## **Single Line Diagram Guideline for Projects**



The AESO requires a single line diagram (SLD) of the market participant and TFO's facilities in order to develop the functional specification in Stage 3. The market participant and TFO are expected to prepare the SLD of their facility according to the requirements in this guideline.

## **Format**

The AESO recommends the market participant or TFO prepare and submit the SLD in Microsoft Visio format, which is editable by the AESO, to aid in the development of the functional specification.

## Requirements

The SLD is expected to include all equipment related to topology including:

- generator or any power resource (including solar, wind, and storage energy);
- transformer:
- transmission line:
- switching device;
- bus;
- feeder; and
- VAR device.

The SLD is expected to include information about key engineering parameters and ratings which impact functionality of the facility such as:

- generator: include at least MARP in MW and terminal voltage;
- transformer: include at least voltage rating in kV, capacity rating in MVA, LTC capability, and winding configuration;
- switching device: include at least device type and connectivity;
- VAR device: include at least the VAR capacity; and
- load or feeder.

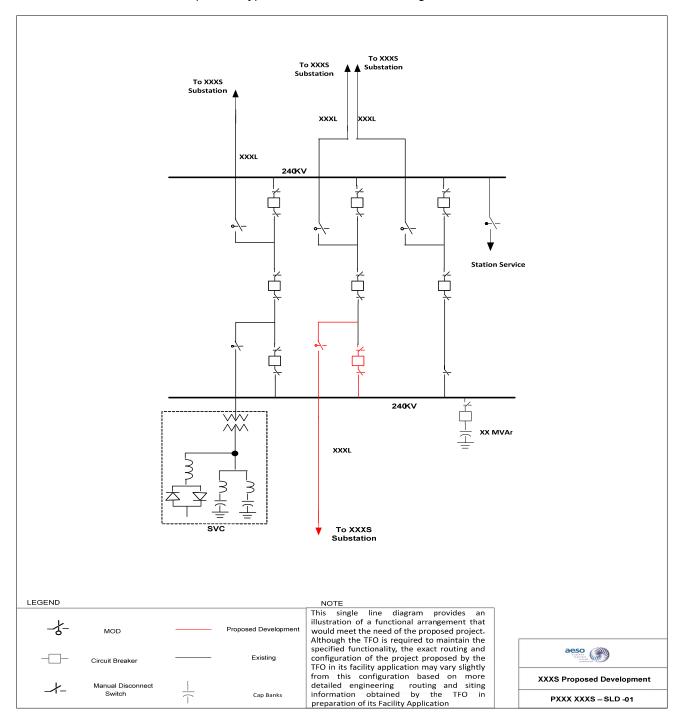
The SLD is expected to also show the following:

- legend for facility;
- project information: project name, project number and location;
- facility name and code (including substation and line number);
- revenue meter location;
- demarcation line to show ownership; and
- topology of point of delivery connection on the transmission side.



## **Examples**

Example #1: Typical Transmission Switching Substation





**XXXS** Phase 1 Phase 2 GTG 1 19kV GTG 2 STF 1 19kV XXXMVA XXXMVA XXXMVA 19/4.16kV 19/4.16kV **W** 19/4.16kV 19/4.16kV WW XXMVA MM XXMVA 240/19kV XXXMVA 240/19kV XXXMVA 240/19kV 240/19kV XXXMVA XXXMVA XXXMVA GFO TFO XXXXL XXXXL To XXXS To XXXS LEGEND NOTE This single line diagram provides an illustration of a functional arrangement that would meet the need of the proposed project. Although the TFO is required to maintain the specified functionality, the exact routing and configuration of the project proposed by the TFO in the following the second project proposed by the TFO in aeso Phase 2 Phase 1 MOD **XXXS Substation** Circuit Breaker its facility application may vary slightly from this configuration based on more detailed engineering, routing and siting information obtained by the TFO in preparation of its Facility Application. Transformer **Proposed Development** Switch Generator PXXX-XXXS-SLD-X

Example #2: Typical Generation Plant Facility

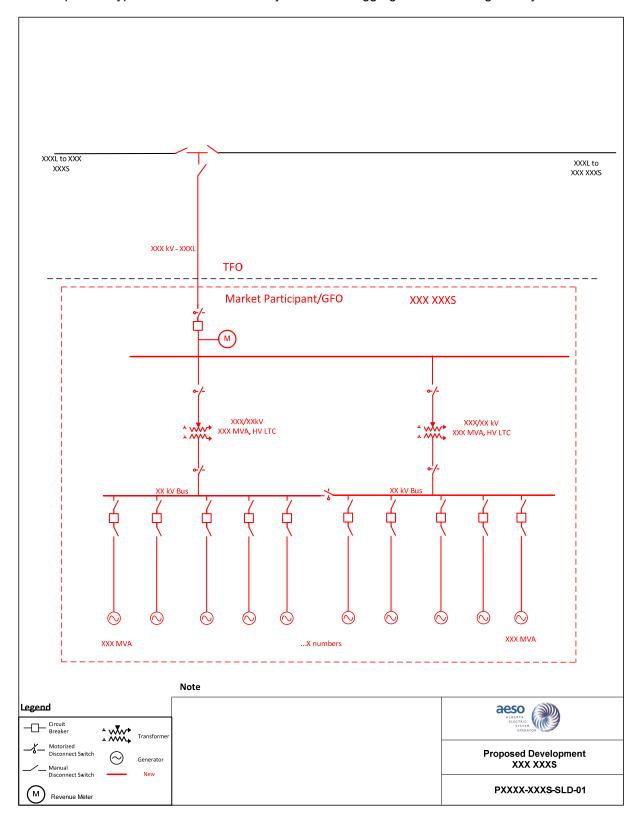


XXXL-XXX kV To XXX XXXS N. O. XXXL - XXkV XXXL - XXkV <mark>ф</mark> н. О. XXXL – XXkV To XXX XXXS XX kV Bus 2 DFO/GFOMP XXXL – XXkV To XXX XXXS Legend Note aeso  $\Box$ Transformer Voltage Ganged Air-Switch (Motor Operated) Existing Regulator XXX XXXS Substation Proposed Additions/ Upgrade **Proposed Development** Ganged Air-Switch Capacitor (Manual Operated) Relocations PXXX-XXXS-SLD-0X Remonved Manual Switch

Example #3: Typical Transmission Substation



Example #4: Typical Transmission Directly Connected Aggregated Generating Facility – Wind Farm





XXXL To 25 kV Bus-XXXS RM MVI Substation DFO Market Participant 52 25 kV RM 25 kV 25 kV 25 kV - INMI -INM WE 25/0.65 kV  $\Delta$  25/0.65 kV  $\Delta$ 25/0.65 kV 25/0.65 kV Y 4 MVA  $\Delta$  <sub>25/0.65 kV</sub> Y 4 MVA 4 MVA 4 MVA Y 4 MVA WT 3.45 MW WT 3.45 MW WT WT ŴΤ 3.45 MW 3.45 MW 3.45 MW ALBERTA ELECTRIC SYSTEM OPERATOR Legend Notes RM Revenue Meter Circuit Breaker Disconnect Switch Off load Proposed Transformer Molded Vacuum MVI XXXX WAGF Interrupter Wind Turbine Proposed Development Generator PXXXX-SLD-01

Example #5: Typical Distributed Energy Resource Connection - AGF in Wind



Example #6: Typical Distributed Energy Resource Connection - AGF in Solar

