

### Appendix A – Explanation of IVP process

The following flow diagram illustrates the high level stages of analysis.

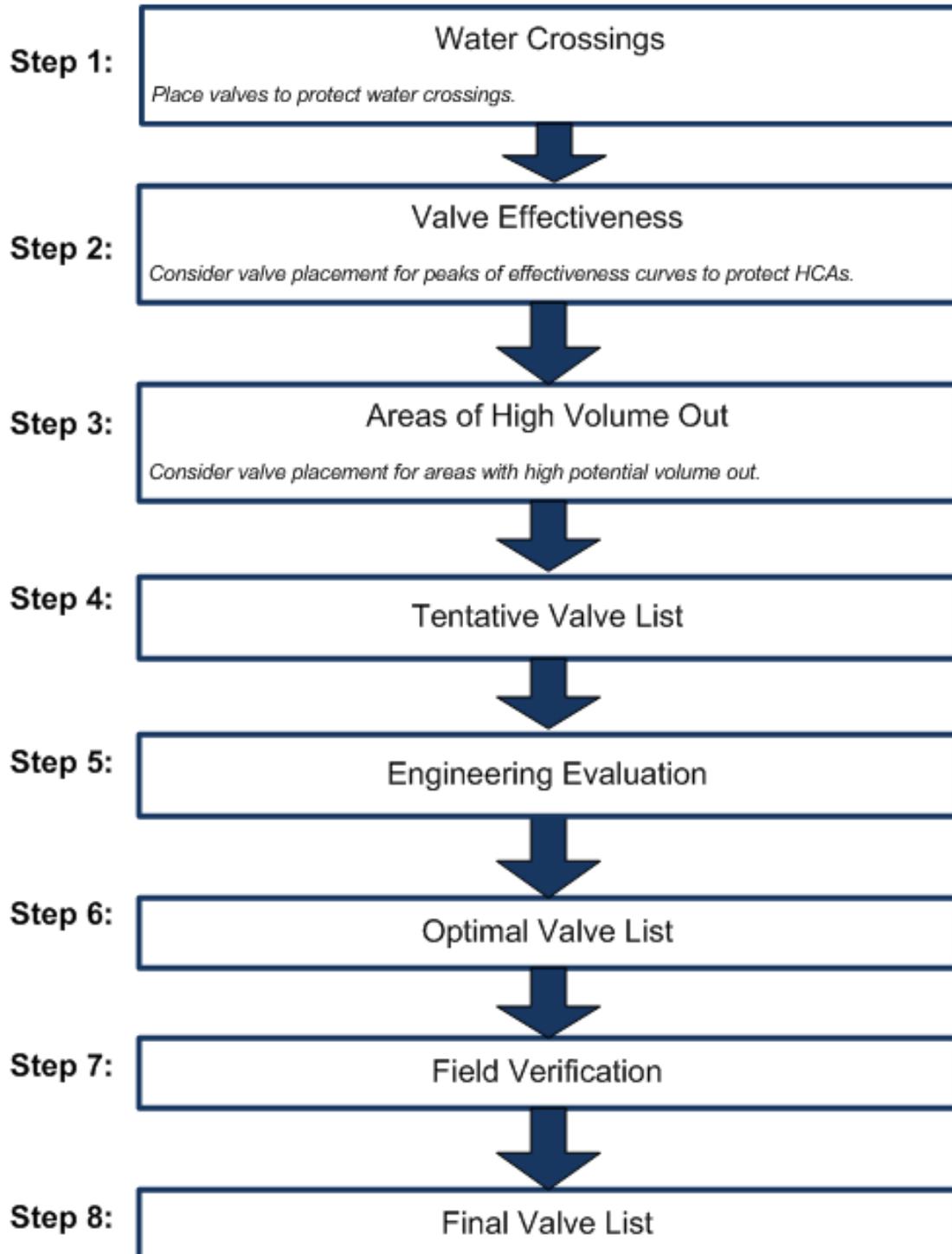


Table 1: IVP process flow chart

## Water Crossing Valve Placement

Water bodies greater than 30 metres (100 ft.) wide are automatically considered a major water crossing and therefore a remote controlled sectionalizing valve shall be installed on each side.

A bay, lake, river or stream that is less than 30 m wide is to be considered for valve placement if it meets one or more of the following criteria:

- Direct or downstream impact to a High Populated Area (“HPA”) or Other Populated Area (“OPA”)
- Direct or downstream impact to a reservoir holding water intended for human consumption (“DW”)
- Direct or downstream impact to a Commercially Navigable Waterway (“CNW”)
- Direct or downstream impact to an Environmentally Sensitive Area (“ESA”)
- Year round or annual mean flow velocity of  $\geq 6$  km/hr with very poor access
- Tributary path

When evaluating tributary path data as justification for valve placement, the following is taken into consideration:

- Distance to a water crossing greater than 30 m wide
- Distance to standing water body
- Distance to HCAs such as drinking water or populated areas
- Distance to power plants or other significant industrial facilities that require water

Water crossing valves are placed within a reasonable distance of the crossing, taking into account elements such as distance to existing facilities, potential volume out, presence of HCAs, and location within a flood plain.

Evaluation of a ‘reasonable distance’ is based on factors such as elevation profile, next nearest valve location, and overland flow conditions. For example, a valve will not be placed at the highest elevation on the line since this eliminates its effectiveness.

## Valve Effectiveness

Valve effectiveness is a relative score that measures the effectiveness of a given valve placement in reducing volume out to HCAs. The highest points of the effectiveness curve for pipe sections are examined and valves are considered for placement around this peak location. Valve placement is based on the amount of volume out reduction to HCAs taking into

consideration the types of HCAs being protected and the additional tributaries that are protected.

### **Areas of High Volume Out**

After placing valves for steps 1 and 2, areas that have a high calculated volume out are considered for additional valve placement. Valves are placed in order to reduce the volume out profile to a practical level, which will vary from pipeline to pipeline, based on pipeline diameter and design flow rate.

### **Field Verification**

The intent of field verification is to perform an on-site review of the proposed valve placement locations to examine valve site access, constructability, power availability, availability of land, etc. Typically the field verification process requires adjustments to the valve placement locations.

If field verification determines that a valve location is undesirable, an alternate location will be suggested and additional analysis will be performed to compare the original identified location with the new proposed location to determine whether moving the valve location is acceptable.

## Canadian High Consequence Area Definitions and Data Collection

Since Canadian codes do not currently have a definition for HCAs, Enbridge has developed a definition that is used for the IVP process.

This section defines HCAs, discusses the methodology applied to Canadian HCA identification, and identifies HCA data sources.

The term “High Consequence Areas” is derived from the U.S. Department of Transport (“DOT”) Code of Federal Regulations (“CFR”) 195.450. High consequence areas are in turn applied to CFR 195.452; Pipeline Integrity Management in High Consequence Areas. CRF 195.450 defines four types of high consequence area as follows:

1. High Population Area
2. Other Populated Area
3. An Unusually Sensitive Area (that is, a drinking water or ecological resource area)
4. A Commercially Navigable Waterway

Enbridge has expanded this definition to include five high consequence area types as follows:

1. High Population Area
2. Other Populated Area
3. Drinking Water Resource
4. Environmentally Sensitive Area
5. A Commercially Navigable Waterway

## Canadian High and Other Population High Consequence Areas

For populated areas within 200 m of the pipeline, the Enbridge Population Class Survey data (where available) was used to determine the appropriate population HCA. The Population Class Survey performed by Enbridge is based on the CSA Z662-11 class location assessment requirements. In this method, the measured population is classified as Class 1, 2, 3 or 4. For the purposes of the Canadian HCA identification, areas cited as being Class 4 were designated as a High Population HCA and those as a Class 3 were considered an Other Populated Area. For areas outside 200 m or instances where population survey data is not available, the populated areas were determined to be an OPA or HPA on the basis of population and municipal designation. A population greater than 50,000 resulted in a classification as an HPA. If the

populated area has a municipal designation of village, town, or city, and a population less than or equal to 50,000, it was designated as an OPA. For those OPAs lacking a defined spatial extent on the 1:50,000 Natural Resources Canada digital topographic maps, Google Earth and/or other available aerial photographs were used to confirm the boundaries of the OPA.

## Drinking Water Resources

The U.S. DOT definitions for drinking water resources, CFR 49 Section 195.6 (see above), are used as the basis for determining drinking water resources. In summary, a drinking water resource is defined as:

1. The water intake for a community water system (“CWS”) or Non-transient Non-community water system (“NTNCWS”) that obtains its water supply from a surface water source and does not have an adequate alternative drinking water source;
2. The Source Water Protection Area (“SWPA”) for a CWS or a NTNCWS that obtains its water supply from a Class I or a Class II aquifer and does not have an adequate alternative drinking water source. Where the SWPA is not identified, the Wellhead Protection Area will be used until the state has identified the SWPA; or
3. The sole source aquifer recharge area where the sole source aquifer is karst in nature.

Due to the difficulties in obtaining data on drinking water areas, few were originally identified for Line 9. Enbridge is working with municipalities and the Minister of Environment, Ontario to obtain additional information where available.

Groundwater well locations are supplied by each province as a point and are buffered to a 400 m radius. Surface water intakes are supplied in the same manner; however a simple one-quarter mile buffer is insufficient in providing an accurate picture of this type of HCA. First, all surface water sources are extracted within an eight km radius of the intake location. Then, only the surface water sources hydrologically connected to the intake location are buffered to one-quarter mile for use as a drinking water high consequence area.

## Canadian Environmentally Sensitive Areas

Canadian environmentally sensitive areas were identified within a five-km buffer on either side of the pipelines. The U.S. DOT definitions for Unusually Sensitive Areas, CFR 195.6 were used as the basis for determining the ESA high consequence areas. These areas include:

- an area containing a critically imperiled species or ecological community;
- a multi-species assemblage area;

- a migratory water bird concentration area;
- an area containing an imperiled species, threatened or endangered species, depleted marine mammal species, or imperiled ecological community where the species or community is aquatic, aquatic dependent, or terrestrial with a limited range; or
- an area containing an imperiled species, threatened or endangered species, depleted marine mammal species, or imperiled ecological community where the species or community occurrence is considered to be one of the most viable, highest quality, or in the best condition, as identified by the element occurrence ranking (EORANK) of A (excellent quality) or B (good quality).

The Enbridge Safety and Environment Species at Risk and provincial and national database are used to identify ESAs. These databases identify sensitive wildlife habitat at specific locations. Locations identified by the Species at Risk or Environment Canada database as a point are buffered by a 1.6 km radius around these locations to mark the extent of the ESA. When an ESA has a large area such as a migratory bird sanctuary, the shape of the area is used to allow for accurate representation.

### **Commercially Navigable Waterway**

A commercially navigable waterway is defined as a waterway on which commercial navigation is likely. Large watercraft such as barges, commercial fishing boats, and ferries are considered as commercial navigation.

### **Enbridge Defined High Consequence Areas**

Enbridge staff may identify High Consequence Areas in addition to those identified by application of the definitions noted above. These high consequence areas are called Enbridge defined HCAs.

### **Existing System Annual Review**

The receipt of new information or information updates, plus configuration changes in the pipeline (for example, increased throughput) are addressed as an annual update of the existing system high consequence areas. This occurs in the fourth quarter – first quarter timeframe. Starting in 2007-2008, an annual review in each Region has been undertaken to revise and/or identify Enbridge defined high consequence areas. This effort is being completed through an

annual data collection and validation process that is applied to the mainline and facility risk assessment models, and the valve placement analyses.

## **Exclusions**

Sensitive areas or areas of concern do not in themselves, automatically obtain a designation of a high consequence area by Enbridge. This only occurs when the area of concern meets the requirements of the definition of HCA as provided earlier in this section.