

## Hydrologic Function

### Groundwater – Quality Target –Hydrologic Function

This value is related to the Quality of Groundwater in the study area.

The purpose of setting a target on this value is to ensure that appropriate features are included in the preferred scenario in order to protect groundwater from contaminants and other threats to water quality.

In context to our study area, these are the areas that are most vulnerable to contamination threats.

### Datasets

1. NPCA NAI ELC Community Series Mapping
2. NPCA Highly Vulnerable Aquifers

Highly Vulnerable Aquifers (HVAs) are a vulnerable area delineated for the Source Water Protection Assessment Report (Chapter 4 - NPCA, 2010). HVAs are identified for priority protection of groundwater quality under the Provincial Policy Statement (MMAH, 2005). The HVAs were based largely upon earlier vulnerability mapping completed as part of the 2005 NPCA Groundwater Study. This earlier mapping combined two vulnerability assessment methods: (i) intrinsic susceptibility index (ISI) and (ii) aquifer vulnerability index (AVI). Transport pathways, such as unused private wells, were also considered as they can increase groundwater vulnerability. This data forms part of the local Niagara Assessment Report Database (ARDB).

The Niagara Watershed identifies 28% of its land base as Highly Vulnerable Aquifer Area of which 29% is currently natural area.

### Discussion

The Scenario Development Team (SDT) discussed the importance of groundwater quality as it related to both stream water quality and well water quality. Jayme Campbell, Hydrogeologist/Engineer with the Niagara Peninsula Conservation Authority provided expert support for this value as he presented the data from the Source Water Protection – Assessment Report.

J. Campbell clearly defined for the team the differences between highly vulnerable and less vulnerable aquifers and the fact that human activities can increase the vulnerability of these groundwater sources, and be contaminant sources.

J. Campbell suggested 100% as the target but it was explained that by using 95%, the model would be able to complete a more meaningful assessment.

There was also discussion about the “Precautionary Principle”:

- In the absence of a high level yard stick from the literature, we need to figure out how much we want to rely on the existing natural cover in contribution to the targets.
- 95% as a target maintains the status quo and ensures no net loss while still allowing some “wiggle room” for the model to make selections.
- Avoiding net loss until we have better data is practical and ethical.

### Data Gap

None noted.

### Decision

Date: April 7, 2011

### 95% of existing natural cover as Baseline.

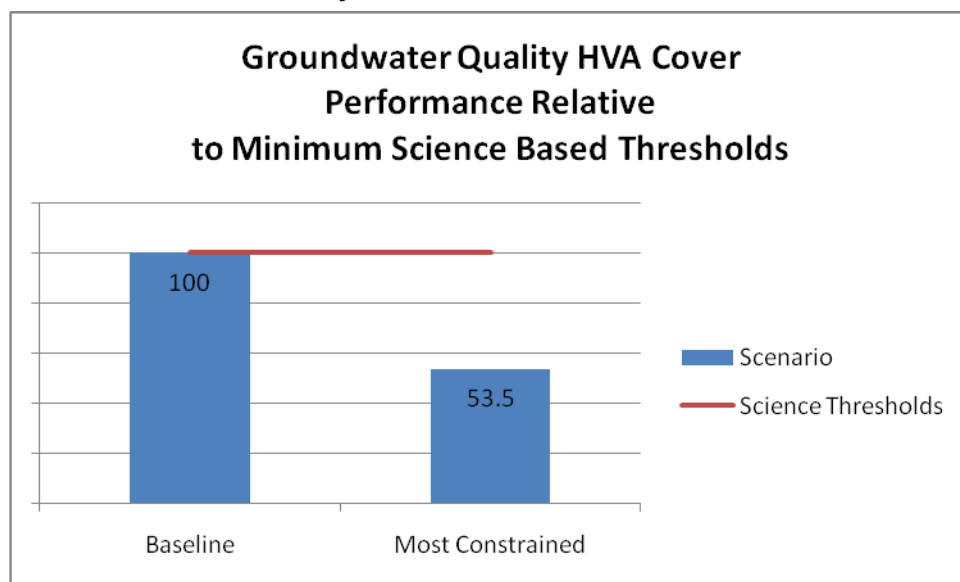
### Representation in the Learning Scenarios

Within the Learning Scenarios, the natural cover in Highly Vulnerable Aquifer areas as defined through the Source Water Protection process was considered for its contribution. Because of the vulnerability of groundwater to contamination in these areas, a target was set of 95% of the existing natural cover. By not setting the target to 100%, the model could then make choices about what to include given the contributions of certain features.

### Representation in the Final Scenarios

Under the Baseline Scenario, Groundwater Quality achieved 100.0% of the target value which was to retain 95% of the existing cover in HVAs.

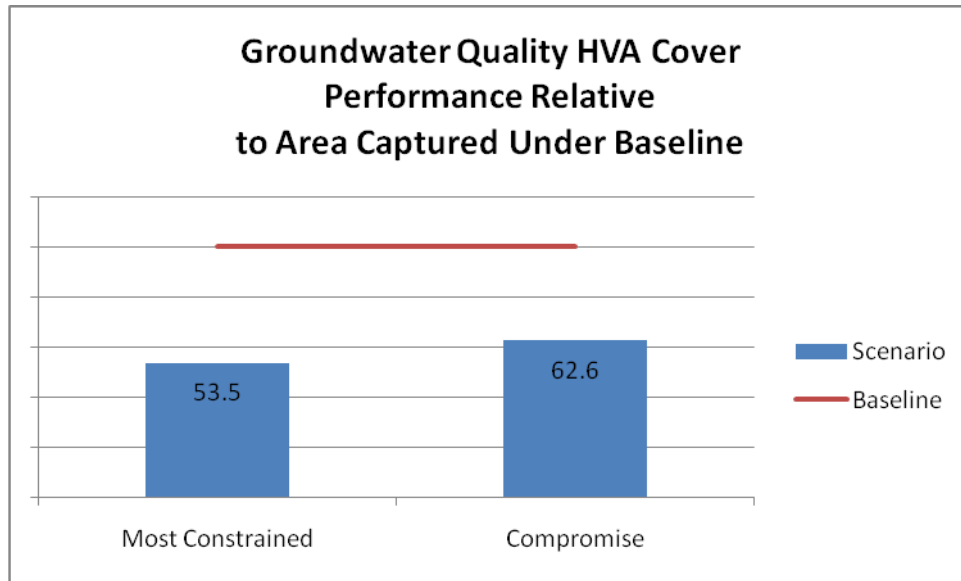
**Figure 33: Groundwater Quality HVA Cover Performance Relative to Science Thresholds**



Under the Most Constrained Scenario, the value had to come from areas that were included based on the fact that they were Provincially Significant Wetlands or Areas of Natural and Scientific Interest or some other included social political constraint. Value could not be derived from those areas that were found on agricultural capable soils or in urban areas as under this scenario as they were excluded from consideration. The driver for the spatial configuration under this scenario was a combination of these two reasons.

As a result, under the Most Constrained Scenario, Ground Water Quality achieved 53.5% of the target value, and 53.5 % of the value in the Baseline.

**Figure 34: Groundwater Quality HVA Cover Performance Relative to Baseline Comparator**



Under the Compromise Scenario, Groundwater Quality achieved 62.6% of the Baseline Comparator value. The shortfall from the anticipated 80% rate comparatively is largely due to the inability of meadows to contribute to the potential cover in this scenario.

### **Recommendations**

There should be more research into what science should recommend as a sustainable level of natural cover in HVA areas in order to protect groundwater quality.