Q. The responses to Requests for Information PUB-NLH-2017 and GRK-NLH-068 describe in general how the system will be designed to respond to a permanent bipole failure. Please provide any design criteria that will be used to design the system to respond to a bipole failure. In the response please provide the following information:

1) Initial design estimates for the time from bipole failure to restoring supply in accordance with the 22 corrective actions outlined in Table 16 of the Teshmont Report.
2) Whether the level of exports will be managed to limit exposure to customers from load shedding for potential bipole failures.
3) Whether there is a limit to the amount of load shed beyond which there is potential for a shut-down of the total island interconnected system.
4) The extent to which the total load requirements on the island will impact the time required to restore supply.
5) The extent to which the duration of the repair to a bipole failure might impact the time required to restore supply.
6) Whether the load shedding scheme will require a greater portion of the load on the Avalon Peninsula to be shed than on the rest of the island interconnected system.
7) Any considerations given to potential cold load pickup issues in designing the system response.

A. The system response in the event of a bipole failure is summarized as follows:

1) Initial design estimates for the time from bipole failure to restoring supply in accordance with the 22 corrective actions outlined in Table 16 of the Teshmont Report.

Please see Hydro's response to PUB-NLH-617 for discussion relating to these time requirements.

2) Whether the level of exports will be managed to limit exposure to customers from load shedding for potential bipole failures.

In the event of a contingency involving the Labrador Island Link, exports over the Maritime Link would be curtailed to avoid under frequency load shedding within the IIS. The coordination of import from Labrador and export to Nova Scotia therefore ensures compliance with Hydro's Transmission Planning Criteria. This coordinated operation also ensures that load shed is minimized in the event of a permanent bipole failure.

It should also be noted that dispatch over the HVdc links would be limited under adverse conditions such as lightning, in accordance with good utility practice.

3) Whether there is a limit to the amount of load shed beyond which there is potential for a shut-down of the total island interconnected system.

Please see Hydro's response to PUB-NLH-569 from Phase I of the Island Interconnected System Supply Issues and Power Outages for discussion relating to requirements for controlled load shed.

4) The extent to which the total load requirements on the island will impact the time required to restore supply.

Load restoration time would be a function of the amount of load shed and the capacity shortfall before backup generation is brought online. Hydro's operating procedures are such that adequate reserve levels must be maintained during all loading conditions. These reserve levels would help to minimize restoration times throughout the year. Details relating to the worst case capacity shortfall would be in accordance with Hydro's response to PUB-NLH-617.

5) The extent to which the duration of the repair to a bipole failure might impact the time required to restore supply.

Hydro's Transmission Planning Criteria are such that there shall be no under frequency load shedding for the temporary loss of a bipole. In the event of the permanent loss of the Labrador Island Link, restoration procedures shall be in accordance with Hydro's response to PUB-NLH-617. If the Labrador Island Link can be restored before other sources of backup generation are brought online, the additional capacity would allow for load restoration to be accelerated.

6) Whether the load shedding scheme will require a greater portion of the load on the Avalon Peninsula to be shed than on the rest of the island interconnected system.

Hydro's future under frequency load shedding scheme will be designed in a study to be completed in 2016/2017. This consideration will be addressed in this study.

7) Any considerations given to potential cold load pickup issues in designing the system response.

The work completed by Hydro in the under frequency load shedding study discussed above will help to minimize cold load pickup issues. The analysis will involve the design of a scheme where load shed is minimized and the loss of generator synchronism is avoided.

As stated above, Hydro must maintain adequate reserve levels. By also ensuring that equipment such as the synchronous condensers at Soldiers Pond Terminals Station remain online following the loss of the bipole, the availability of dynamic voltage support will further facilitate the restoration process.

Upon completion of the under frequency load shedding study, Hydro will work in cooperation with Newfoundland Power to implement an effective under frequency load shedding scheme that will minimize customer impact.