Distribution Customer Connection Requirements

2 January 2020

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This Revision: Third – January 2020
Date for Next Review: January 2025

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<td>M Cheney</td>
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Distribution Customer Connection Requirements

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FOREWORD

This Third edition of the WA Distribution Customer Connection Requirements (DCCR) is a revised and updated version of the now superseded Introduction, Sections One and Two of the Distribution Substation Manual (DSM).

The document details network arrangements for both customer connections and the interconnection of substations to Western Power’s LV/HV distribution network within the South West Interconnected Network (SWIN).

These requirements do not contain detailed information on the practices, processes and procedures associated with the design, construction, installation, connection, energisation or operation of depicted infrastructure, network equipment or connection arrangements.

For specific information pertaining to infrastructure or network equipment, please refer one of the following network publications or go to Western Power’s public website for the complete range of publicity listed documents:

- Distribution Construction Standards Handbook. (DCSH)
- Distribution Substation Plant Manual. (Previously known as DSM Sections 3 to 9).
- Network Integration Guideline. (NIG)
- Underground Distribution Schemes Manual. (UDS)
- Underground Cable Installation Manual. (UCIM)
- Western Australian Distribution Connections Manual. (WADCM)
- Western Australian Electrical Requirements. (WAER)

The content of these documents, together with Western Powers detailed design requirements, form the key network elements in the process of communicating Western Power’s network connection and supply arrangement requirements to customers, industry and related network design, construction and operational personnel.

With the introduction of this document and transition to Distribution Substation Plant Manual, additional work has been initiated to review and further define the appropriate levels of AS-5577 compliance. During this interim period, readers should reference the Distribution Substation Plant Manual and the WA Distribution Connections Manual for current requirements and practices.

Western Power acknowledges the valuable support and contribution made during the development of this document by officers and personnel from both industry and Western Power.

Feedback on any aspect of the document is encouraged, welcomed and valued. Western Power looks forward to your continued support and involvement in the future development of new editions of the Distribution Customer Connection Requirements.

Ben Bristow

Head of Grid Transformation
Western Power
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1. Disclaimer

These requirements have been compiled and published by Western Power using definitions, drawings, guidelines, standards, and network information consistent with the relevant Acts and Regulations of the state of Western Australia at the date of publication.

Users are responsible for determining the relevance and applicability of that material, to their specific circumstance. Legislation, standards and electricity industry publications are revised periodically. Consequently this document may at times require amendment therefore users must make their own inquiries to ensure compliance.

2. Document ownership and administration

This document is the property of the copyright owner, being Electricity Networks Corporation trading as Western Power, who reserves the right to develop, revise, administer and or publish amended content, as deemed appropriate.

3. Application

This edition supersedes all previous versions of the Introduction, Sections One and Two of the Distribution Substation Manual (DSM) and any previous versions of this document.

The application of the information contained within this document and subsequent amendments are not retrospective unless an existing connection, network arrangement, electrical installation or part thereof is altered, modified, upgraded or constitutes a safety issue as determined by an authorised inspector under the Energy Coordination Act 1994.

These requirements are to be applied to all electrical connections and installations as soon as practical, during the six month period directly following the date of publication, after which time these requirements are deemed to be mandatory.

Specific substation installation, operational or technical detail should be sourced from the DSPM and the WADCM manuals accessible via Western power’s public website.

Where work on an electrical connection, installation or network arrangement, has commenced or formal contracts to undertake electrical work were signed prior to the publication of these requirements, Western Power may grant an exemption from these requirements on receipt of an appropriate application. Where an exemption is granted the electrical work is to be completed in accordance with the previously published DSM requirements. An exemption will not be granted where there is a safety issue or concern.

Additionally, there may be connection requirements, configurations or unusual situations that cannot be or have not been covered by these requirements. In such circumstances Western Power must be advised and consulted before any design or installation work commences.

3.1 Application date

These requirements shall apply from the date shown in the “Record of revisions” located at the front of the document.
4. **Introduction**

These requirements have been developed to promote, support and complement the documents listed within the scope, through specific references to the design of the customer connection arrangement at the point of supply (PoS).

This document contains diagrams showing, standard connection arrangements for Low voltage (LV) and High voltage (HV) customers to Western Power’s distribution network within the South West Interconnected Network (SWIN). These diagrams form the framework for both customer and network designers when selecting an appropriate customer connection.

Each connection arrangement and its supporting network infrastructure must be selected, designed and installed to ensure that:

- The integrity and safety of the network together with the customer’s installation is not compromised;
- Network capacity limits are not exceeded;
- The customers’ load and generation expectations are taken into consideration; and
- Other users of the surrounding network either directly or indirectly are not adversely affected or put at risk.

Connection arrangements may be either for a discrete customer (e.g., a single residential, commercial or industrial connection) or an arrangement for a number of new customers (e.g. multi-residential/commercial customers or subdivision).

5. **Scope**

5.1 **In scope**

These requirements are to be applied to all new, altered or modified connections to the SWIN at distribution voltages including both low voltage (LV) and high voltage (HV) up to and including 33 kV. The content is to be read in conjunction with but not limited to:

- Applicable Federal, State and Local Legislation, and Codes.
- **Documents as published by** Building and Energy (formerly EnergySafety) including:
  - Guidelines for the safe management of High voltage electrical installations;
  - Western Australian Electrical Requirements (WAER).
- **Industry standards as published by** Standards Australia including:
  - AS 2067: Substations and high voltage installations exceeding 1 kV a.c.;
  - AS/NZS 3000: Wiring rules;
  - AS 4777 series.
- **Documents as published by** Western Power including:
  - Distribution Construction Standards Handbook (DCSH);
  - Distribution Design Catalogue (DDC);
  - Distribution Substation Plant Manual (DSPM)
  - Network Integration Guideline – Inverter Embedded Generation (NIG);
  - Distribution Overhead Line Design Manual. (LDM) (Network only access)
  - Underground Distribution Schemes Manual (UDS);
  - Technical Rules;
  - Western Australian Distribution Connections Manual (WADCM).
- Other related network standards as outlined in this document which may specify minimum requirements for a customer supply arrangement or connection.
In connecting a customer, over and above compliance with the identified technical standards, the designer of the customer connection arrangement shall demonstrate due diligence with safety in design principles as prescribed by Western Power and the Occupational Safety and Health (OS&H) legislation.

5.1.1 Section 8 drawings
This Section contains drawings showing standard arrangements for the connection of LV or HV customers to the network and associated distribution substation. The intent of these drawings is to assist designers to select the correct method for connection of a customer.

5.1.2 Section 9 drawings
This Section contains drawings showing standard arrangements for the interconnection of a distribution substation with the HV network. As with Section 8 the intent of these drawings is to assist designers with the selection of the appropriate substation arrangement and connection methodology to the HV network.

5.2 Out of scope
It is intended that the DCCR will be progressively updated to cover other aspects of the connection relationship between the distribution network and the customer. This edition of the requirements, does not currently include, but may in future, cover specific detail on network requirements associated with one or more of the following:

- Metering and Service equipment connections;
- Overhead connection and supply arrangements for both metropolitan and rural networks;
- Standalone Power Supply (SPS) supply and connection arrangements;
- Inverter and Battery (IES) connection arrangements;
- Emergency Response Generation (ERG) connection arrangements;
- Private Power Generation (PPG) connection arrangements;
- Neutral Voltage Displacement (NVD) – LV connection arrangements;
- Single Phase Overhead and Underground Distribution connection arrangements.

6. Compliance with these requirements
It is the responsibility of the customer to operate and maintain (or ensure their authorised representatives, operate and maintain) their electrical infrastructure and equipment forming a part of their respective facilities in accordance with both regulatory and network requirements.

Western Power will not connect a non-compliant or, where aware, permit a non-compliant connection to remain connected to the distribution network until such time as that connection or electrical installation is rectified and made compliant by the customer.

Re-inspection of the customer’s electrical connection/installation may be required for reasons of safety or non-compliance or both. In such cases a re-inspection fee may be applied.

7. Definitions
These requirements use standard industry terminology wherever possible to align the document’s language with that used in legislation, frequently referenced industry and network publications. In addition to the documented Legends, common definitions and phrases have been drawn from the WADCM.
# 8. Customer connections

## 8.1 Arrangement drawings

### 8.1.1 Drawing index

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<td><strong>HV Connected Customer Owned Substations</strong></td>
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<td>Drawing Notes to DCCR 1-07-1 to 1-07-5</td>
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</tbody>
</table>
8.1.3 **Drawing legend**

- Whole Current (direct connected) Meter (non CT)
- LV Current Transformer Meter (LV CT)
- HV Current Transformer Metering Unit (HV CT)
- Maximum Demand Meter
- Links (Removable)
- Connection Block
- Fuse
- Circuit Breaker (CB)
- Combination Fuse Switch
- LV Links or HV / LV load Disconnector
- Drop Out Fuse (DOF)
- Pole Top Switch
- Inverter
- Battery
- Generator
- Transformer (Tx)
- Cable Termination to Network Assets Including Switchgear or Transformer
- Cable Termination to Overhead Network
- CB Circuit Breaker
- CFS Combination Fuse / Switch
- CP Connection Point
- CMS Customer Main Switch
- CPS Customer Paralleling Switch
- CPR Customer Protection Relay
- CT Current Transformer
- DB Customer Distribution Board
- CT Earth Connection
- FSD Fuse Switch Disconnect
- GMS Generator Main Switch
- HV High Voltage
- LU xx Distribution Design Catalogue Reference

Legend

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<td>MPD</td>
<td>Meter Protection Device (Meter Fuse)</td>
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<tr>
<td>MCB</td>
<td>Mains Connection Box</td>
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<tr>
<td>MPS</td>
<td>Modular Package Substation</td>
</tr>
<tr>
<td>MSB</td>
<td>Main Switchboard</td>
</tr>
<tr>
<td>MS</td>
<td>Main Switch</td>
</tr>
<tr>
<td>MTG</td>
<td>Maximum Total Generation</td>
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<td>MTL</td>
<td>Maximum Total Load</td>
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<td>Point of Supply</td>
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<td>Point of Common Coupling</td>
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<td>Site Main Switch Board</td>
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<td>SPD</td>
<td>Service Protection Device</td>
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Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes, the WAER and WADCM
### 8.1.4 Fuse charts

#### Overhead Fusing

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<th>SMU – 20 Fuse (A)</th>
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<td>Overhead Fusing</td>
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<tr>
<td><strong>Size (kVA)</strong></td>
<td>Expulsion Dropout</td>
</tr>
<tr>
<td>6.6 kV</td>
<td>3.15</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>25</td>
<td>3.15</td>
</tr>
<tr>
<td>50</td>
<td>3.15</td>
</tr>
<tr>
<td>63</td>
<td>3.15</td>
</tr>
<tr>
<td>100</td>
<td>3.15</td>
</tr>
<tr>
<td>160</td>
<td>3.15</td>
</tr>
<tr>
<td>200</td>
<td>3.15</td>
</tr>
<tr>
<td>300</td>
<td>3.15</td>
</tr>
<tr>
<td>315</td>
<td>3.15</td>
</tr>
<tr>
<td>500</td>
<td>3.15</td>
</tr>
<tr>
<td>630</td>
<td>3.15</td>
</tr>
<tr>
<td>1000</td>
<td>3.15</td>
</tr>
</tbody>
</table>

**Note Reference only.**

For specific detail refer to Network Technical Manuals.

**For Historical Proposes Only**

Fuse Rating Cross Reference

<table>
<thead>
<tr>
<th>EDO Fuse Rating (A)</th>
<th>SMU – 20 Fuse (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.15</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>5E. Std</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>31.5</td>
<td>30</td>
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<td>40</td>
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</tr>
<tr>
<td>63</td>
<td>65</td>
</tr>
<tr>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

Note 5A SMU-20 fuse is an “E” rated fuse not “K” to match 5K characteristic of 5A EDO fuse.

---

**EDM 435 17 326**

**Date # Aug 2018**

**Rev # Initial**

**Sheet # 1 of 3**

**Draw # DCCR 1-00-2**
<table>
<thead>
<tr>
<th>Transformer Voltage</th>
<th>Fuse Rating (A)</th>
<th>LV Max Fuse Rating (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.6 kV</td>
<td>31.5</td>
<td>200</td>
</tr>
<tr>
<td>160</td>
<td>31.5</td>
<td>200</td>
</tr>
<tr>
<td>200</td>
<td>31.5</td>
<td>200</td>
</tr>
<tr>
<td>315</td>
<td>31.5</td>
<td>315</td>
</tr>
<tr>
<td>500</td>
<td>80</td>
<td>400</td>
</tr>
<tr>
<td>630</td>
<td>100</td>
<td>400</td>
</tr>
<tr>
<td>1000</td>
<td>160</td>
<td>400</td>
</tr>
<tr>
<td>11 kV</td>
<td>25</td>
<td>200</td>
</tr>
<tr>
<td>160</td>
<td>25</td>
<td>200</td>
</tr>
<tr>
<td>315</td>
<td>31.5</td>
<td>315</td>
</tr>
<tr>
<td>500</td>
<td>40</td>
<td>400</td>
</tr>
<tr>
<td>630</td>
<td>50</td>
<td>400</td>
</tr>
<tr>
<td>1000</td>
<td>80</td>
<td>400</td>
</tr>
<tr>
<td>22 kV</td>
<td>16</td>
<td>315</td>
</tr>
<tr>
<td>63</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>160</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>200</td>
<td>10</td>
<td>200</td>
</tr>
<tr>
<td>315</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>500</td>
<td>25</td>
<td>400</td>
</tr>
<tr>
<td>630</td>
<td>31.5</td>
<td>400</td>
</tr>
<tr>
<td>1000</td>
<td>40</td>
<td>400</td>
</tr>
<tr>
<td>1500</td>
<td>80</td>
<td>-</td>
</tr>
<tr>
<td>33 kV</td>
<td>6.3</td>
<td>-</td>
</tr>
<tr>
<td>160</td>
<td>6.3</td>
<td>-</td>
</tr>
<tr>
<td>315</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>500</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>630</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>100</td>
<td>40</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes -
1. HV fuse sizes are the minimum required to ensure non-operation of fuses for transformer energisation etc.
2. LV fuse sizes are the maximum which can be used for LV circuits to ensure grading with the transformer HV fuse.
3. Smaller LV may be used.
4. Where 80A dropout fuses are to be used (eg 630kVA Tx at 6.6kV or 1MVA Tx at 11kV) use K-mate current limiter in series.
5. Dropout fuses are not suitable for 1MVA Tx at 6.6kV. A fuseswitch unit must be used.
6. Piggybacking of transformers is not permissible.
7. Low loss fuses with a rating of 3/7.2 kV are to be used at 6kV to alleviate thermal compatibility problems between switchgear and fuses.
8. Applies to single or string of up to five 22kV, 63kVA 3ph transformers.
### Overhead Fusing – Isolation Transformer Source Side Fusing

<table>
<thead>
<tr>
<th>Transformer Size kVA</th>
<th>Source Side Voltage (kV)</th>
<th>Load Side Voltage (kV)</th>
<th>Expulsion Drop Out Fuse (A)</th>
<th>Fault Tamer (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>19.1</td>
<td>12.7</td>
<td>3.15</td>
<td>-</td>
</tr>
<tr>
<td>63</td>
<td>19.1</td>
<td>12.7</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>63</td>
<td>22</td>
<td>12.7</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>200</td>
<td>22</td>
<td>12.7</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>200</td>
<td>33</td>
<td>12.7</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>200</td>
<td>33</td>
<td>19.1</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>315</td>
<td>22</td>
<td>12.7</td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

### Ring Main Unit Fusing – Isolation Transformer Source Side Fusing

<table>
<thead>
<tr>
<th>Transformer Size kVA</th>
<th>Source Side Voltage (kV)</th>
<th>Load Side Voltage (kV)</th>
<th>Expulsion Drop Out Fuse (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>19.1</td>
<td>12.7</td>
<td>3.15</td>
</tr>
<tr>
<td>63</td>
<td>19.1</td>
<td>12.7</td>
<td>5</td>
</tr>
<tr>
<td>63</td>
<td>22</td>
<td>12.7</td>
<td>5</td>
</tr>
<tr>
<td>200</td>
<td>22</td>
<td>12.7</td>
<td>16</td>
</tr>
<tr>
<td>200</td>
<td>33</td>
<td>12.7</td>
<td>16</td>
</tr>
<tr>
<td>200</td>
<td>33</td>
<td>19.1</td>
<td>16</td>
</tr>
<tr>
<td>315</td>
<td>22</td>
<td>12.7</td>
<td>25</td>
</tr>
</tbody>
</table>

**Note**: Reference only. For specific detail refer to Network Technical Manuals.
8.1.5 LV District substations

LU10, LU34, LU52, & UM04
Connected via 25mm² from the street circuit

LU11
Connected street circuit up to a max 240mm²

LU35
Connected via 120mm² from the street circuit

UM01
Connected via 16mm² from street circuit

Notes - Refer to DCCR 1-05-1N

- Permitted maximum size consumer mains:
  - All ≤ 100 Amps
    - LU10, LU11, LU34 & LU52 is 1 x 35mm² cables / phase
  - All > 100 Amps
    - LU11 is 1 x 185mm² cables / phase
    - LU35 is 1 x 120mm² cables / phase

- UMS loads up to 20 Amps
  - LU10, LU1, LU52, UM01 & UM04 is 1 x 16mm² / phase

- Metering arrangements refer to the WADCM
- Customer capacity limits refer to the NIG & WADCM

Customer connections may be via a block, link or fuse.
# Distribution Customer Connection Requirements

## Third Edition

**January 2020**

---

**Drawing Notes**

**for**

**DCCR 1-05-1**

---

## Notes DCCR 1-05-1N

### Table 1

<table>
<thead>
<tr>
<th>Network Connection Asset</th>
<th>Max Load (A) at PoS</th>
<th>Max Generation (A) at PoS</th>
<th>SPD Type (Notes 1, 4 &amp; 5)</th>
<th>Max SPD Size</th>
<th>Network Connection Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>LU10 &amp; LU52</td>
<td>100</td>
<td>Hosting Capacity ≤ 30%</td>
<td>Fuse</td>
<td>100</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UMS 20</td>
<td>Not permitted</td>
<td>Hosting Capacity ≤ 30%</td>
<td>Fuse</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>LU34</td>
<td>100</td>
<td></td>
<td>Fuse</td>
<td>100</td>
<td>N/A</td>
</tr>
<tr>
<td>LU11</td>
<td>101 - 250</td>
<td></td>
<td>CB</td>
<td>N/A</td>
<td>315 (max) (Note 3)</td>
</tr>
<tr>
<td>LU35</td>
<td>150 (Note 2)</td>
<td></td>
<td>CB</td>
<td>N/A</td>
<td>200</td>
</tr>
<tr>
<td>UM 01 &amp; UM 04</td>
<td>20</td>
<td>Not permitted</td>
<td>Fuse</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>LU44</td>
<td>101 - 250</td>
<td></td>
<td>CB</td>
<td>N/A</td>
<td>315 (max) (Note 3)</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Transformer Size (kVA)</th>
<th>Max Street Circuit Fuse Size (A)</th>
<th>Max Demand on a Shared Feeder (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>200</td>
<td>200 (Note 6)</td>
</tr>
<tr>
<td>315</td>
<td>315</td>
<td>315</td>
</tr>
<tr>
<td>500</td>
<td>315</td>
<td>315 (Note 6 and 7)</td>
</tr>
<tr>
<td>630</td>
<td>315</td>
<td>315 (Note 6)</td>
</tr>
<tr>
<td>1000</td>
<td>315</td>
<td>315 (Note 6)</td>
</tr>
</tbody>
</table>

### Tables 1 & 2 Notes:

1. CB denotes fault limiting circuit breaker in accordance with AS/NZS 3000:2018 2.5.4.2 item (a).
2. 200A permitted in the CBD
3. A smaller connection fuse may be used for loads less than the maximum.
4. CT metering is required for loads above 100A.
5. Fault rating of the protection device shall be in accordance the WAER, Technical Rules and WADCM. Unless stated otherwise the minimum rating shall be 25kA.
6. 400A fuse may be used in commercial / industry areas only. Maximum demand on a shared feeder remains at 315A.
7. For 500kVA transformers 400A fuses are not permitted if HV fuses are expulsion drop out type. **Note** For specific detail refer to engineering requirements.
8. 160kVA transformers are no longer available for new connections.
9. Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes, including the WAER and WADCM.
**Notes** - Refer to DCCR 1-05-N

<table>
<thead>
<tr>
<th>Transformer Size (kVA)</th>
<th>Transformer FSD Fuse (A)</th>
<th>Max Street Circuit Fuse (A)</th>
<th>Max. Customer Load A / Ø LU11</th>
<th>LU35</th>
<th>Customer Max Total Generation</th>
<th>Max. ERG Fuse Size (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 (Note 11)</td>
<td>NA</td>
<td>200</td>
<td>150</td>
<td>150</td>
<td>Subject to technical review</td>
<td>NA</td>
</tr>
<tr>
<td>315</td>
<td>2 x 250</td>
<td>315</td>
<td>250</td>
<td>200</td>
<td></td>
<td>630</td>
</tr>
<tr>
<td>500 (from DOP) (Note 11)</td>
<td>NA</td>
<td>315</td>
<td>250</td>
<td>200</td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>500 (from RMU) (Note 11)</td>
<td>400</td>
<td>315</td>
<td>315</td>
<td>200</td>
<td></td>
<td>630</td>
</tr>
<tr>
<td>630</td>
<td>2 x 400</td>
<td>400</td>
<td>315</td>
<td>200</td>
<td></td>
<td>630</td>
</tr>
</tbody>
</table>

- Dedicated street circuits maximum cable size 240mm²
- LU11 fitted with 400A links (LU36)
- LU35 jointed to street circuit via 4 core 120mm² CU cable
- LU 35 may be fitted with fuses or links
- * Connection via link or fuse as determined by WP.
- Metering arrangements refer to the WADCM
Notes - Refer to DCCR 1-05-N

<table>
<thead>
<tr>
<th>Voltage</th>
<th>6kV</th>
<th>11kV</th>
<th>11kV</th>
<th>22kV</th>
<th>22kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV Fuse Type</td>
<td>AIR HRC</td>
<td>DOF</td>
<td>AIR HRC</td>
<td>DOF</td>
<td>AIR HRC</td>
</tr>
<tr>
<td>Network Connection LV Fuse Size</td>
<td>2 x 400</td>
<td>2 x 315</td>
<td>2 x 400</td>
<td>2 x 315</td>
<td>2 x 400</td>
</tr>
<tr>
<td>Customer: Total Max Load (A)</td>
<td>630</td>
<td>500</td>
<td>630</td>
<td>500</td>
<td>630</td>
</tr>
<tr>
<td>Customer: Total Max Generation</td>
<td>Subject to technical review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Network**

- **Customer LV Switchboard**
  - Note 2

- **Network Circuit Fuses**
  - Note 8

- **LV Kiosk**
  - PoS
  - Main Switch
  - Notes 9 & 10

- **SPD**
  - Notes 1, 3, 5 & 6

- **Customer LV**

- **Consumer mains cable**
  - Max Size: 4 x 400mm²

**Notes**

- **Note 4**
- **Note 2** & 8
- **Note 12**

**Warning label**

- **PARALLEL SUPPLY ISOLATE GANGED SWITCHES.**

- **PARALLEL SUPPLY ISOLATE LOAD BEFORE OPERATING**

- **Note:** LV 2 x 240mm² street mains not to exceed 245m route length from the transformer to the LV kiosk.

- **Note:** Where fuses are not required replace with switch disconnect.

**Customer:**

- **Total Max Load (A)**
  - 630
  - 500
  - 630

- **Total Max Generation**
  - Subject to technical review

---

**District Substation**

Non - MPS LV Loads up to 630A
Dedicated LV Circuit

---

**Western Power**

Distribution Customer Connection Requirements

EDM 435 17 326

**Date #** Jan 2020
**Rev #** Initial
**Sheet #** 1 of 1
**Draw #** DCCR 1-05-3
Notes - Refer to DCCR 1-05-N

<table>
<thead>
<tr>
<th>Transformer Size (kVA)</th>
<th>Customer Fuse (A)</th>
<th>Customer Max Total Load (A/Phase)</th>
<th>Customer: Max Total Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>315</td>
<td>600</td>
<td>415 (Tx Rating)</td>
<td></td>
</tr>
<tr>
<td>500 (Note 11)</td>
<td>600</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>500 (Note 11)</td>
<td>Non MPS-1600</td>
<td>655 (Tx Rating)</td>
<td></td>
</tr>
<tr>
<td>630</td>
<td>600</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>630</td>
<td>Non MPS-1600</td>
<td>825 (Tx Rating)</td>
<td>Subject to technical review</td>
</tr>
<tr>
<td>1000</td>
<td>600</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1600</td>
<td>1310 (Tx Rating)</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. Where fuses are not required replace with switch disconnect.
Notes - Refer to DCCR 1-05-N

<table>
<thead>
<tr>
<th>Transformer Size (kVA)</th>
<th>Customer Disconnect (A)</th>
<th>Max. Customer Load (A/Phase)</th>
<th>Customer: Max Total Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 630</td>
<td>2000</td>
<td>1655</td>
<td>Subject to technical review</td>
</tr>
<tr>
<td>2 x 1000</td>
<td>2000</td>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

District Substation
Non MPS LV Loads up to 2000A
Dedicated LV Street Circuits

Date # Jan 2020
Rev # Initial
Sheet # 1 of 1
Draw# DCCR 1-05-5
Notes DCCR 1-05-N

1. The customer’s point of supply (POS) shall be:
   a. Pillar, or wall box;
   b. The LV terminals for connections to a District LV frame or kiosk; or
   c. The transformer terminals for connections to a Sole Use transformer rated above 160kVA up to 1MVA

2. The customer’s switchboard shall be contiguous with the substation/kiosk.

3. Fault rating of the protection device shall be in accordance with the WAER, Technical Rules, WADCM; and for:
   a. Single transformer connections 160kVA and above the SPD shall be minimum of 25kA; and
   b. Multiple transformer connections the SPD shall have a minimum rating of 50kA.

4. CT LV metering is required for loads greater than 100A. Loads equal to or less than 100A shall be direct metered.

5. SPD denotes service protection device. CB must grade with the:
   a. Network connection fuse.
   b. Network transformer HV fuse.

6. SPD/TX isolation device shall be tested by the electrical contractor to Western Power’s agreed settings.

7. For customer connections exceeding 200A this arrangement is applicable only when it is not possible to install a transformer on the customer’s property and the existing nearby transformer does not have the necessary spare capacity to meet the customer’s requirements.

8. This arrangement is only applicable for 1000kVA transformers and is limited to heritage buildings where it is not possible to provide a substation site.

9. Customer may have more than one main switch as per WAER, WADCM, AS/NZS 3000 and AS/NZS 4777.

10. CB shown as main switch (es) – for illustration purposes only.

11. 160 and 500kVA transformers are no longer available for new connections.

12. Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes, including the WAER and WADCM.
8.1.6 **LV Sole use connections**

![Diagram of LV Sole use connections]

**Notes** - Refer to DCCR 1-06-N

<table>
<thead>
<tr>
<th>Transformer Size (kVA)</th>
<th>Voltage</th>
<th>Max Customer Load (A/Phase)</th>
<th>Consumer Mains Max mm² / Phase</th>
<th>Maximum Total Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>240</td>
<td>100</td>
<td>1 x 35</td>
<td>Subject to technical review</td>
</tr>
<tr>
<td>480</td>
<td>50</td>
<td>1 x 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 (Note 12)</td>
<td>415</td>
<td>32</td>
<td>1 x 35</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>82.5</td>
<td>1 x 35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Sole Use Substation**
LV Loads up to 82A 3Ø
Underground Dedicated Transformer

Date # Aug 2018
Rev # Initial
Sheet # 1 of 1
Draw # DCCR 1-06-2
Notes - Refer to DCCR 1-06-N

<table>
<thead>
<tr>
<th>Transformer Size (kVA)</th>
<th>Max. Customer Load (A/Phase)</th>
<th>Consumer Mains Cable mm² / Phase</th>
<th>Customer: Max Total Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>415</td>
<td>2 x 630</td>
<td>Subject to technical review</td>
</tr>
<tr>
<td>315 (Note 12)</td>
<td>415</td>
<td>2 x 630</td>
<td></td>
</tr>
<tr>
<td>630</td>
<td>825</td>
<td>2 x 630</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1310</td>
<td>3 x 630</td>
<td></td>
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</tbody>
</table>

Note. Permissible number and size of consumer mains cables connected to each transformer terminal is manufacturer dependant. Refer to engineering requirements for specific detail.

---

**Transformer Size (kVA)**

LV Loads up to 1310A 3Ø

**Underground Dedicated Transformer**
Notes - Refer to DCCR 1-06-N

<table>
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<tr>
<th>Transformer Size (kVA)</th>
<th>Max. Customer Load (A/Phase)</th>
<th>Consumer Mains Max ( mm^2 ) /Phase/TX</th>
<th>Customer Max Total Generation</th>
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<tr>
<td>2 X 1000</td>
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**Notes**

- Refer to DCCR 1-06-N
- Transformer Size (kVA)
- Max. Customer Load (A/Phase)
- Consumer Mains Max \( mm^2 \) /Phase/TX
- Customer Max Total Generation

**Sole Use Substation**
LV Load up to 2625A 3Ø
Underground
Dedicated Transformers
Notes - Refer to DCCR 1-06-N

<table>
<thead>
<tr>
<th>Transformer Size (kVA)</th>
<th>Max. Customer Load (A/Phase)</th>
<th>Consumer Mains Max mm²/Phase/TX</th>
<th>Customer Max Total Generation</th>
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Distribution Customer Connection Requirements
Third Edition
January 2020

Sole Use Substation
LV Load up to 5250A 3Ø
Underground Dedicated Transformers

Date # Aug 2018
Rev # Initial
Sheet # 1 of 1
Draw # DCCR 1-06-5
Notes DCCR 1-06-N

1. The customer's point of supply (POS) shall be:
   a. Pillar; or
   b. For connections to transformers rated up to 25kVA the:
      i. Customer's mains connection box for an overhead service supply;
      ii. Terminals within the pillar for a pole to pillar supply (including 2 X 25 kVA);
      iii. Transformer fuse where directly connected; or
   c. The bar system for connections to transformers rated at 63kVA; or
   d. The LV terminals for connections to a District LV frame or kiosk; or
   e. The transformer terminals for connections to a Sole Use transformer rated above 63kVA and up to 1MVA.

   **Note:** Where there are parallel transformer connections (PoS) they shall be deemed to be a single PoS for the purposes of determining the supply arrangement and load/generation limitations.

2. The customer's switchboard shall be contiguous with the substation.

3. Fault rating of the protection device shall be in accordance with the WAER, Technical Rules, WADCM and for:
   a. Single transformer connections 160kVA and above the SPD shall be minimum of 25kA; and
   b. Multiple transformer connections the SPD shall have a minimum rating of 50kA.

4. CT LV metering is required for loads greater than 100A. Loads equal to or less than 100A shall be direct metered.

5. Commercial customers may be LV metered in 2MVA transformer groups at one combined location to allow for future summation where required.

6. Services protection device (SPD). For sole use CT metered transformer arrangements, the SPD may also be used as the transformer isolation device. The SPD must grade with the:
   a. Network connection fuse.
   b. Network transformer HV fuse.

7. SPD/TX isolation device shall be tested by the electrical contractor to Western Power’s agreed settings.

8. Customer Main Switch (MS) shall be a circuit breaker which grades with the upstream protection.

9. Overload trip on the CB must be set at 1.25 times the rated current of the transformer:
   a. 630kVA – 825A;
   b. 1000kVA – 1310A.

10. Customer may have more than one main switch as per WAER, WADCM, AS/NZS 3000 and AS/NZS 4777.

11. CB shown as main switch (es) – for illustration purposes only.

12. 25, 160 and 500kVA transformers are no longer available for new connections.

13. Paralleling of 2MVA transformer groups shall be prevented by mechanical interlocking.

14. Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes, including the WAER and WADCM.
8.1.7 HV Connected customer owned substations

- HV Aerial Feeder
- Notes 1 & 3

- HV Feeder
- LV SMSB
- Main Switch
- Notes 6 & 12

- Disconnector
- Metering Unit
- kWH
- Note 14

- Network
- Customer
- Recloser pole must be a strain structure
- May be UG or OH at any length
- Main switch recloser set to one shot.
- Notes 6 & 7

- Notes 1 & 3

- HV SPUR line with overhead metering arrangement – (4 MVA maximum Rural areas only)

Notes - Refer to DCCR 1-07-N

Customer Owned Substation
HV Metering
Overhead Pole Mounted Outdoor

Date # Aug 2018
Rev # Initial
Sheet # 1 of 2
Draw # DCCR 1-07-1a
HV SPUR line with overhead metering arrangement – (4MVA maximum Rural areas only)
Customer ground mounted equipment (Alternative arrangement)

Notes - Refer to DCCR 1-07-N
Network equipment, located on the front boundary. Refer to design note 2 (Section 9)

HV ground outdoor metering arrangement – for loads < 4MVA

Notes - Refer to DCCR 1-07-N
Switchroom, located on the front boundary.
Room designed and constructed by the customer in consultation with Western Power.

Notes - Refer to DCCR 1-07-N
Notes - Refer to DCCR 1-07-N

Customer Owned Substation

HV Metering

Ground Mounted Indoor (with generation)

Notes 4 & 5

Switchroom, located on the front boundary.
Room designed and constructed by the customer in consultation with Western Power.

Notes 11 & 12

Isolator

PoS

Notes 6, 8, 10 & 11

kWH

HV MSB

G

G

G

Notes 11 & 12

Note 14

Isolator

Customer LV Supply

Customer LV DB

Network

Customer Note 14

HV cables to street Note 1

Isolators

Metering Unit

CPS

GMS
Notes - Refer to DCCR 1-07-N
Notes DCCR 1-07-N

1. Network connection shall be selected from DCCR Section 9, based on the:
   a. Available overhead/underground distribution network and associated nominated supply voltage; and
   b. Customers agreed maximum demand and allocated aggregate capacity of the customer generation capacity at the point of supply.

2. Western Power assets shall be located within 30m of the property boundary. Refer to the WADCM.

3. Installation of Western Power overhead assets inside a customer’s property shall comply with:
   EDM #238 82 505 “New distribution overhead constructions or upgrading distribution overhead assets inside properties.”

4. Western Power cable:
   a. Supplied by Western Power. 240 mm² XLPE copper - 1 core per phase.
   b. The customer is responsible for the cable termination kit and connection to their equipment.

5. Cable shall be as short as possible, and mechanically protected. Customer shall provide spare ducts in accordance with the WADCM. Refer to DCCR design note 2. (Section 9)

6. Customer protection system shall comply with the WAER, WADCM and the Technical Rules.

7. Customer main switch may be a circuit breaker or fuse switch.

8. Customer’s main switch shall be a circuit breaker.

9. Where a customer’s main switch is a circuit breaker, the customer may have a circuit breakers or multiple fuse switches for transformer protection. Note fuse switches shall only be used where the transformer is ≤ 1.5MVA.

10. Refer to EDM # 324 19 002 “User guide for connection of embedded generators from 30kVA up to 10MW.”

11. Customer may have more than one main switch as per WAER, WADCM, AS/NZS 3000 and AS/NZS 4777.

12. CB shown as main switch (es) – for illustration purposes only

13. Neutral voltage displacement (NVD) protection:
   a. For HV connected customers, NVD protection is required where generation/storage systems are installed. Refer to the Technical Rules for specific requirements.

14. Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes, including the WAER and WADCM.
9. HV Network arrangements

9.1 Planning philosophies

The HV network arrangements shown in this section of the requirements are based on the following philosophies:

9.1.1 General

For all voltages the nominal maximum feeder load is defined as 390A for a first contingency outage. Given that the nominal maximum load under normal planning conditions is deemed to be 325A, the maximum permissible operational limit for feeder loads shall be calculated at 80% (260A) to add with load restoration in the event of an unplanned event.

Note that other feeder loads (and hence HV network arrangements) may be possible if alternative designs are used – e.g. duplicate feeder cables. However, these are not reflected in this document.

9.1.2 6.6 KV philosophy

Elements of the SWIN retain a 6.6 kV HV distribution network and associated connection and supply arrangements. Shared feeders with these networks are not based on a ‘Y’ configuration philosophy. The maximum permissible loading on a shared feeder is 260A or 3MVA.

Arrangements are based on limiting the maximum discrete load on a feeder to 2MVA, leaving 1MVA available for other loads. In practice, the designer will need to review specific situations and vary the load ranges for a particular arrangement taking into account existing and potential loads.

This philosophy results in the following arrangements:

a) Discrete loads up to 2MVA - The load can be supplied from a single shared feeder.

b) Discrete loads above 2MVA up to 4MVA - The load must be evenly split across two switchboards (with a maximum of 2MVA per switchboard). Each switchboard can be supplied from a separate shared feeder, with a normally open point between the switchboards (i.e., two feeders operating radially). Note that discrete loads above 2MVA up to 4.5MVA could also be supplied from a dedicated feeder, however, this arrangement is not shown.

c) Discrete loads above 4MVA - Such loads must be assessed on an individual basis.

Note that the arrangements shown for 6.6kV are suitable for future conversion to 22kV based on the ‘Y’ configuration.

9.1.3 11 KV philosophy

The 11kV HV network arrangement for shared feeders is not based on ‘Y’ configuration.

The maximum permissible loading on a shared feeder is 260A or 5MVA. Arrangements are based on limiting the maximum discrete load on a feeder to 4MVA, leaving 1MVA available for other loads. In practice, the designer will need to review specific situations and vary the load ranges for a particular arrangement taking into account existing and potential loads.
This philosophy results in the following arrangements:

a) Discrete loads up to 4MVA - the load can be supplied from a single shared feeder.

b) Discrete loads above 4MVA up to 8MVA - the load must be evenly split across two switchboards (with a maximum of 4MVA per switchboard). Each switchboard can be supplied from a separate shared feeder, with a normally open point between the switchboards (i.e., two feeders operating radially).

c) Note that discrete loads above 4MVA up to 7.5MVA could also be supplied from a dedicated feeder, however, this arrangement is not shown.

d) Discrete loads above 8MVA - such loads must be assessed on an individual basis. Note that the arrangements shown for 11kV are suitable for future conversion to 22kV based on the ‘Y’ configuration.

9.1.4 22 KV philosophy

The 22kV HV network arrangement for shared feeders is based on the ‘Y’ configuration specified in Report “ESD 65/93 22kV Feeder Design” (EDM 26822564). The maximum permissible load on each leg of the ‘Y’ is 130A or 5MVA. Arrangements are based on limiting the maximum discrete load on one leg of the ‘Y’ for a shared feeder to 4MVA, leaving 1MVA available for other loads. In practice, the designer will need to review specific situations and vary the load ranges for a particular arrangement taking into account existing and potential loads.

Dedicated feeders can be loaded to 390A or 15MVA.

This philosophy results in the following arrangements:

a) Discrete loads up to 4MVA - The load can be supplied from one leg of a shared ‘Y’ configured feeder.

b) Discrete loads above 4MVA up to 8MVA - The load must be evenly split across two switchboards (with a maximum of 4MVA per switchboard). Each switchboard can be supplied from one leg of a shared ‘Y’ configured feeder, with a normally open point between the switchboards (the two legs can be from the same or different feeders). Note that where this load is to be supplied from a feeder that is not in the ‘Y’ configuration, it may be acceptable to operate with the normally open point closed until such time as the ‘Y’ configuration is implemented on the feeder.

c) Discrete loads above 8MVA up to 15MVA - The load must be supplied from a dedicated feeder. Such loads will have limited backup unless a second dedicated feeder is provided.

d) Discrete loads above 15MVA - Such loads must be assessed on an individual basis. It is generally preferable that they be supplied from the transmission network rather than the distribution network.

9.1.5 33 KV philosophy

For 33kV, the same philosophy and loading levels are to be used as for those specified for 22kV.

9.2 Design notes

The following design notes are referenced on the HV network arrangement drawings:

9.2.1 Note 1

For all types of extensions or augmentation work, excluding work to rectify existing network deficiencies (e.g. defective equipment, power quality correction or transformer overload), underground construction shall be considered and adopted, wherever possible even if an overhead option would be acceptable.
Where a transformer is protected by dropout fuses (DOF’s), the substation arrangement nominated must have sufficient site area for the installation of HV switchgear. The larger site area provides the required level of flexibility to install HV switchgear if retrospective undergrounding occurs in the future.

This HV switchgear need not be installed initially where the transformer is supplied via DOF’s.

In cases where the customer requires the transformer/s to be installed more than 30 metres from the property boundary, Western Power will not install HV switchgear this far into the customer’s property regardless of whether retrospective undergrounding occurs or not in the future (see Note 2 below). Therefore, in these cases, the customer can’t be supplied off DOF’s and HV switchgear must be installed from the outset.

Generally no provision is to be made for retrospective undergrounding in rural areas. Therefore, where a transformer is protected by DOF’s, the substation arrangement nominated need not include additional site area for the installation of future HV switchgear.

9.2.2 Note 2

All HV feeder cables shall be fully fault rated. HV feeder cables on the customer’s property shall be provided with extra mechanical protection within a registered easement. They shall be kept as short as possible, preferably 5 metres and in any case not more than 30 metres from the property boundary. Where HV feeder cables run off Western Power’s standard alignment and through the customer’s property, the associated HV feeder network is deemed to be at a greater risk. The distance of 30 metres has been chosen as the maximum acceptable risk.

Where HV switchgear is required and the customer requires the transformer/s to be installed more than 30 metres from the property boundary, HV switchgear must be installed separately from the transformers and within 5 metres of the property boundary.

9.2.3 Note 3

Transformer cables shall always be protected by a fuse and hence do not need to be fault rated. There is no limitation on the length which transformer cables can run into the customer’s property. Protection is as shown on the appropriate fuse charts and substation arrangement drawings.

9.2.4 Note 4

Where a transformer is protected by a DOF installed directly off the street mains, the need for an adjacent pole top switches (PTS/s) in the street mains is dependent on the transformer size and neighbouring network configuration. This shall be determined on the basis that a maximum of three transformers or a maximum capacity of 1000kVA is to be installed in between PTS’s. Generally, the minimum transformer capacity installed between PTS’s should not be less than 630kVA (provided that this does not conflict with the maximum allowances given above).

9.2.5 Note 5

Where a transformer is protected by a DOF installed directly off the street mains, there is no need for a combination PTS (i.e., a PTS installed between the street mains and the DOF). When the transformer cable length exceeds the critical length for ferroresonance and an adjacent PTS/s cannot be used for three phase energisation, then the transformer should be energised via the DOF with a load bank connected to the transformer.
9.2.6  Note 6

There are a number of instances where a RMU fuse switch must be used to protect the transformer as DOF’s are not acceptable (e.g., a 1MVA transformer at 6.6kV). In such cases, where a non-MPS transformer of smaller size (which could be protected by DOF’s) is initially installed on an overhead HV network and that there is a possibility that a future upgrade to the larger size transformer may occur, a fuse switch should be installed from the outset. However, if there is no intention ever to upgrade to the larger transformer, DOF’s can be used.

9.2.7  Note 7

HV metering shall be in accordance with Western Power’s requirements. In metro situations, ground mounted metering units are to be used. In rural situations, pole mounted metering units may be used subject to Western Power approval. Where more than one HV metering unit is installed, all metering is to be at the one combined location.

9.2.8  Note 8

For Western Power owned substations, a maximum of two transformers can be housed in one enclosure, with transformer pairs fire segregated.

9.2.9  Note 9

Dual fire segregated switchboards are required for loads in excess of 4MVA.

9.2.10  Note 10

Customer’s transformer controlled by a combination fuse switch shall not exceed 1500kVA. Transformers larger than this shall be controlled by a circuit breaker.

9.2.11  Note 11

For customer owned substations where Western Power has a cable (or existing bus) section switch/es between two switchboards and operates with the section open (i.e. two feeders/feeder legs operating radially), mechanical interlocking is required to prevent closed ring operation via the customer’s switchboards while Western Power’s section switch is open. If necessary, paralleling of the customer’s switchboards is only permitted when Western Power’s bus section switch is closed and only under the direction of Western Power.

9.2.12  Note 12

In customer owned substations where Western Power has a cable (or existing bus) section switch/es between two switchboards and operates with the section closed (i.e., two feeders operating closed ring), paralleling of the customer’s switchboards is only permitted when Western Power’s section switch is closed. Mechanical interlocking is required to prevent closed ring operation via the customer’s switchboards while Western Power’s section switch is open.

9.2.13  Note 13

Where a customer is supplied from a dedicated feeder/s, consideration must be given to maintenance of the circuit and busbar at the zone substation. Where the customer selects or is provided with a dedicated connection arrangement, the impact of unplanned outages together with supply reliability expectations should be discussed with the applicant.
9.3 HV Network arrangement drawings

9.3.1 Drawing index

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<tr>
<td>DSM 2-06 sht 2 of 2</td>
<td>DCCR 2-06-2</td>
<td>11kV Customer Owned Substation - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-11 sht 1 of 2</td>
<td>DCCR 2-11-1</td>
<td>22kV Customer Owned Substation - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-11 sht 2 of 2</td>
<td>DCCR 2-11-2</td>
<td>22kV Customer Owned Substation - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-12 sht 1 of 2</td>
<td>DCCR 2-12-1</td>
<td>22kV Customer Owned Substation - Typical Rural</td>
</tr>
<tr>
<td>DSM 2-12 sht 2 of 2</td>
<td>DCCR 2-12-2</td>
<td>22kV Customer Owned Substation - Typical Rural</td>
</tr>
<tr>
<td>DSM 2-16 sht 1 of 1</td>
<td>DCCR 2-16-1</td>
<td>33kV Customer Owned Substation - Typical Rural</td>
</tr>
<tr>
<td>DSM 2-16 sht 2 of 1</td>
<td>DCCR 2-16-2</td>
<td>33kV Customer Owned Substation - Typical Rural</td>
</tr>
<tr>
<td><strong>Underground district and sole use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM 2-03 sht 1 of 2</td>
<td>DCCR 2-03-1</td>
<td>6.6kV District and Sole Use Substations - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-03 sht 2 of 2</td>
<td>DCCR 2-03-2</td>
<td>6.6kV District and Sole Use Substations - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-07 sht 1 of 3</td>
<td>DCCR 2-07-1</td>
<td>11kV District and Sole Use Substations - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-07 sht 2 of 3</td>
<td>DCCR 2-07-2</td>
<td>11kV District and Sole Use Substations - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-07 sht 3 of 3</td>
<td>DCCR 2-07-3</td>
<td>11kV District and Sole Use Substations - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-13 sht 1 of 3</td>
<td>DCCR 2-13-1</td>
<td>22kV District and Sole Use Substations - Typical Metro or Rural</td>
</tr>
<tr>
<td>DSM 2-13 sht 2 of 3</td>
<td>DCCR 2-13-2</td>
<td>22kV District and Sole Use Substations - Typical Metro or Rural</td>
</tr>
<tr>
<td>DSM 2-13 sht 3 of 3</td>
<td>DCCR 2-13-3</td>
<td>22kV District and Sole Use Substations - Typical Metro or Rural</td>
</tr>
<tr>
<td><strong>Underground customer owned</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM 2-04 sht 1 of 2</td>
<td>DCCR 2-04-1</td>
<td>6.6kV Customer Owned Substation - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-04 sht 2 of 2</td>
<td>DCCR 2-04-2</td>
<td>6.6kV Customer Owned Substation - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-08 sht 1 of 2</td>
<td>DCCR 2-08-1</td>
<td>11kV Customer Owned Substation - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-08 sht 2 of 2</td>
<td>DCCR 2-08-2</td>
<td>11kV Customer Owned Substation - Typical Metro</td>
</tr>
<tr>
<td>DSM 2-14 sht 1 of 2</td>
<td>DCCR 2-14-1</td>
<td>22kV District and Sole Use Substations - Typical Metro or Rural</td>
</tr>
<tr>
<td>DSM 2-14 sht 2 of 2</td>
<td>DCCR 2-14-2</td>
<td>22kV District and Sole Use Substations - Typical Metro or Rural</td>
</tr>
</tbody>
</table>
9.3.3 Drawing legend

- Sustation
- Ring Main Unit
- Overhead HV
- Underground HV

→ Cable termination to network equipment

→ Cable termination to overhead network

HV Metering Unit

Transformer (TX)

Pole Top Switch

Drop Out Fuse (D.O.F.)

Disconnect

Circuit breaker (CB)

Combined Fuse Switch (CFS)

N.O.P. Normally open point

Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM

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Date # Aug 2018
Rev # Initial
Sheet # 1 of 1
Draw # DCCR 2-00-1
### 9.3.4 Overhead district and sole use

#### 6.6kV Overhead Supply

**District and Sole Use Substations**

**Typical Metro**

<table>
<thead>
<tr>
<th>Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM</th>
<th>DSPM Section 3 Substation Drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substation located within 30m of the property boundary Note 2</td>
<td>Substation to have provision for HV switchgear, but not to be installed initially - Design note 1</td>
</tr>
<tr>
<td>Substation located more than 30m from the property boundary Note 2</td>
<td>Refer to Section 8 for customer supply arrangement</td>
</tr>
<tr>
<td>Substation located within 30m of the property boundary Note 2</td>
<td>Substation does not need provision for HV switchgear - Design note 1</td>
</tr>
<tr>
<td>Substation located more than 30m from the property boundary Note 2</td>
<td>Where drop out fuses are used as an alternative to this arrangement, substation to have provision for HV switchgear but not to be installed initially - Design note 1</td>
</tr>
</tbody>
</table>

**Number of Transformers**

- **One**

**Transformer Rating (kVA)**

- **Up to 630 MPS**
- **315 to 1000 Non MPS**

**Comments**

- **Optional** – Dependant on neighbouring network configuration and TX size - Design note 4
- Design note 3
- Design note 2
- Design note 1

Refer to Section 8 for customer supply arrangement.
### Distribution Customer Connection Requirements

#### Third Edition
January 2020

**6.6kV Overhead Supply**

**District and Sole Use Substations**

**Typical Metro**

---

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two</td>
<td>630 to 1000 Non-MPS</td>
<td></td>
</tr>
</tbody>
</table>

**Substation located within 30m of the property boundary**

Note 2: Where one large transformer will provide the load, the customer must pay the full cost difference between this and the single transformer arrangement.

**RMU to be installed within 5m of the property boundary**

Design note 2

Refer to Section 8 for customer supply arrangement

---

**Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WACCM**

**Refer to the DSPM for substation technical and engineering details**

---

**EDM 43517326**

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Distribution Customer Connection Requirements

**11kV Overhead Supply**

**District and Sole Use Substations**

**Typical Metro**

**Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM**

**Design notes:**
1. Substation does not need provision for HV switchgear.
2. RMU to be installed within 5m of the property boundary.
3. Substation to have provision for HV switchgear, but not to be installed initially.
4. Optional – Dependant on neighbouring network configuration and TX size.
5. Refer to Section 8 for customer supply arrangement.
6. 80A boric Acid type DOF suitable for use at 1000kVA.

**Number of Transformers**

<table>
<thead>
<tr>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 630 MPS</td>
<td></td>
</tr>
<tr>
<td>315 to 1000 Non MPS</td>
<td></td>
</tr>
</tbody>
</table>

**HV System Arrangement**

- **Optional – Dependant on neighbouring network configuration and TX size - Design note 4:**
  - Refer to Section 8 for customer supply arrangement.
  - Substation to have provision for HV switchgear, but not to be installed initially - Design note 1.
  - RMU to be installed within 5m of the property boundary.
  - 80A boric Acid type DOF suitable for use at 1000kVA - Design note 6.

**Distribution Customer Connection Requirements**

**Rev #**

<table>
<thead>
<tr>
<th>Sheet #</th>
<th>Date #</th>
<th>Draw #</th>
<th>Initial</th>
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<tr>
<td>1</td>
<td>Aug 2018</td>
<td>DCCR 2-05-1</td>
<td>Initial</td>
</tr>
</tbody>
</table>
Distribution Customer Connection Requirements

Typical Metro

11kV Overhead Supply
District and Sole Use Substations

Design note 2

Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM

Substation located within 30m of the property boundary:
Note 2. Where one large transformer will provide the load, the customer must pay the full cost difference between this and the single transformer arrangement.

Two 630 to 1000 Non-MPS

Design note 2

RMU to be installed within 5m of the property boundary:

Two 630 to 1000 Non-MPS

Design note 2

Three or Four 630 to 1000 Non-MPS

Where the transformers are to be located more than 30m from the property boundary, the HV switchroom can be adjacent to the transformers. However where the transformers are to be located within 30m from the boundary the HV switchboard is to be located separately from the transformers and should be within 5m of the boundary.

Where less transformers will provide the load, the customer must pay the full cost of the difference between this and the minimum arrangement.

Design note 2

Space to always be provided for a 2nd WP isolator

Design note 2

Refer to Section 8 for customer supply arrangement

Refer to Section 8 for customer supply arrangement

Refer to Section 8 for customer supply arrangement

Refer to Section 8 for customer supply arrangement

Refer to Section 8 for customer supply arrangement

Design note 8

Fire Segregation

Refer to the DSPM for substation technical and engineering details

DSPM Section 3 Substation Drawings

Refer to the DSPM for substation technical and engineering details

 DSPM Section 3 Substation Drawings

Refer to the DSPM for substation technical and engineering details

 DSPM Section 3 Substation Drawings

Refer to the DSPM for substation technical and engineering details

 DSPM Section 3 Substation Drawings

Refer to the DSPM for substation technical and engineering details

 DSPM Section 3 Substation Drawings

Refer to the DSPM for substation technical and engineering details
Alternative to the previous arrangement where the customer is prepared to pay the full cost of the second cable and isolator for improved security.
### 22kV Overhead Supply

#### Substations

<table>
<thead>
<tr>
<th>Substation Type</th>
<th>Range</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>District and Sole Use Substations</td>
<td>Up to 630 MPS</td>
<td>Substation located within 30m of the property boundary Note 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Substation located more than 30m from the property boundary Note 2</td>
</tr>
<tr>
<td></td>
<td>315 to 1000 Non MPS</td>
<td>Substation located within 30m of the property boundary Note 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Substation located more than 30m from the property boundary Note 2</td>
</tr>
</tbody>
</table>

##### Notes

- **Note 1**: Substation to have provision for HV switchgear, but not to be installed initially.
- **Note 2**: Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM.
- **Note 3**: Refer to Section 8 for customer supply arrangement.
- **Note 4**: Optional – Dependant on neighbouring network configuration and TX size

---

### HV System Arrangement

- **Design note 1**: Substation does not need provision for HV switchgear.
- **Design note 2**: RMU to be installed within 5m of the property boundary.
- **Design note 3**: Substation to have provision for HV switchgear, but not to be installed initially.
- **Design note 4**: Optional – Dependant on neighbouring network configuration and TX size.
### 22kV Overhead Supply

**District and Sole Use Substations**

**Typical Metro**

#### Substation located within 30m of the property boundary

- **Notes:**
  - Design note 2
  - Refer to Section 8 for customer supply arrangement

- **HV System Arrangement:**
  - Substation located within 30m of the property boundary Note 2. Where one large transformer will provide the load, the customer must pay the full cost difference between this and the single transformer arrangement.

- **2 to 4 transformers:**
  - Where the transformers are to be located within 30m of the property boundary, the HV switchroom can be adjacent to the transformers. However, where the transformers are to be located more than 30m from the boundary the HV switchboard is to be located separately from the transformers and should be within 5m of the boundary. Where less transformers will provide the load, the customer must pay the full cost of the difference between this and the minimum arrangement.

- **RMU to be installed within 5m of the property boundary:**
  - Design note 2
  - Refer to Section 8 for customer supply arrangement

#### RMU to be installed within 5m of the property boundary

- **Notes:**
  - Design note 2

#### Transformer Rating (kVA)

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two</td>
<td>630 to 1000 Non-MPS</td>
<td></td>
</tr>
</tbody>
</table>

Refer to Section 8 for customer supply arrangement.

Refer to the DSPM for substation technical and engineering details.
Alternative to the previous arrangement where the customer is prepared to pay the full cost of the second cable and isolator for improved security.
Distribution Customer Connection Requirements

## 22kV Overhead Supply

### District and Sole Use Substations

#### Typical Rural

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Up to 630 MPS</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optional – Dependant on neighbouring network configuration and TX size - Design note 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can be overhead if the distance is more than 30m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Substation does not need provision for HV switchgear - Design note 1</td>
</tr>
</tbody>
</table>

| One           | Up to 1000 Non-MPS       |          |
|               |                          | Optional – Dependant on neighbouring network configuration and TX size - Design note 4 |
|               |                          | Can be overhead if the distance is more than 30m |
|               |                          | Substation does not need provision for HV switchgear - Design note 1 |

| Two           | 630 to 1000 Non-MPS      |          |
|               |                          | Optional – Dependant on neighbouring network configuration and TX size - Design note 4 |
|               |                          | Can be overhead if the distance is more than 30m |
|               |                          | Substation does not need provision for HV switchgear - Design note 1 |

Refer to the DSPM for substation technical and engineering details.
Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM.

Where the transformers are to be located within 30m of the property boundary, the HV switchroom can be adjacent to the transformers. However where the transformers are to be located more than 30m from the boundary the HV switchboard is to be located separately from the transformers and should be within 5m of the boundary. Where less transformers will provide the load, the customer must pay the full cost of the difference between this and the minimum arrangement.

Alternative to the previous arrangement where the customer is prepared to pay the full cost of the second cable and isolator for improved security.

Refer to Section 8 for customer supply arrangement.
<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Up to 630 MPS</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>315 or 1000 Non-MPS</td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>1000 Non-MPS</td>
<td></td>
</tr>
</tbody>
</table>

**HV System Arrangement**

- Optional – Dependant on neighbouring network configuration and TX size - Design note 4
- Can be overhead if the distance is more than 30m
- Substation does not need provision for HV switchgear - Design note 1

**Drawings** to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM

**DSPM Section 3 Substation Drawings**

Refer to the DSPM for substation technical and engineering details

Refer to Section 8 for customer supply arrangement

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9.3.5 Overhead customer owned

<table>
<thead>
<tr>
<th>Loads Range</th>
<th>HV System Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1.5 MVA up to 2 MVA</td>
<td></td>
</tr>
<tr>
<td>Dependant on circumstances this arrangement may be considered for a HV customer whose load is ≤ 2MVA but &gt; 1.5 MVA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;1.5 MVA up to 2 MVA</td>
<td></td>
</tr>
<tr>
<td>Alternative to the above where the customer is prepared to pay the full cost of the 2nd cable and isolator for improved security</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;2 MVA up to 4 MVA</td>
<td></td>
</tr>
<tr>
<td>Each switchboard is supplied off a separate feeder (Two feeders operating radially) – Note 11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Board configuration depends upon installation Max load on each board is 2 MVA</td>
<td></td>
</tr>
</tbody>
</table>

Upstream metering unit isolator required for outdoor substations

Design note 7

Space to always be provided for a 2nd WP isolator

Design note 2

Customer

N.O.P. at either isolator

Design note 11

Upstream metering unit isolator required for outdoor substations

Design note 7

Customer

Max load on each board is 2 MVA

Design note 7

Customer

Board configuration depends upon installation

Max load on each board is 2 MVA

Design note 7

Customer

Upstream metering unit isolator required for outdoor substations

Design note 7

Customer

Upstream metering unit isolator required for outdoor substations

Design note 7

Customer

Upstream metering unit isolator required for outdoor substations

Design note 7

Customer

Upstream metering unit isolator required for outdoor substations

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Design note 7

Customer

Upstream metering unit isolator required for outdoor substations

Design note 7

Customer

Upstream metering unit isolator required for outdoor substations

Design note 7

Customer
Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13.

Design note 2

Fire Segregated – Design note 9

Board configuration depends upon installation

Customer

Design note 7
Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM.

Dependant on circumstances this arrangement may be considered for a HV customer whose load is ≤ 2 MVA but > 1.5 MVA.

>2 MVA up to 4 MVA

Alternative to the above where the customer is prepared to pay the full cost of the 2nd cable and isolator for improved security.

>4 MVA up to 8 MVA

Each switchboard is supplied off a separate feeder (Two feeders operating radially) – Note 11.
Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13

Design note 2

Design note 7

Design note 9

Board configuration depends upon installation

Board configuration depends upon installation

Customer

Customer

HV System Arrangement

Loads Range

Comments:

Above 8 MVA

11 kV Overhead Supply

Customer Owned Substation

Typical Metro

Distribution Customer Connection Requirements

Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM

Refer to the DSPM for substation technical and engineering details.
Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM. 

Dependant on circumstances this arrangement may be considered for a HV customer whose load is ≤ 2 MVA but > 1.5 MVA.

>2 MVA up to 4 MVA

Alternative to the above where the customer is prepared to pay the full cost of the 2nd cable and isolator for improved security.

>4 MVA up to 8 MVA

Each switchboard supplied from a separate leg of a Y split feeder, may be from the same or different feeders – Note 11.

Board configuration depends upon installation.

Max load on each board is 4 MVA.

Customer

Design note 2

Design note 2

Fire Segregated – Design note 9

Customer

Design note 2

Design note 2

Customer

Design note 7

Board configuration depends upon installation.

Max load on each board is 4 MVA.
Distribution Customer Connection Requirements

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January 2020

Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM.

**Loads Range**

<table>
<thead>
<tr>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;8 MVA up to 15 MVA</td>
</tr>
</tbody>
</table>

Single dedicated feeder from the zone substation to the customer. (Minimum arrangement) – Note 13.

**HV System Arrangement**

- Single dedicated feeder from the zone substation to the customer. (Minimum arrangement) – Note 13.
- Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13.
- Note: Can also be used as an alternative to the above where the customer is prepared to pay the additional costs. In such cases isolators can be used in place of circuit breakers and one WP bus section switch must be a N.O.P. Notes 11 & 13.

Above 15 MVA

Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13.

**Board configuration depends upon installation**

Refer to the DSPM for substation technical and engineering details.
### Loads Range

<table>
<thead>
<tr>
<th>Comments</th>
<th>HV System Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2 MVA up to 4 MVA</td>
<td></td>
</tr>
<tr>
<td>Dependant on circumstances this arrangement may be considered for a HV customer whose load is ≤ 2MVA but &gt; 1.5 MVA</td>
<td></td>
</tr>
<tr>
<td>&gt;4 MVA up to 8 MVA</td>
<td></td>
</tr>
<tr>
<td>Each switchboard supplied from a separate leg of a Y split feeder. (May be from the same or different feeders)</td>
<td></td>
</tr>
<tr>
<td>This arrangement may also be considered for loads as above where the customer is prepared to pay the full cost of the additional metering unit and the two additional isolators.</td>
<td></td>
</tr>
</tbody>
</table>

#### Customer

Each switchboard supplied from a separate leg of a Y split feeder.

**Declarative Note**: Each switchboard supplied from a separate leg of a Y split feeder. (May be from the same or different feeders)

**Design Note**: This arrangement may also be considered for loads as above where the customer is prepared to pay the full cost of the additional metering unit and the two additional isolators.

Refer to the DSPM for substation technical and engineering details.
Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM.

**Single dedicated feeder from a zone substation to the customer. – Note 13**

- **Above 15 MVA**
  - Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13.
  - Note: Can also be used as an alternative to the above where the customer is prepared to pay the additional costs.
  - In such cases the customer’s bus section would be a N.O.P. complete with WP lock. Notes 11 and 13.

**Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13.**

- Design note 7

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Dependant on circumstances this arrangement may be considered for a HV customer whose load is ≤ 2 MVA but > 1.5 MVA.

>2 MVA up to 4 MVA

Each switchboard supplied from a separate leg of a Y split feeder. (May be from the same or different feeders)

This arrangement may also be considered for loads as above where the customer is prepared to pay the full cost of the additional metering unit and the two additional isolators.

>4 MVA up to 8 MVA
Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM.

Single dedicated feeder from a zone substation to the customer. – Note 13

Above 15 MVA

Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13

Note: Can also be used as an alternative to the above where the customer is prepared to pay the additional costs.

In such cases the customer’s bus section would be a N.O.P. complete with WP lock. Notes 11 and 13.
9.3.6 Underground district and sole use

### Transformer Connection Requirements

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Up to 630 MPS</td>
<td></td>
</tr>
</tbody>
</table>

Remote fuse switch available

- Design note 3

Refer to Section 8 for customer supply arrangement

### District and Sole Use Substations

- Typical Metro

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
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</thead>
<tbody>
<tr>
<td>One</td>
<td>Up to 630 MPS</td>
<td></td>
</tr>
</tbody>
</table>

HV switchgear required

Substation located within 30m of the property boundary - Note 2

- Design note 2

Refer to Section 8 for customer supply arrangement

### 6.6kV Underground Supply

- Design note 3

Refer to Section 8 for customer supply arrangement

### RMU to be installed within 5m of the property boundary

- Design note 2

Refer to Section 8 for customer supply arrangement

### Remote fuse switch available

- Design note 3

Refer to Section 8 for customer supply arrangement
HV System Arrangement

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>315 to 1000 Non-MPS</td>
<td>HV switchgear required. Substation located within 30m of the property boundary. - Note 2</td>
</tr>
<tr>
<td>One</td>
<td>315 to 1000 Non-MPS</td>
<td>HV switchgear required. Substation located more than 30m from the property boundary - Note 2</td>
</tr>
<tr>
<td>Two</td>
<td>630 to 1000 Non-MPS</td>
<td>Substation located within 30m of the property boundary. - Note 2. Where one large transformer will provide the load, the customer must pay the full cost difference between this and the single transformer arrangement</td>
</tr>
</tbody>
</table>

Design note 2
Refer to Section 8 for customer supply arrangement

RMU to be installed within 5m of the property boundary -

Design note 2
Refer to Section 8 for customer supply arrangement

Design note 3
Refer to Section 8 for customer supply arrangement

Refer to the DSPM for substation technical and engineering details

Drawings to be read in conjunction with applicable Legislation, Industry Standards, Codes including the WAER and WADCM

6.6kV Underground Supply
District and Sole Use Substations
Typical Metro

Date #     Aug 2018

Distribution Customer Connection Requirements

Uncontrolled document when printed
Refer to DM for current version

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### 11kV Underground Supply

**District and Sole Use Substations**

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Up to 630 MPS</td>
<td>Remote fuse switch available</td>
</tr>
</tbody>
</table>

**HV System Arrangement**

- **Remote fuse switch available**
  - Design note 3
  - Refer to Section 8 for customer supply arrangement

**HV switchgear required**

- Substation located within 30m of the property boundary. - Note 2

- **Remote fuse switch**
  - Design note 2
  - Refer to Section 8 for customer supply arrangement

- **RMU to be installed within 5m of the property boundary**
  - Design note 2
  - Refer to Section 8 for customer supply arrangement

<table>
<thead>
<tr>
<th>Transformer #</th>
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</thead>
<tbody>
<tr>
<td>One</td>
<td>315 to 1000 Non-MPS</td>
<td>Remote fuse switch available</td>
</tr>
</tbody>
</table>

**Design note 2**

Refer to Section 8 for customer supply arrangement

**Design note 3**

Refer to Section 8 for customer supply arrangement

Refer to the DSPM for substation technical and engineering details.
### HV System Arrangement

**Transformer #**

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<tbody>
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**HV switchgear required.**

Substation located within 30m of the property boundary. - Note 2

![Diagram](image1)

Refer to Section 8 for customer supply arrangement

---

**Transformer #**

<table>
<thead>
<tr>
<th>Transformer Rating (kVA)</th>
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<tbody>
<tr>
<td>315 to 1000 Non-MPS</td>
<td></td>
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</table>

**HV switchgear required.**

Substation located more than 30m from the property boundary. Note 2

![Diagram](image2)

Refer to Section 8 for customer supply arrangement

---

**Transformer #**

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<thead>
<tr>
<th>Transformer Rating (kVA)</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>630 to 1000 Non-MPS</td>
<td></td>
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</table>

**Remote fuse switch available.**

![Diagram](image3)

Refer to Section 8 for customer supply arrangement

---

**Transformer #**

<table>
<thead>
<tr>
<th>Transformer Rating (kVA)</th>
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</thead>
<tbody>
<tr>
<td>630 to 1000 Non-MPS</td>
<td></td>
</tr>
</tbody>
</table>

Substation located within 30m of the property boundary. - Note 2. Where one large transformer will provide the load, the customer must pay the full cost difference between this and the single transformer arrangement

![Diagram](image4)

Refer to Section 8 for customer supply arrangement
Where the transformers are to be located within 30m of the property boundary, the HV switchroom can be adjacent to the transformers. However, where the transformers are to be located more than 30m from the boundary the HV switchboard is to be located separately from the transformers and should be within 5m of the boundary. Where less transformers will provide the load, the customer must pay the full cost of the difference between this and the minimum arrangement.

Refer to Section 8 for customer supply arrangement.
22kV Underground Supply
District and Sole Use Substations
Typical Metro or Rural

<table>
<thead>
<tr>
<th>Transformer #</th>
<th>Transformer Rating (kVA)</th>
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<tbody>
<tr>
<td>One</td>
<td>Up to 630 MPS</td>
<td></td>
</tr>
</tbody>
</table>

Remote fuse switch available

- Remote fuse switch

Design note 3

Refer to Section 8 for customer supply arrangement

HV System Arrangement

Design note 2

HV switchgear required

Substation located within 30m of the property boundary. - Note 2

Design note 2

Refer to Section 8 for customer supply arrangement

Design note 3

RMU to be installed within 5m of the property boundary

Design note 2

Refer to Section 8 for customer supply arrangement

One

Up to 630 MPS

HV switchgear required.

Substation located more than 30m from the property boundary. Note 2

One

Up to 1000 Non-MPS

Remote fuse switch available

Design note 3

Remote fuse switch

Design note 3

Refer to Section 8 for customer supply arrangement

Refer to the DSPM for substation technical and engineering details

DSPM Section 3 Substation Drawings

Refer to the DSPM for substation technical and engineering details

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Refer to DM for current version
### HV System Arrangement

#### Transformer Details

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<thead>
<tr>
<th>Transformer #</th>
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<tbody>
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<td>315 to 1000</td>
<td>Non-MPS</td>
</tr>
</tbody>
</table>

- HV switchgear required.
- Substation located within 30m of the property boundary. - Note 2

![Diagram of HV System Arrangement with Transformer and Switchgear](image)

**Design note 2**

Refer to Section 8 for customer supply arrangement.

#### Transformer Details

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<td>Non-MPS</td>
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- HV switchgear required.
- Substation located more than 30m from the property boundary - Note 2

![Diagram of HV System Arrangement with Transformer and Switchgear](image)

**Design note 2**

Refer to Section 8 for customer supply arrangement.

#### Transformer Details

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<tbody>
<tr>
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<td>Non-MPS</td>
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</tbody>
</table>

- Remote fuse switch available

![Diagram of HV System Arrangement with Transformer and Switchgear](image)

**Design note 2**

Refer to Section 8 for customer supply arrangement.

#### Transformer Details

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- Substation located within 30m of the property boundary. - Note 2. Where one large transformer will provide the load, the customer must pay the full cost difference between this and the single transformer arrangement

![Diagram of HV System Arrangement with Transformer and Switchgear](image)

**Design note 2**

RMU to be installed within 5m of the property boundary.

Refer to Section 8 for customer supply arrangement.
Where the transformers are to be located within 30m of the property boundary, the HV switchroom can be adjacent to the transformers. However, where the transformers are to be located more than 30m from the boundary, the HV switchboard is to be located separately from the transformers and should be within 5m of the boundary. Where less transformers will provide the load, the customer must pay the full cost of the difference between this and the minimum arrangement.
### 9.3.7 Underground customer owned

#### Loads Range

<table>
<thead>
<tr>
<th>Comments</th>
<th>HV System Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1.5 MVA up to 2 MVA</td>
<td>Design note 7</td>
</tr>
<tr>
<td>Dependant on circumstances this arrangement may be considered for a HV customer whose load is ≤ 2MVA but &gt; 1.5 MVA.</td>
<td>Upstream metering unit isolator required for outdoor substations</td>
</tr>
<tr>
<td>&gt;2 MVA up to 4 MVA</td>
<td>Board configuration depends upon installation</td>
</tr>
<tr>
<td>Each switchboard is supplied off a separate feeder (Two feeders, operating radially) – Note 11</td>
<td>Max load on each board is 2 MVA</td>
</tr>
</tbody>
</table>

#### Design notes

- Design note 2
- Design note 7

Refer to the DSPM for substation technical and engineering details.

---

**Notes:**
- Upstream metering unit isolator required for outdoor substations.
- Board configuration depends upon installation.
- Max load on each board is 2 MVA.
- Customer configuration.

---

**Drawings:**
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Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection. Notes 12 and 13.

Board configuration depends upon installation

Customer

Design note 2

Fire Segregated – Design note 9

Design note 2

Customer

Board configuration depends upon installation

Design note 7

Design note 7
Dependant on circumstances this arrangement may be considered for a HV customer whose load is ≤ 2MVA but > 1.5 MVA.

Each switchboard is supplied off a separate feeder (Two feeders operating radially) – Design note 2

>4 MVA up to 8 MVA

- Board configuration depends upon installation
- Max load on each board is 4 MVA

Fire Segregated – Design note 9

Refer to the DSPM for substation technical and engineering details.
Above 8 MVA

Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection.

Notes 12 and 13.

Notes

12

13

Above 8 MVA

Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection.

Notes 12 and 13.
### Loads Range

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</tr>
</tbody>
</table>

Each switchboard is supplied from a separate leg of a Y split feeder (May be from the same or difference feeders) – Note 11

>4 MVA up to 8 MVA

Circuit breaker or fused switch depend on Tx size

Upstream metering unit isolator required for outdoor substations

Board configuration depends upon installation

Max load on each board is 4 MVA

Refer to the DSPM for substation technical and engineering details.
**Loads Range**

<table>
<thead>
<tr>
<th>Comments</th>
<th>HV System Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;8 MVA up to 15 MVA</td>
<td>Single dedicated feeder from the zone substation to the customer. (Minimum arrangement) – Note 13</td>
</tr>
</tbody>
</table>

**Notes**

- Can also be used as an alternative to the above where the customer is prepared to pay the additional costs. In such cases isolators can be used in place of circuit breakers and one WP bus section switch must be a N.O.P. Notes 11 & 13.

Above 15 MVA

Dedicated feeders from the same zone substation busbar operating on a closed ring with directional O/C and E/F or pilot protection.

Notes 12 and 13

---

Refer to the DSPM for substation technical and engineering details.