# Section 8: LV systems from SWER

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# Key components of this section

- Earthing and safety of LV systems.
- Single phase and dual phase LV.
- Bare wire and Aerial bundle conductor considerations.
- Service connections, metering and protection.

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# Earthing and safety of LV systems

***Earthing and safety of LV systems.***

- LV system and earthing essentially the same as for conventional (non SWER) systems.

- Separate earthing - MV/LV - 6 kV SA installed between earthing systems.

- Single point earthing- LV system.
  - Dangers of load side return - broken neutral.
  - Loop impedance tests.
  - Consumer “earth’s” and impact on separation.

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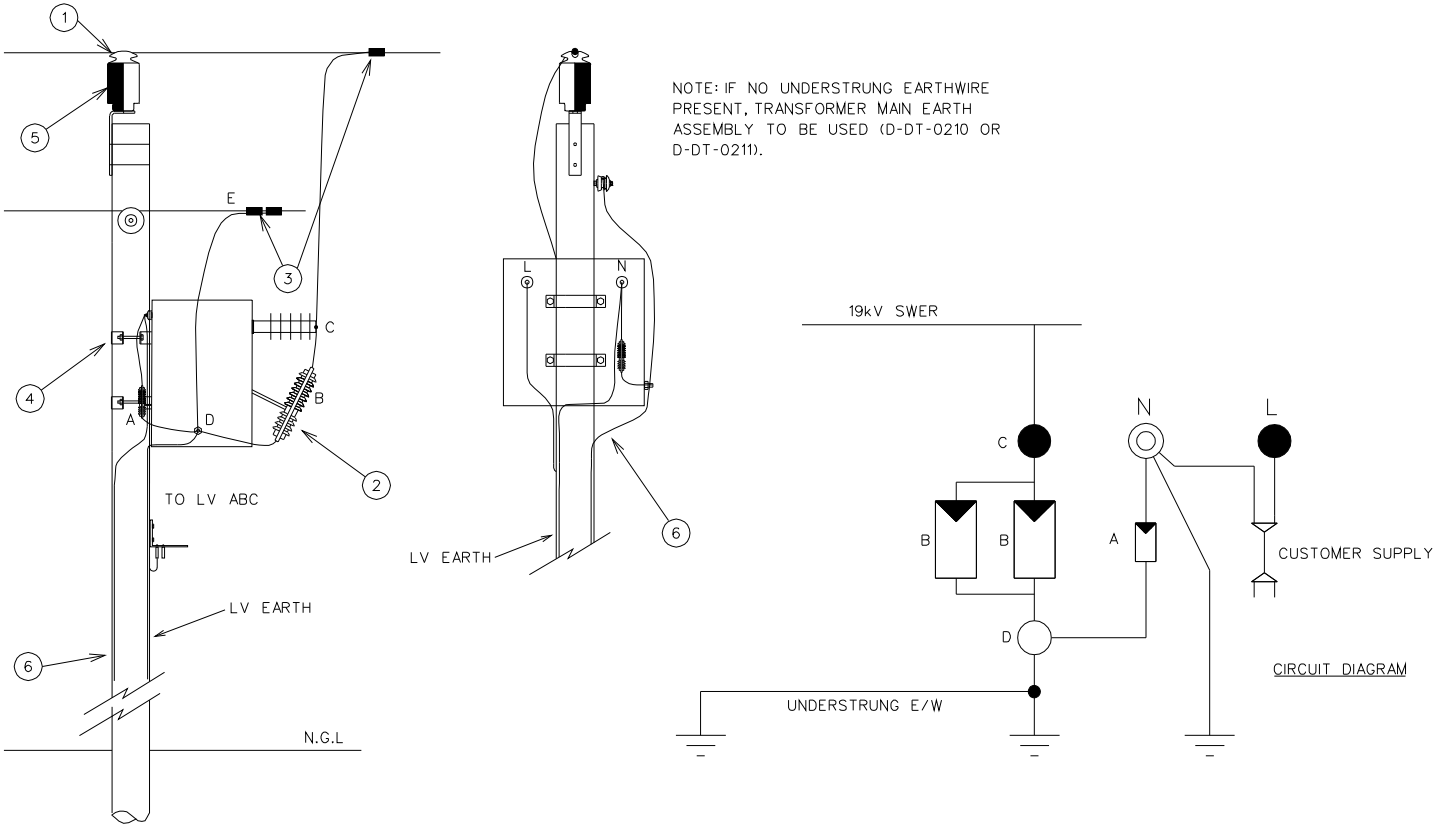
# Earthing and safety of LV systems

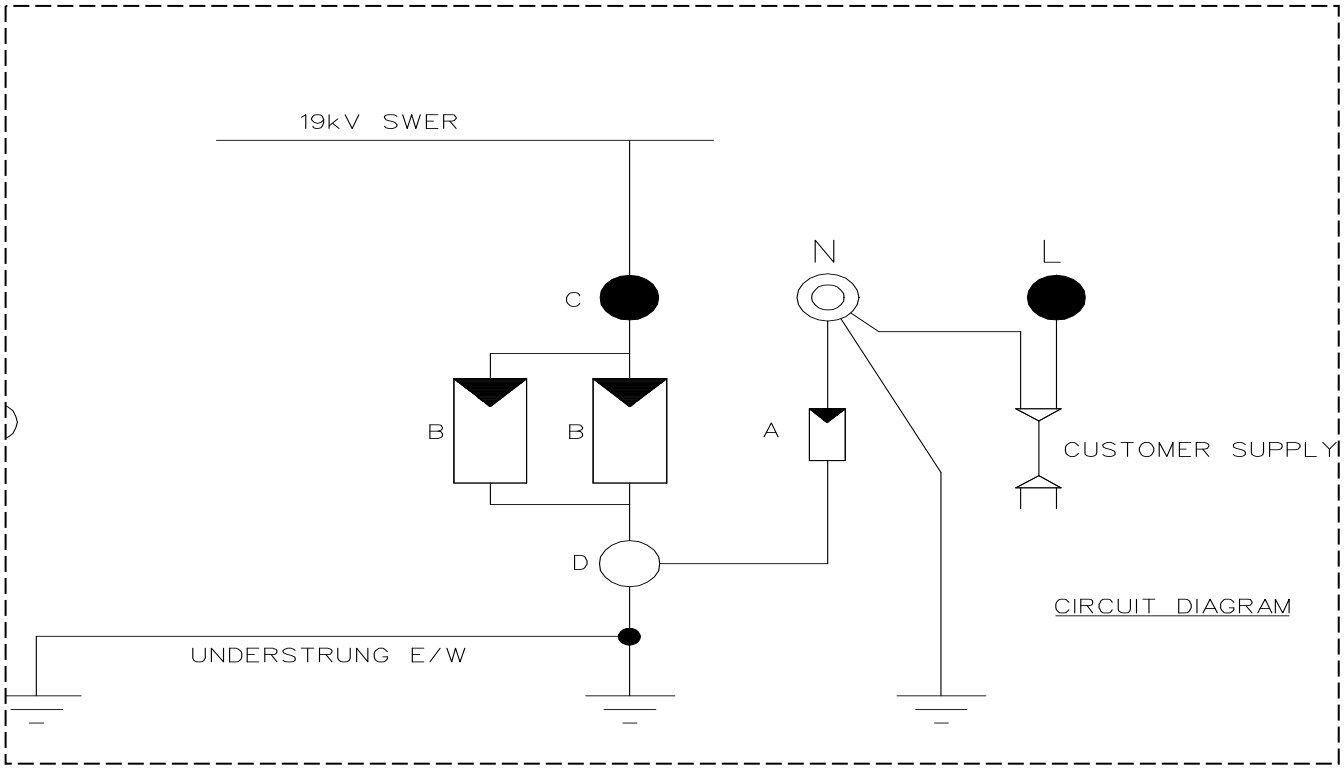



REFER TO LOW VOLTAGE RETICULATION STANDARD , PART 3, FOR DETAIL OF LV CONNECTIONS TO TRANSFORMER, LV NETWORK AND EARTH.

# Service connections, metering and protection.

MV/LV earth separation - 6 kV SA

# Earthing and safety of LV systems



# LV systems from SWER.

LV systems emanating from SWER.

Systems -

- Single phase and dual phase.

Line technology applications -

- Aerial bundled conductor (ABC).
- Bare wire.
- Hybrids (ABC backbone and bare wire laterals).

# LV systems from SWER.

LV ABC system
Bare neutral.

# LV systems from SWER.

LV open wire system – (no vegetation)

# LV systems from SWER.

LV ABC with concentric service from a 2 way service box.

# Single and dual phase LV application. *Layout design, technology options and upgradeability.*

***Layout design, technology options and upgradeability***.

- Transformer placement and upgrade considerations.

- System deployment and reinforcement.
  - *(MV) SWER*
  - Transformer
  - LV backbone
  - Single Phase and Dual Phase deployment.

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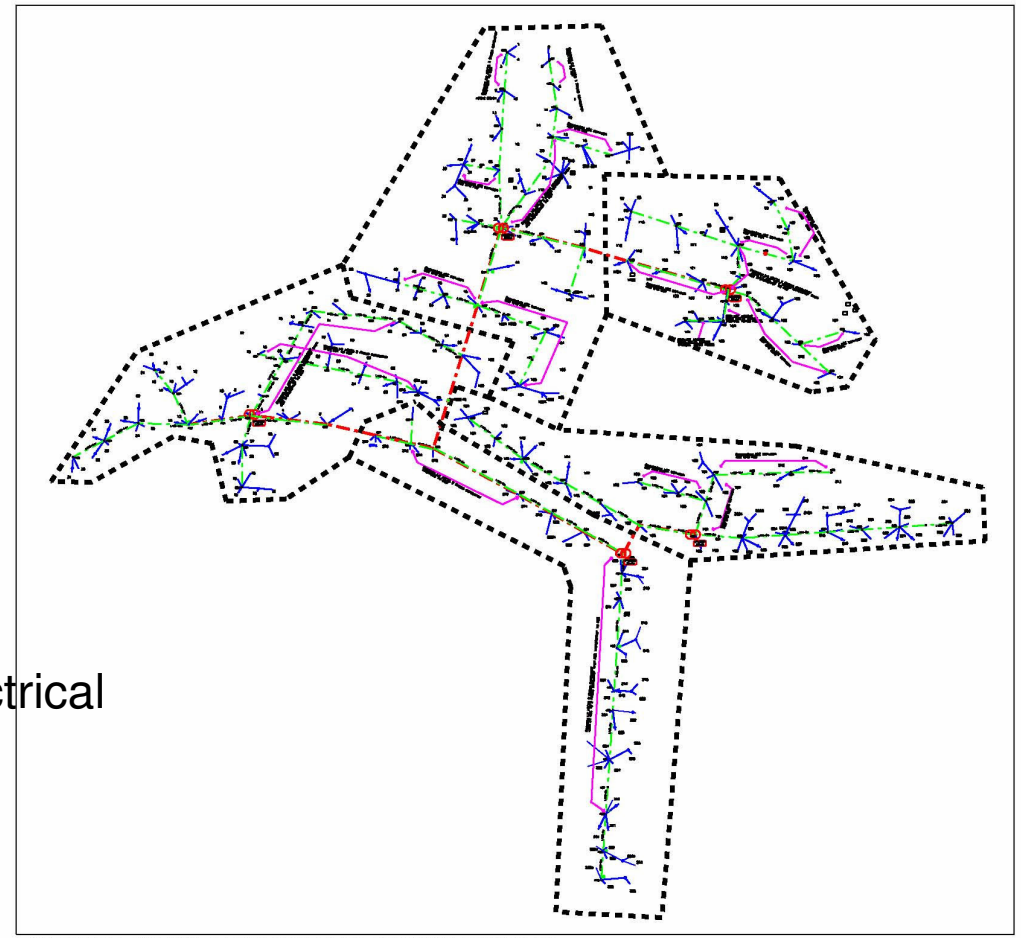
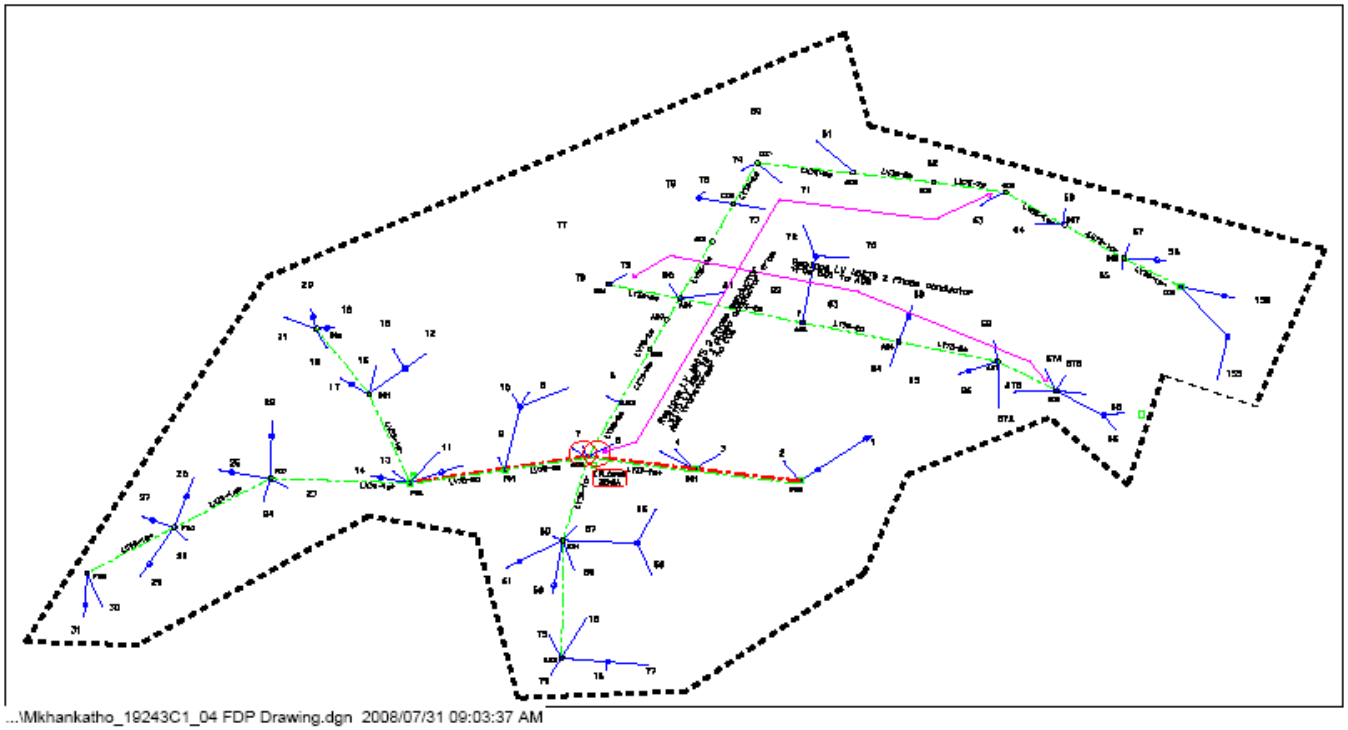
# Single and dual phase LV application. *Layout design, technology options and upgradeability.*

Typical village electrical layout



# Single and dual phase LV application. *Layout design, technology options and upgradeability.*




Typical transformer zone with LV design layout

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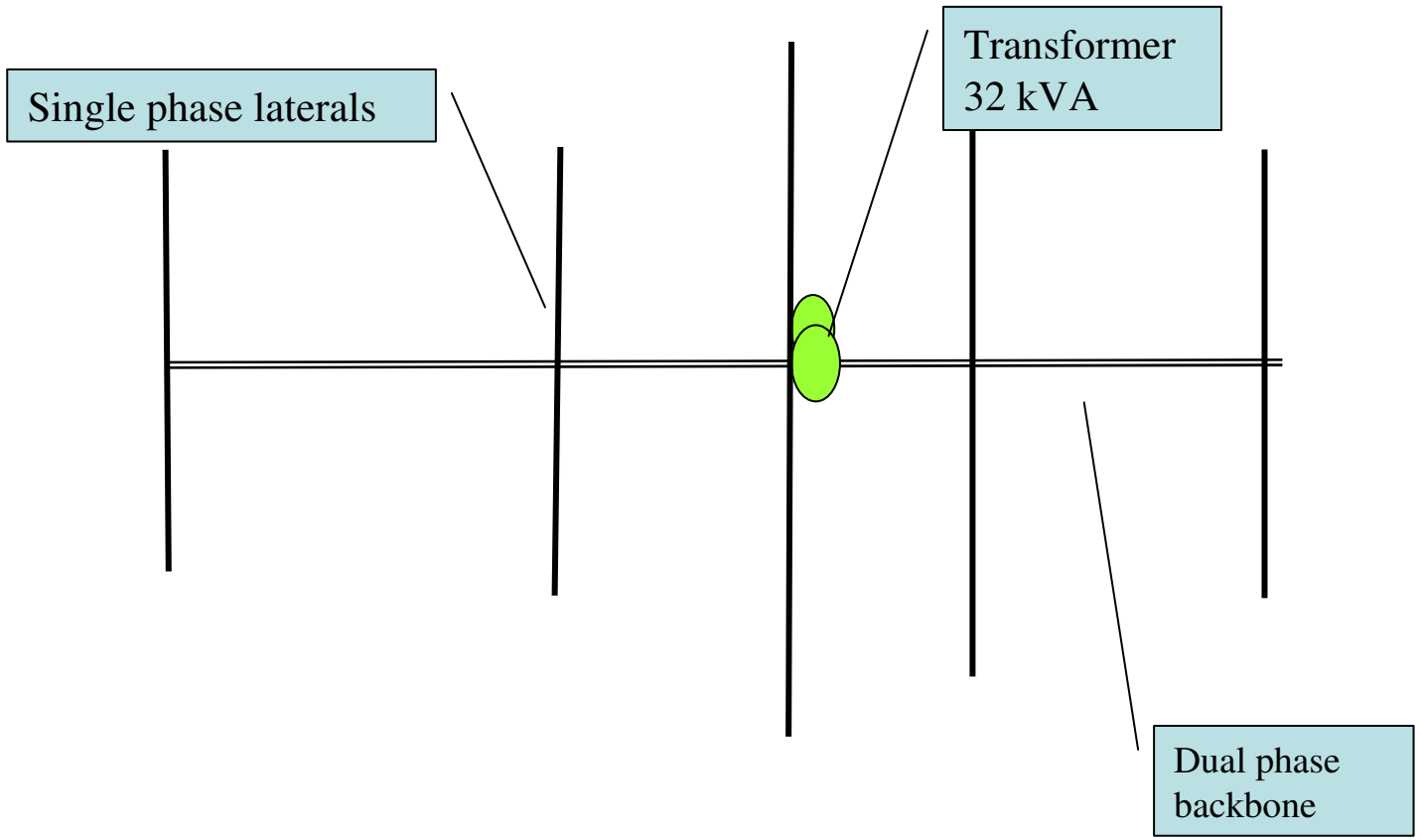
# Single and dual phase LV application. *Layout design, technology options and upgradeability.*




Phase 1

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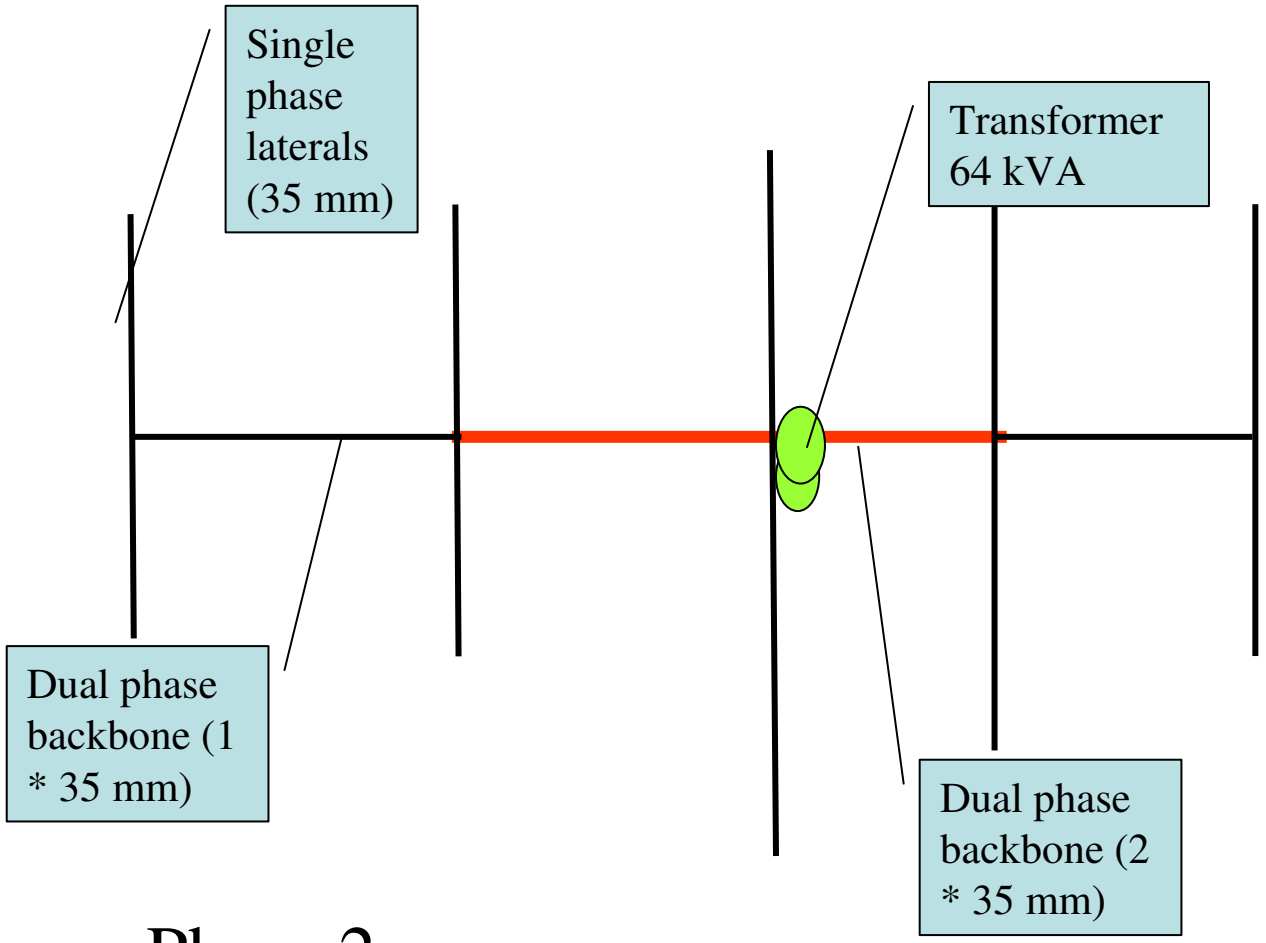
# Single and dual phase LV application. *Layout design, technology options and upgradeability.*




Phase 2

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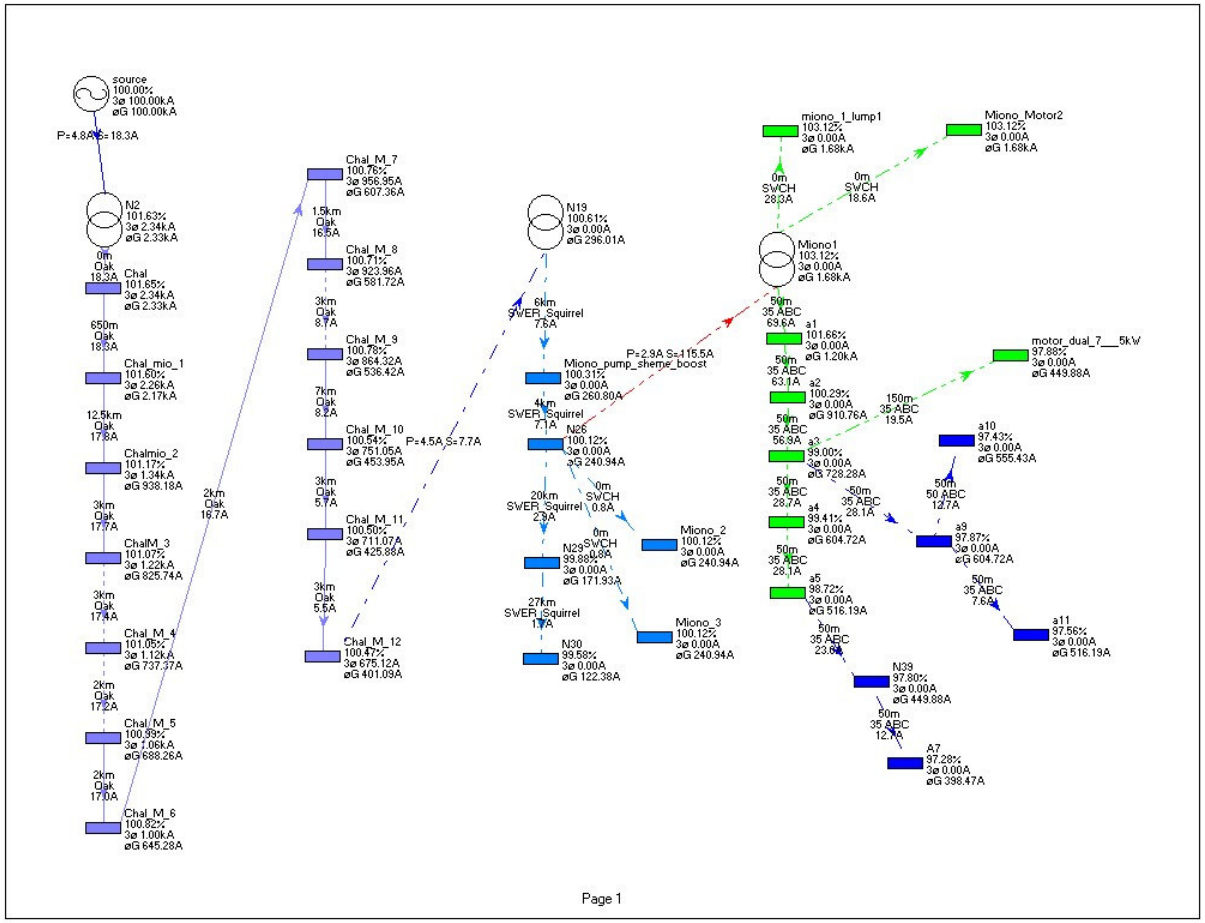
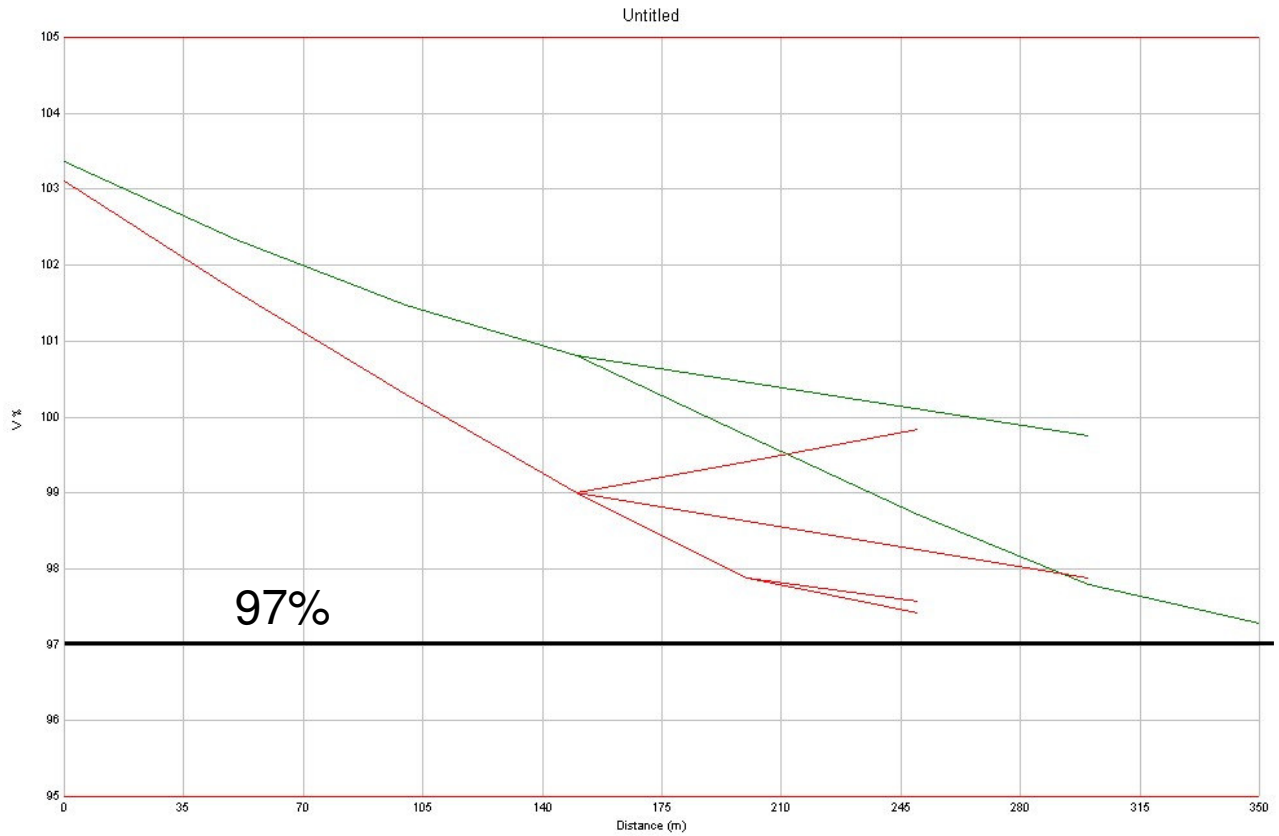
# Single and dual phase LV application. *Layout design, technology options and upgradeability.*




Example of backbone upgrade effect - Network Configuration

# Single and dual phase LV application. *Layout design, technology options and upgradeability.*




Example of backbone upgrade effect - Initial 0.3 kVA 35 mm dual backbone.

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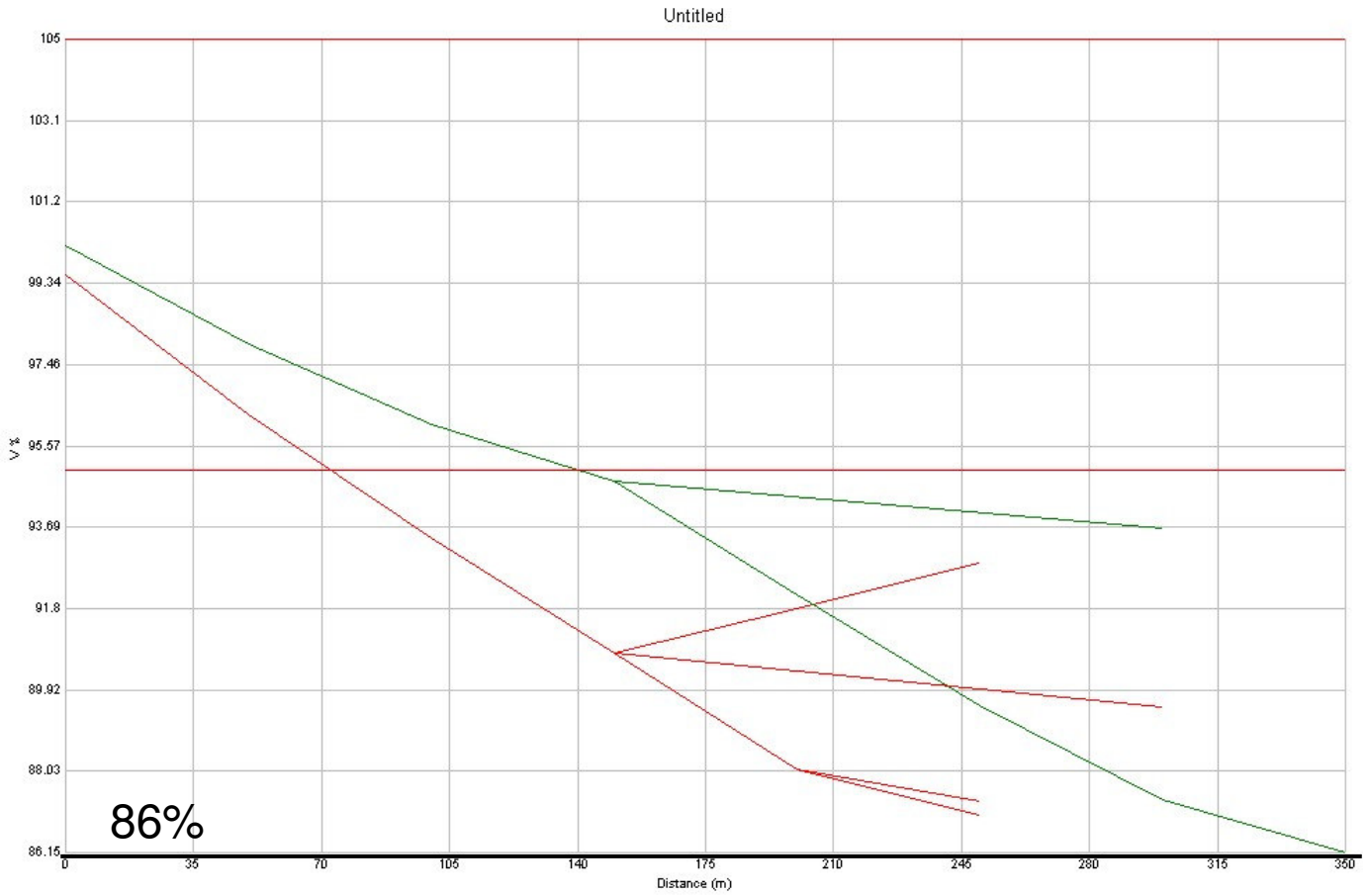
# Single and dual phase LV application. *Layout design, technology options and upgradeability.*




Example of backbone upgrade effect - Final 0.8 kVA - 35 mm dual backbone.

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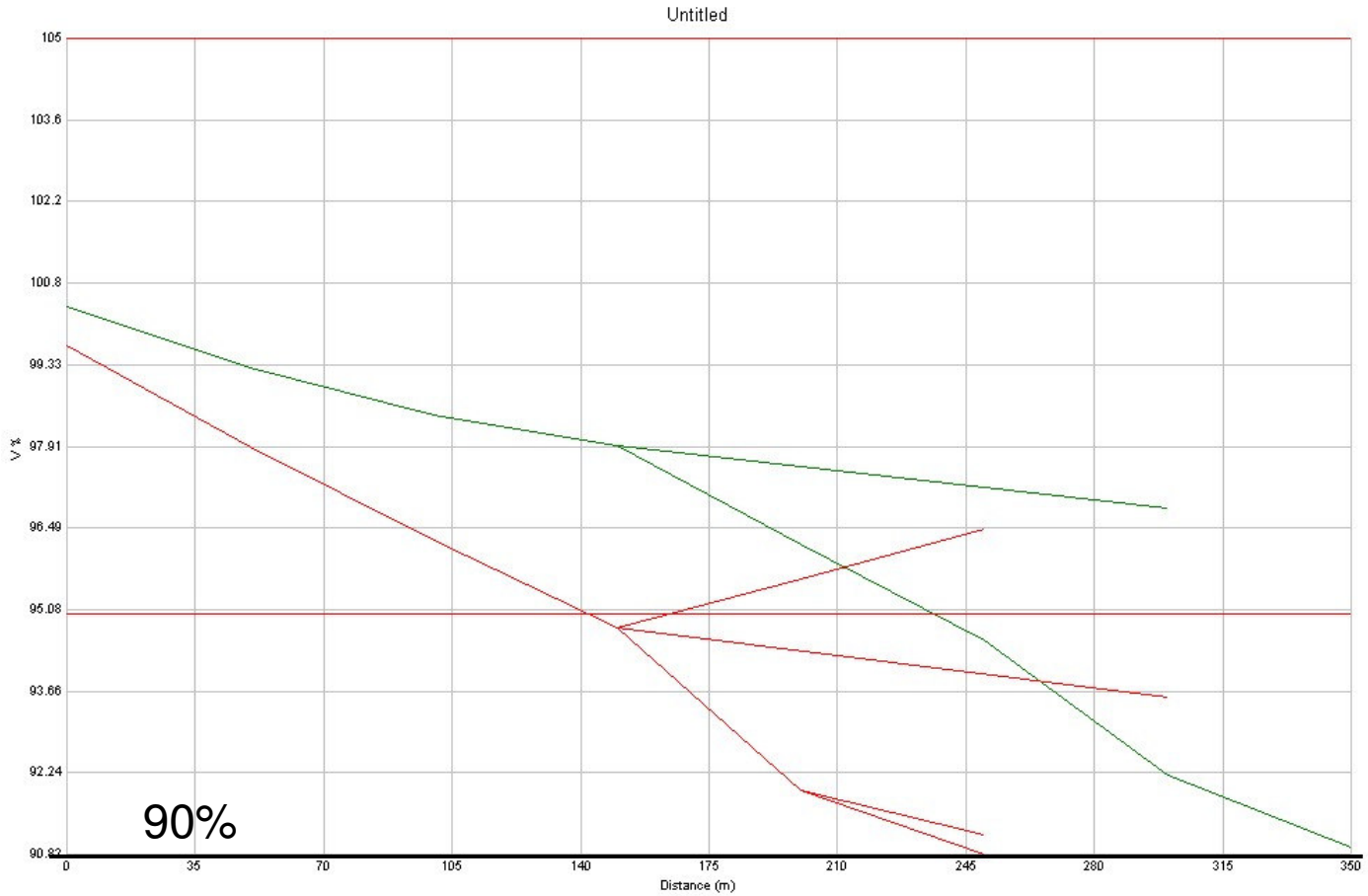
# Single and dual phase LV application. *Layout design, technology options and upgradeability.*




Example of backbone upgrade effect - Final 0.8 kVA -70 mm dual backbone.

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# Bare wire or Aerial Bundled Conductor (ABC) considerations

***Bare wire or ABC considerations***

- ***Bare wire .***

- Pros
  - Simple to install and fault find.
  - Low cost material.
  - Limited inventory - same components as MV.

- Con's
  - Protection on long feeders can be problematic.
  - Exposed system.

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# Bare wire or ABC considerations

***Bare wire or ABC considerations***

- ***Aerial bundled conductor.***
  - Pro's
    - Insulated to a large extent.
    - Less stringent protection requirements.
    - Lower clearance requirements.
  - Con's
    - Components are specific to applications.
    - Neutral exposed.
    - Difficult to fault find.
    - Skills required to install and connect.
    - A number of systems available.

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# Service connections, metering and protection

## LV protection and metering configuration.

- LV reticulation system protection - LV fuse units - 80/63 A

- Service box protection - 50A slow curve MCB's. Grading between the feeder protection and customer protection.

- Ensure adequate fault levels at the critical points on the LV system.

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# LV systems from SWER.

Typical configuration SWER MV, Single phase Trans., LV protection, LV ABC system (Bare neutral).

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# Bare wire or ABC considerations

Typical service installation

# Service connections, metering and protection.

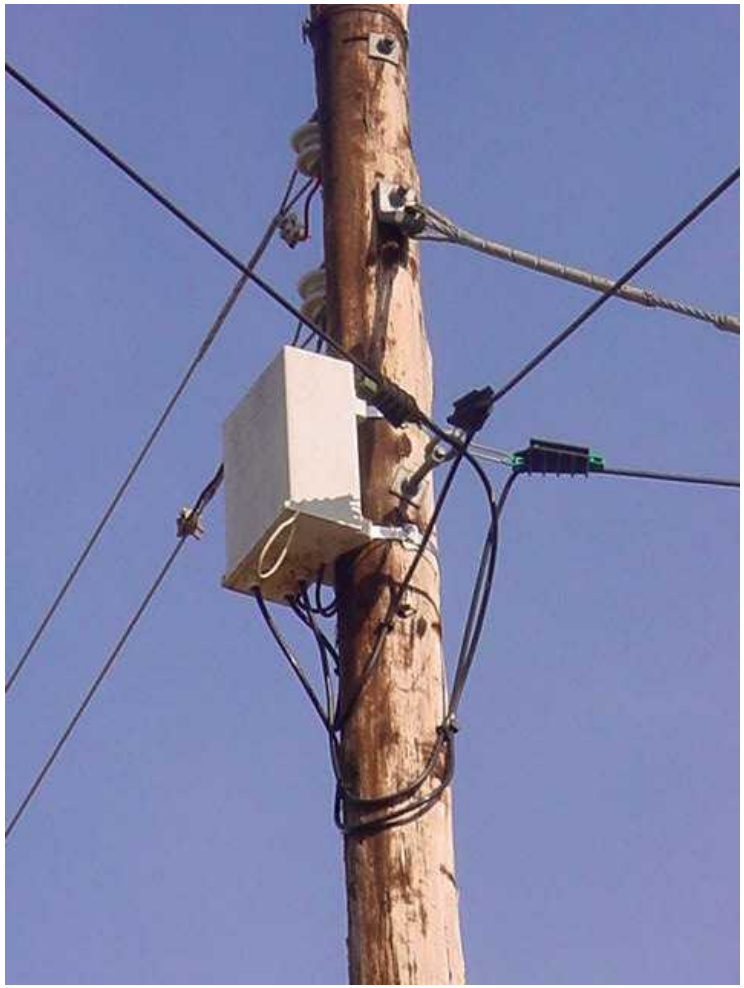
8 way service box and concentric overhead service.

# Service connections, metering and protection

Service connections, metering and protection.

- Service connections.
  - 20 and 60 Ampere options
  - Service technology - Concentric service cable - Can be installed overhead or underground.
  - Stranded copper - 4, 10 and 16 $mm^2$ options.

# Service connections, metering and protection



8 way service box and concentric overhead service.

# Service connections, metering and protection

Concentric intermediate clamp.

# Service connections, metering and protection

Concentric termination - wedge clamp

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# Service connections, metering and protection

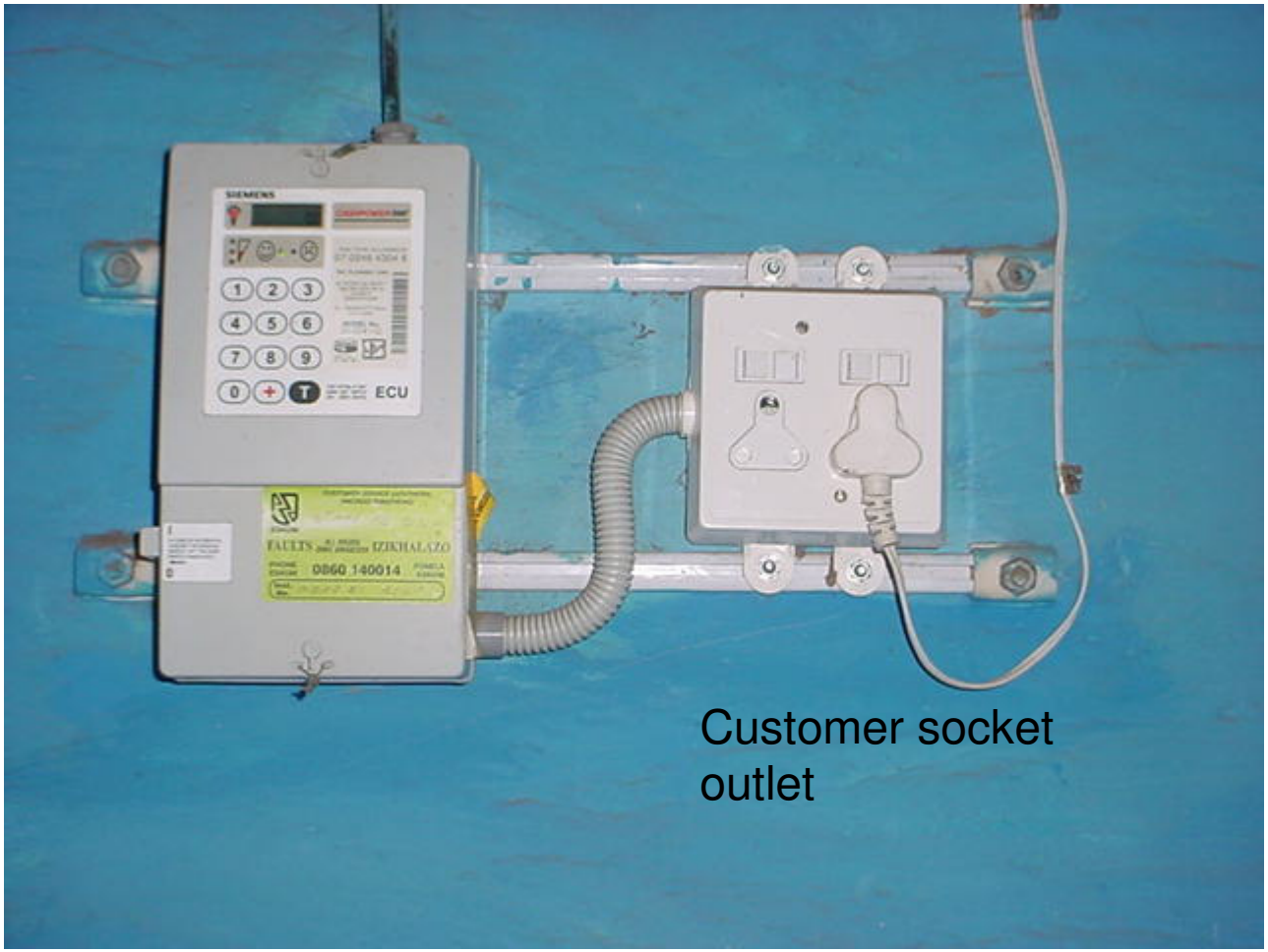
Service connections, metering and protection.

Customer metering

- 20A - Electronic control unit with electronic earth leakage unit (ELU) as an integral part.
- 60A - Electronic meter, main board with separate ELU

# Service connections, metering and protection

Integral meter(pre paid) LV protection and earth leakage device




2 - 20 A Service connection (ECU) and socket outlet.

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# Service connections, metering and protection

Typical 60 A supply arrangement – separate (split meter) with “ready board”.