponent to UE.

5. Fees and Charges

Refer to UE's customer connection policy[2] for type of connection fees applicable to basic micro EG connections and how these fees are determined.

Refer to UE's model standing offer for basic micro EG (Appendix C: Model Standing Offer) for fees payable and how fees are to be paid by the proponent.

6. Testing and Commissioning

Testing and commissioning of the basic micro EG installation shall be undertaken in accordance with AS/NZS 4777.1:2016, AS/NZS 3000:2018 and AS/NZS 5033:2014 (where applicable), the CEC approved checklist, the equipment manufacturer's specifications and to the technical requirements stipulated in this document, inorder to demonstrate that the installed basic micro EG system meets the requirements of the connection agreement.

Where an export limit is implemented, the proponent shall provide UE written confirmation that the export limit is functioning correctly.

Note these tests shall be installation tests and not type tests of the equipment. Equipment type tests shall be as per IEC 62116:2014. All CEC approved inverters are compliant with type tests requirements as per IEC 62116:2014.

7. Operations and Maintenance

Basic micro EG systems shall be operated and maintained by the proponent to ensure compliance with the connection agreement and all legislation, codes, and/or other regulatory instruments at all times. In addition, the proponent shall:

1. Maintain the electrical installation at the supply address in a safe condition.
2. Ensure that any changes to the electrical installation at the supply address are performed by an electrician lawfully permitted to do the work and that the proponent holds a Certificate of Electrical Safety (CES) issued in respect of any of the changes. The proponent shall provide UE with a copy of the CES.
3. Seek UE approval prior to altering the connection in terms of an addition, upgrade, extension, expansion, augmentation or any other kind of alteration, including any changes to protection functions, settings or firmware.

If any breach of this technical standard is suspected, UE may undertake an investigation. If the investigation reveals a breach, the proponent shall be required to rectify this breach and pay UE for the costs associated with the investigation and associated works undertaken by UE.

[2] https://www.unitedenergy.com.au/wp-content/uploads/2015/09/Connection-Policy.pdf

Appendix A: Deviations from the National DER Connection Guidelines

Table 9 Table of Deviations from National DER Connection Guidelines

Section	Description of deviation	Type of deviation	Justification
1.1	The system capacity for single phase basic micro EG system is up to the maximum rating of the main circuit breaker instead of less than or equal to 5kVA as per the National DER Basic Micro EG Connection Guideline.	Promote improved benefits to Australia's electricity system	To promote clarity on IES capacity and facilitate EG basic connections by allowing higher IES capacity under basic connection.
1.1	Basic micro EG connections are not limited by voltage level if the maximum total IES capacity and export capacity requirements in Table 1 are met. The National DER Basic Micro EG Connection Guideline limits basic connection to LV.	Promote improved benefits to Australia's electricity system	To promote clarity on IES connections and facilitate EG basic connections by not restricting connections based on voltage level.
2.1	Definition of IES is different from the National DER Basic Micro EG Connection Guideline.	To meet jurisdictional requirement	The definition was amended to align with AS/NZS 4777.1:2016.
2.3	Definition of the word 'may' and 'should' were swapped as described in the National DER Basic Micro EG Connection Guideline	Promote improved benefits to Australia's electricity system	Clarifies requirements for proponents
4.3.1	Export limits at the connection point shall be 10kW instead of 5kVA as per the National DER Basic Micro EG Connection Guideline	Promote improved benefits to Australia's electricity system	To facilitate EG basic connections by allowing higher export limit under basic connection.
4.7	Removal of section relating to application of central protection	To meet jurisdictional requirement	To align with AS/NZS 4777.1:2016 section 3.4.4.3 which states central protection is required for IES larger than 30kVA. As basic micro EG will have a max IES capacity of 30kVA, it will not require central protection.
4.7.1, 4.7.2	Sustained voltage limit of 258V was used instead of 260V stipulated in AS 4777.2:2015	Promote improved benefits to Australia's electricity system	Max overvoltage limit to maintain network stability and avoid nuisance tripping

Appendix B: Connection Arrangement Requirements

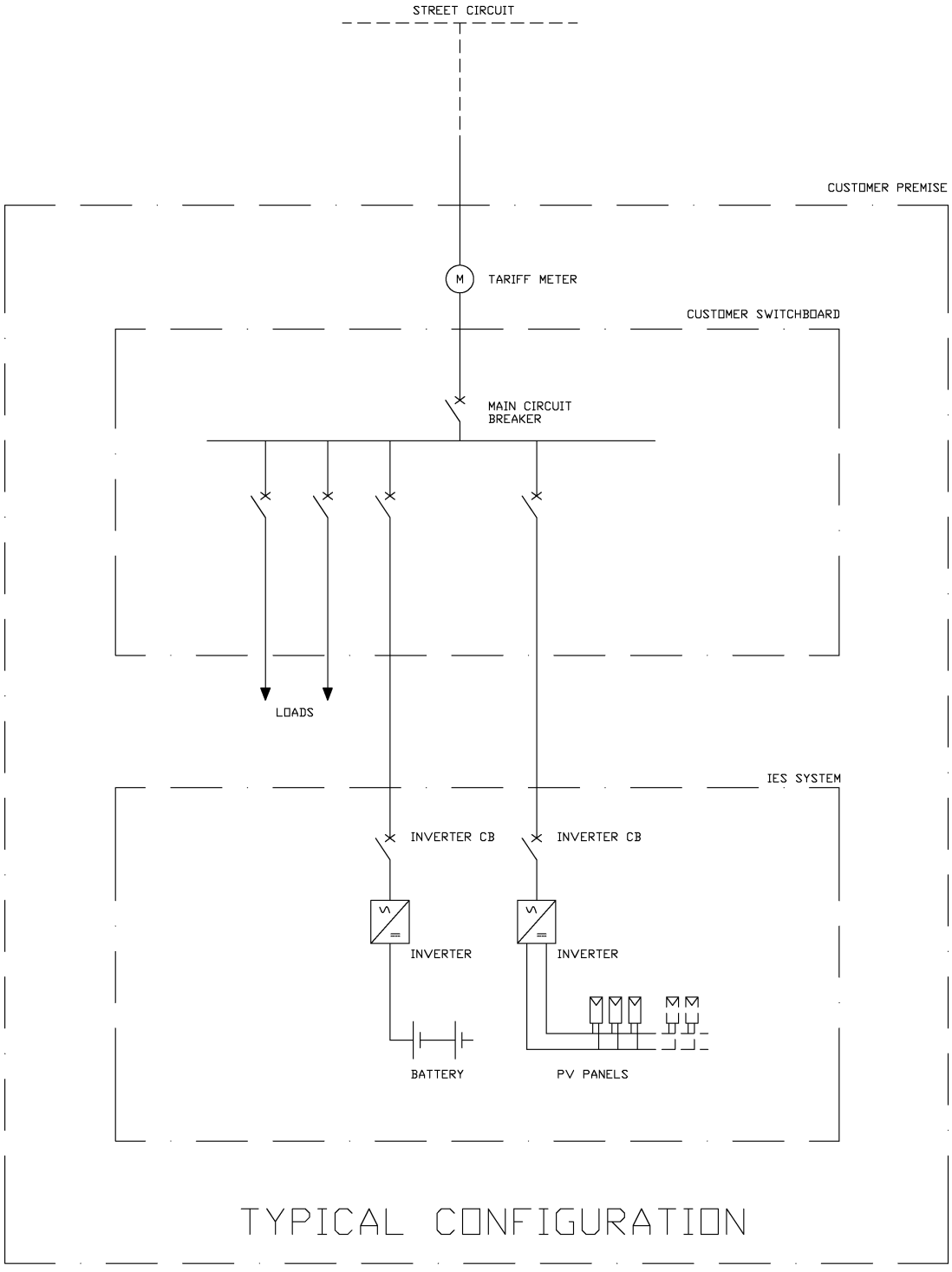

Figure 4: Typical single line diagram for IES system which does not require export limitation

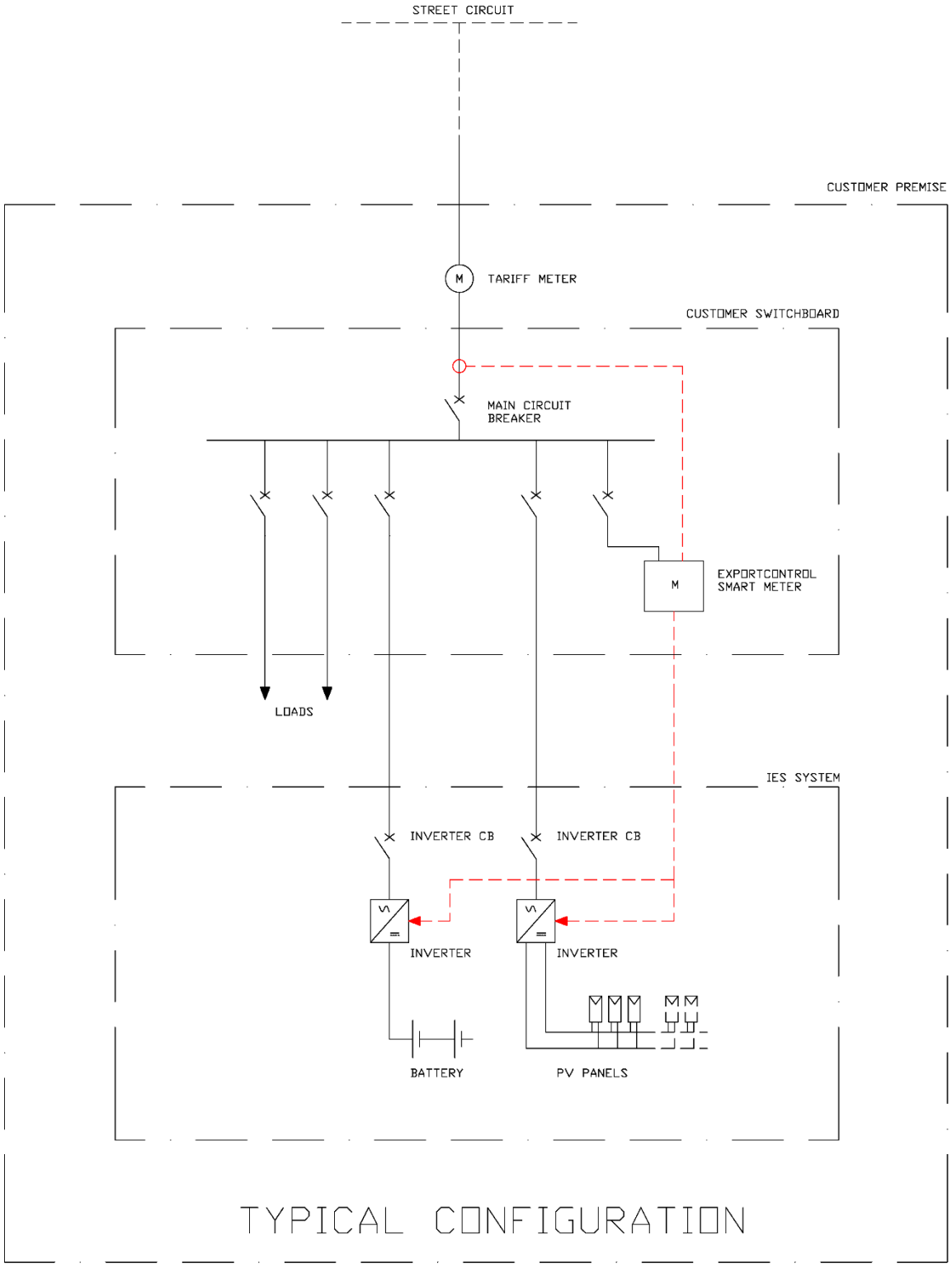

Figure 5: Typical single line diagram for IES system with a 10kW per phase export limit

Appendix C: Model Standing Offer

The ***Model Standing Offer Basic Connection Service for Retail Customers (For Micro Embedded Generation)*** can be found on UE's website.

https://www.unitedenergy.com.au/

Appendix D: Static Data and Information

Static data and information to be provided by the proponent in the ***United Energy Inverter – Basic Micro Embedded Generator Connection Form*** which can be found on UE's website.

https://www.unitedenergy.com.au/

Appendix E: SWER Locations in UE Network

Table 10: SWER locations

Suburb	Post code
Tuerong	VIC 3915
Balnarring	VIC 3926
Main Ridge	VIC 3928
Flinders	VIC 3929
Boneo	VIC 3939
Cape Schanck	
Fingal	

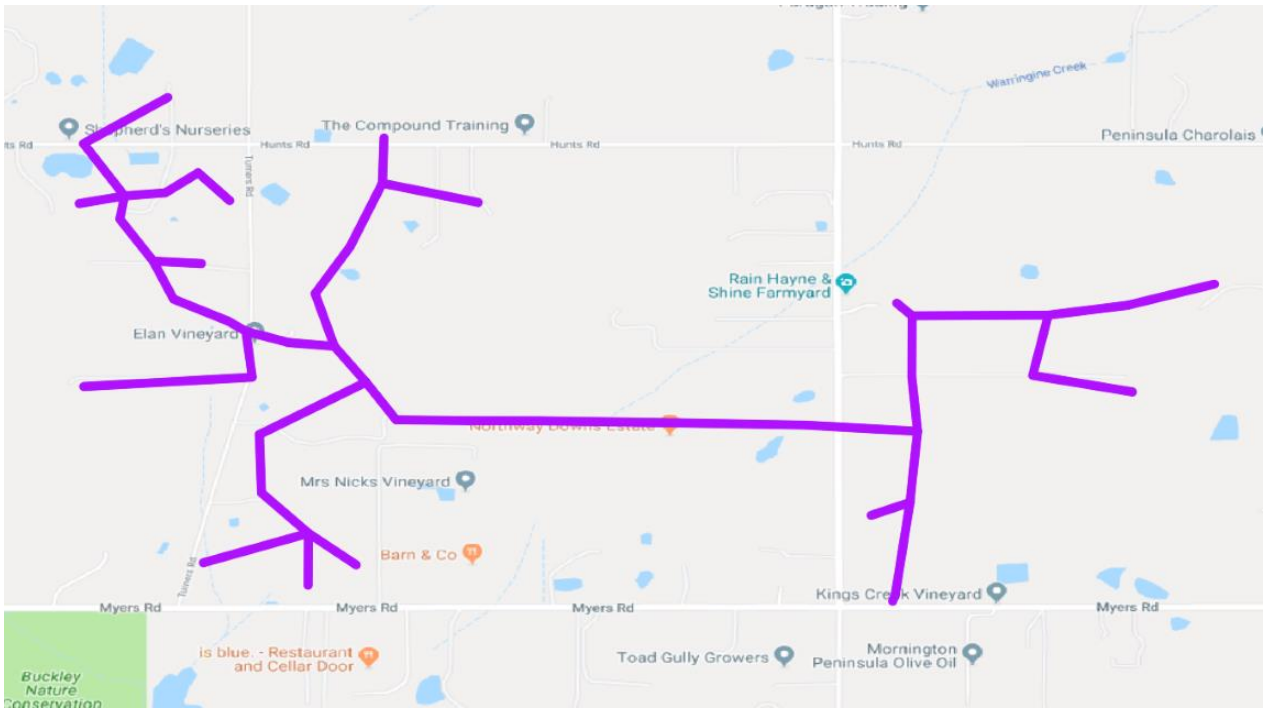

Figure 6: SWER location in Tuerong and Balnarring

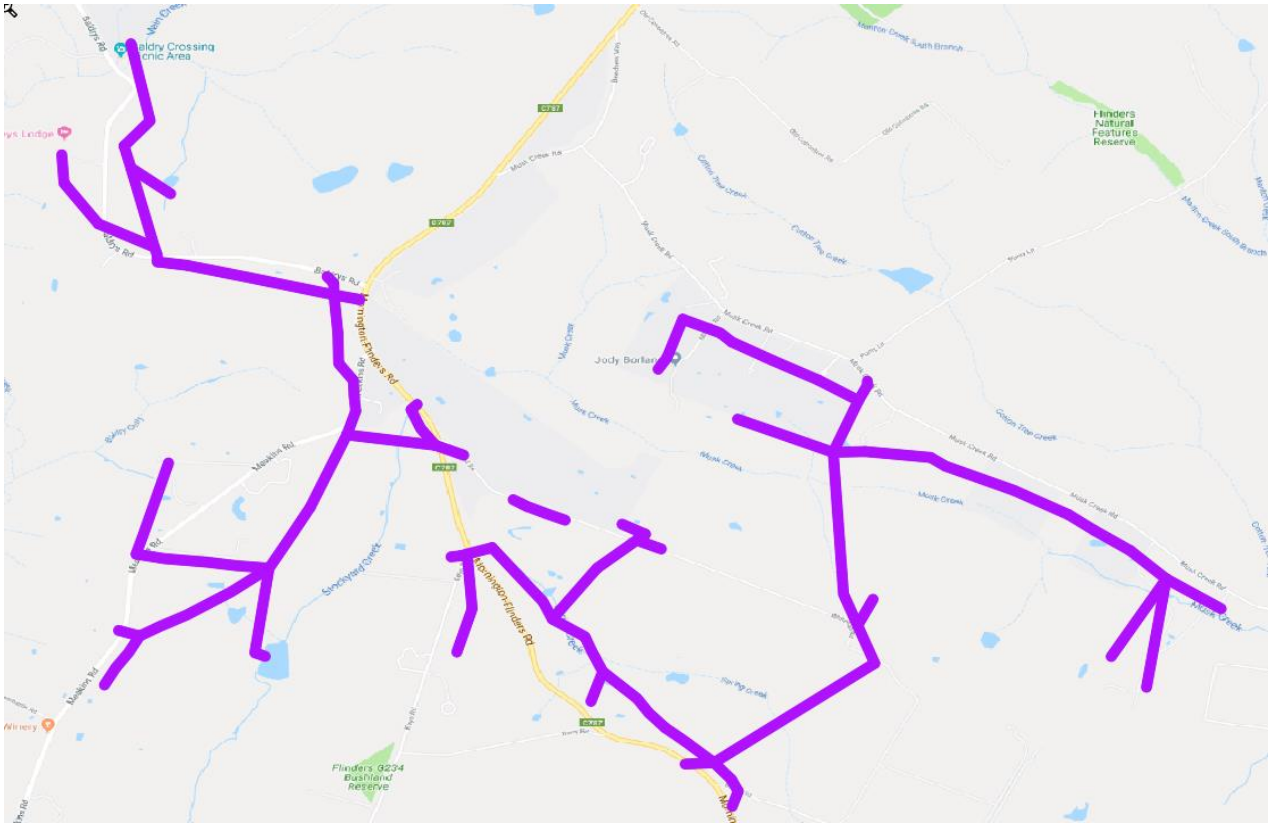

Figure 7: SWER locations in Main Ridge and Flinders

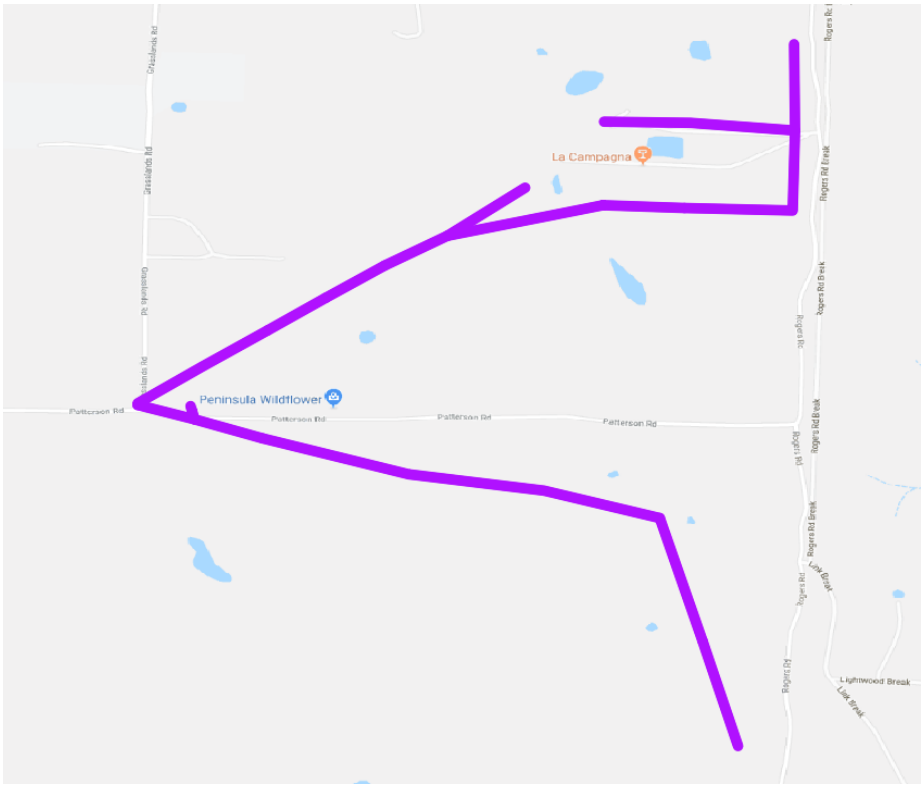

Figure 8: SWER locations in Boneo and Fingal

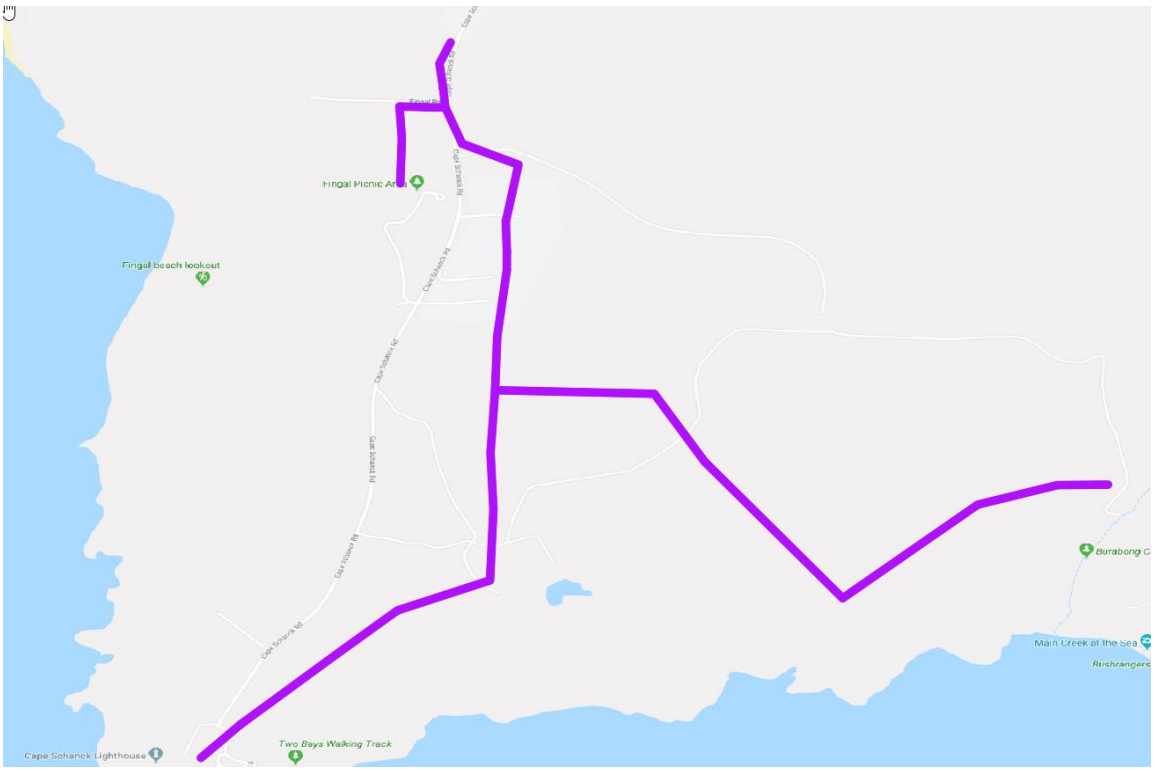

Figure 9: SWER locations in Cape Schanck

Figure 10: SWER locations across UE's network

UE-ST-2008.1 Basic Micro EG Network Access Standard

Final Audit Report 2019-12-19

Created:	2019-12-18
By:	Kaisui Tnay (kaisui.tnay@ue.com.au)
Status:	Signed
Transaction ID:	CBJCHBCAABAAxsjLplP8C9Jzx41A1VHaLfpuYaQJYfBT

"UE-ST-2008.1 Basic Micro EG Network Access Standard" History

Document created by Kaisui Tnay (kaisui.tnay@ue.com.au)
2019-12-18 - 06:20:32 GMT- IP address: 202.125.86.254

Document emailed to Sarah Lim (sarah.lim@wsp.com) for signature
2019-12-18 - 06:20:47 GMT

Email viewed by Sarah Lim (sarah.lim@wsp.com)
2019-12-18 - 06:26:32 GMT- IP address: 203.161.138.77

Document e-signed by Sarah Lim (sarah.lim@wsp.com)
Signature Date: 2019-12-18 - 06:27:00 GMT - Time Source: server- IP address: 203.161.138.77

Document emailed to Kaisui Tnay (kaisui.tnay@ue.com.au) for signature
2019-12-18 - 06:27:02 GMT

Email viewed by Kaisui Tnay (kaisui.tnay@ue.com.au)
2019-12-18 - 06:27:35 GMT- IP address: 202.125.86.254

Document e-signed by Kaisui Tnay (kaisui.tnay@ue.com.au)
Signature Date: 2019-12-18 - 06:27:51 GMT - Time Source: server- IP address: 202.125.86.254

Document emailed to Darshana Paranagama (darshana.paranagama@ue.com.au) for signature
2019-12-18 - 06:27:53 GMT

Email viewed by Darshana Paranagama (darshana.paranagama@ue.com.au)
2019-12-18 - 09:08:01 GMT- IP address: 110.32.238.114

Document e-signed by Darshana Paranagama (darshana.paranagama@ue.com.au)
Signature Date: 2019-12-18 - 09:09:46 GMT - Time Source: server- IP address: 110.32.238.114

Document emailed to Robert Simpkin (robert.simpkin@ue.com.au) for signature
2019-12-18 - 09:09:49 GMT

Email viewed by Robert Simpkin (robert.simpkin@ue.com.au)
2019-12-18 - 21:35:23 GMT- IP address: 202.125.87.205

Document e-signed by Robert Simpkin (robert.simpkin@ue.com.au)
Signature Date: 2019-12-18 - 21:36:15 GMT - Time Source: server- IP address: 202.125.87.205

Document emailed to Rosh Sivanathan (roshanth.sivanathan@ue.com.au) for signature
2019-12-18 - 21:36:17 GMT

Email viewed by Rosh Sivanathan (roshanth.sivanathan@ue.com.au)
2019-12-18 - 22:00:20 GMT- IP address: 1.143.59.196

Document e-signed by Rosh Sivanathan (roshanth.sivanathan@ue.com.au)
Signature Date: 2019-12-19 - 21:04:55 GMT - Time Source: server- IP address: 202.125.86.254

Document emailed to Rodney Bray (rodney.bray@ue.com.au) for signature
2019-12-19 - 21:04:57 GMT

Email viewed by Rodney Bray (rodney.bray@ue.com.au)
2019-12-19 - 21:07:48 GMT- IP address: 202.125.87.205

Document e-signed by Rodney Bray (rodney.bray@ue.com.au)
Signature Date: 2019-12-19 - 21:10:15 GMT - Time Source: server- IP address: 202.125.86.254

Document emailed to Craig Savage (craig.savage@ue.com.au) for signature
2019-12-19 - 21:10:18 GMT

Email viewed by Craig Savage (craig.savage@ue.com.au)
2019-12-19 - 22:08:29 GMT- IP address: 202.125.86.254

Document e-signed by Craig Savage (craig.savage@ue.com.au)
Signature Date: 2019-12-19 - 22:08:45 GMT - Time Source: server- IP address: 202.125.86.254

Signed document emailed to Kaisui Tnay (kaisui.tnay@ue.com.au), Craig Savage (craig.savage@ue.com.au), Rodney Bray (rodney.bray@ue.com.au), Robert Simpkin (robert.simpkin@ue.com.au) and 3 more
2019-12-19 - 22:08:45 GMT