

## TRANSMISSION AND DISTRIBUTION SYSTEM INFORMATION

Kitchener-Wilmot Hydro Inc. owns 8 transformer stations and 7 Distribution Stations to support its own power distribution system. Kitchener-Wilmot Hydro Inc.'s distribution system delivers power to end users through about 100 distribution feeders from these stations. All distribution feeders in K-W Hydro Inc.'s distribution system are supplied radially from each station. K-W Hydro Inc.'s distribution feeders operate at the following voltages (Phase-to-Phase/Phase-to-Neutral): 27.6/16kV, 13.8/8kV, 8.32/4.8kV.

The 27.6kV feeders and 8.32kV feeders cover the vast rural area in the Township of Wilmot; and the 13.8kV feeders cover the City of Kitchener and a small portion of Wilmot Township (Mannheim area). K-W Hydro Inc. has plans to convert the 8.32kV distribution system into 27.6kV distribution system in the next 15 years.

In general, the maximum total generation capacity of all DG connected to K-W Hydro Inc.'s feeders will be limited to:

- 27.6 kV Feeders: 10MW
- 13.8 kV Feeders: 5MW
- 8.32kV Feeders: 0.5MW

The 27.6 kV feeders also supply all distribution stations. The permissible generation at 27.6kV feeders may be reduced by the cumulative DG on the connected distribution stations with all connected 8.32kV feeders. The above maximum allowable DG capacity presumes 3-phase feeder with sufficient conductor size and load levels to permit the DG. The actual ability of K-W Hydro Inc.'s feeders to accept a specific DG may only be determined through a detailed engineering review at the Connection Impact Assessment stage.

For the system service areas of K-W Hydro Inc. transformer stations and distribution stations and the system capacity available to the potential renewable generation, check Kitchener-Wilmot Hydro Inc.'s website below or contact Kitchener-Wilmot Hydro Inc.

### [Map of Current System Service Areas](#)

K-W Hydro Inc.'s distribution system typically operates as multi-grounded system (3 phase 4 wire system). The transformer neutral at the station is either solidly grounded (distribution stations supplying 8.32kV feeders) or effectively grounded through a low reactance at the station (transformer stations supplying 27.6kV and 13.8kV feeders) to limit the ground fault level. The fault levels on K-W Hydro Inc. system vary from location to location and from time to time. The maximum allowable fault levels are listed in Table 1. The actual fault levels at a certain DG site will be provided at the Connection Impact Assessment stage. Both the actual fault levels and the maximum system fault levels shall be considered by the DG proponent.

Table 1: Maximum fault levels on K-W Hydro Inc. Distribution System

Nominal Voltage (kV)	Max. 3-Phase Fault	Max. Single-Phase Ground Fault
27.6/16 kV	17kA	8kA
13.8/8 kV	21kA	8kA
8.32/4.8 kV	4kA	4kA

K-W Hydro Inc. uses voltage regulating devices in the distribution system in order to maintain an adequate voltage profile along the feeders under various operating conditions. These voltage regulating devices include the under-load tap changers at the transformer stations and the voltage regulators or under-load tap changers at the distribution stations.

K-W Hydro Inc. uses automatic reclosing to quickly clear the temporary faults on the distribution feeders in order to quickly restore the power supply. 27.6kV and 13.8kV feeders use single-shot reclosing. 8.32kV feeders use multiple-shot reclosing. The DG proponents shall consider the auto-reclosing while designing the DG facility. The DG protection shall coordinate with the auto-reclosing to prevent DG damage.

Abnormal system conditions and normal system maintenance may cause power interruptions or power outages on K-W Hydro Inc.'s distribution feeders. The DG owner shall consider all possible disturbances while designing the protection system to ensure both the DG and other K-W Hydro Inc.'s customers are protected. The DG shall also consider the DG revenue loss due to the power interruptions or power outages. K-W Hydro Inc. is protected from any claims and demands for loss, damage or injuries to persons or property resulting from the power interruptions and outages.