Chapter 9

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9 Findings and Considerations

9.1 Key Outcomes

Introduction

There are currently two municipal groundwater drinking water systems in the Mississippi Valley Source Protection Area (MVSPA). A third, Lanark, is planned in accordance with the environmental assessment protocols. The municipal systems, their location, and the estimated number of residents using each system are shown in the following table.

Municipal Groundwater Water Supply	Estimated Number of Users
Almonte	4,700
Carp	1,500
Village of Lanark (*future system)*	
Total	6,200

Table 9-i. Groundwater Drinking Water Systems in the MVSPA.

There is one municipal surface water drinking water system in the MVSPA. Its location and the estimated number of residents using each system may be found in the following table.

Municipal Surface Water Supply (Intake Location)	Estimated Number of Users
Carleton Place	9,400
Total	9,400

Table 9-ii. Surface Water Drinking Water Systems in the MVSPA.

The following sections provide key outcomes for each of chapters in the MVSPA Assessment Report. A summary of all supporting reports for the MRSPR may be found in Appendix A-1.

A total of 250 potentially significant threats have been identified in the MVSPA, 230 related to municipal groundwater drinking water systems and 20 related to municipal surface water drinking water systems. Table 9-12 is a summary of potentially significant threats, broken down by category for both groundwater and surface water municipal drinking water systems in the MVSPA.

9.1.1 Watershed Characterization

The physical and human features of a watershed play an important role in defining groundwater and surface water availability, vulnerability, and other characteristics.

The MRSPR consists of two subwatersheds of the Ottawa River Basin, the Mississippi and Rideau watersheds, which are managed by Mississippi Conservation Authority (MVC) and Rideau Valley Conservation Authority (RVCA), respectively. The Conservation Authority boundaries are also the boundaries for Mississippi Valley Source Protection Area (MVSPA) and the Rideau Valley Source Protection Region (RVSPA). The region covers approximately 8,585 km^2. It is considered to have 20 natural subwatersheds though it has been divided into 22 subwatersheds for the purpose of developing the Water Budget found in Chapter 3.

Regional geological features have been greatly influenced by glacial activity, especially by the most recent Wisconsin glaciation. This in turn influences the characteristics of regional water features. Surface water in the region is comprised of hundreds of lakes, wetlands, and rivers with large tracts of forest, primarily in the western portion of the region. Groundwater consists of two key aquifers, the Oxford – March dolostone aquifer and the Nepean Sandstone aquifer. Portions of the region have other unconfined and confined overburden aquifers. Water quality in the region reflects the influences of natural factors such as soil or rock types which come in contact with the water.

Approximately five percent of the MRSPR is settled. Settlement in the region consists of the City of Ottawa as well as numerous towns, villages and scattered rural hamlets. Population density varies widely, from the very dense urban areas found in the City of Ottawa (population density greater than 1,000 people per square kilometre) to very sparse populations in the western portion of the region (1.7 people per square kilometre).

Surface water quality in the MRSPR is generally good to excellent, with some indications of impairment related to human activity primarily in the vicinity of settlement areas.

Regional groundwater quality within the MRSPR is generally good. In some local instances mineral composition of aquifer material may adversely affect the quality of a groundwater supply aquifer. Similar to surface water quality, human activities may have local impacts on the groundwater quality and/or quantity.

9.1.2 Water Budget

The Water Budget estimates *how much* water exists in the MRSPR through measuring or estimating values of components of the Water (hydrologic) Cycle.

In developing the Water Budget a Conceptual Water Budget is first developed. Its purpose is to determine the major hydrological pathways through the watersheds. The Tier 1 Water Budget is completed after the Conceptual Water Budget. The Tier 1 refines the scale of the Conceptual by developing water budgets for each of the 22 subwatersheds in the region and using monthly and annual data.

The total municipal surface water and groundwater takings in the MRSPR are approximately 9.5 million m^3/yr. This excludes Britannia and Lemieux surface water intakes in the Ottawa River, which take approximately 22 million m^3/yr. Private well consumption in the MRSPR is estimated as 9.2 million m^3/yr. Agricultural takings were estimated as 3 million m^3/yr.

Stress levels for surface water and groundwater were calculated for each of the subwatersheds in the MRSPR.

Three subwatersheds, all situated in the MVSPA have a moderate surface water stress under the current and future demand scenarios:

- Carp River Near Kinburn;
- Ottawa MVC; and
- Fall River At Bennett Lake.

One subwatershed, Rideau River at Ottawa and situated in the RVSPA, has a moderate groundwater stress under current and future demand scenarios.

The Technical Rules require further study (Tier 2) if subwatersheds supplying municipal drinking water systems are determined to have moderate or high stress. Of the four subwatersheds identified as showing moderate stress under current and future demand scenarios, none supply municipal drinking water systems.

When surveyed during the Tier 1 study, no municipality with a surface water or groundwater system reported water quantity concerns in recent history so no additional stress studies were required. Therefore, the Tier 1 Water Budget for the MRSPR concludes that Tier 2 and 3 studies are not required.

9.1.3 Groundwater Sources

Groundwater is more susceptible to contamination in some areas and these areas have been identified regionally as Highly Vulnerable Areas (HVAs). Approximately 89% of the MRSPR has been identified as HVA, as shown in Figure 9-1. Significant Groundwater Recharge Areas (SGRAs) are areas where a relatively large percentage of water recharges from the ground surface to an aquifer. Approximately 13.2% of the MRSPR has been identified as SGRAs, as shown in Figure 9-2. Table 9-1 lists the lower and single tier municipalities located in the HVAs and SGRAs.

Carp draws from a sand and gravel aquifer. Almonte draws water only from bedrock aquifers. All wellhead protection areas (WHPAs) in the MVSPA are shown in Figure 9-3. Table 9-2 summarizes the key findings for all WHPAs as well as the HVAs and SGRAs.

As with HVAs and SGRAs, each of the WHPAs often covers a number of municipalities. Table 9-3 lists the lower/single tier municipalities and WHPAs which fall within their boundaries.

As noted in Section 9.1, two wellhead protection areas have been delineated in the MRSPR. A third wellhead protection area for the Village of Lanark has not been completed and it is anticipated that information on the wells and associated WHPAs will be included in an updated Assessment Report.

There are 230 potentially significant drinking water threats identified in the MVSPA which are associated with the two WHPAs. The breakdown for each WHPA is in the following table.

Wellhead Protection Area	Potentially Significant Threats
Almonte	93
Carp	137

Table 9-iii. Number of Potentially Significant Drinking Water Threats to MVSPA Wellhead Protection Areas.

Summary information on key findings and potentially significant drinking threats for MVSPA WHPAs can be found in Table 9-2. Table 9-4 provides further information on potentially significant threats for each municipal drinking water system. Table 9-5 is a summary of potentially significant threats to groundwater in the MVSPA by prescribed drinking water threat category.

One condition has been identified in Carp and it has been classified as a low drinking water threat.

Drinking water issues have been identified in non-municipal groundwater drinking water in:

- Beckwith (MVSPA and RVSPA);
- Crotch Lake area;
- Village of Constance Bay; and
- Village of Lanark.

Table 9-6 is a summary of non-municipal drinking water issues for the MRSPR. Each issue shows the location and indicates, in brackets, whether the issue is in the RVSPA or the MVSPA.

9.1.4 Surface Water Sources

As noted in Section 9.1, there are five municipal surface drinking water intakes in the MRSPR. Figure 9-4 shows the location of all the intake protection zones (IPZs) in the MRSPR. Table 9-7 summarizes the key findings for all the IPZs in the MVSPA.

A number of lower or single tier municipalities have IPZs located within their boundaries. Table 9-8 lists which municipalities within the MRSPR have IPZs within their boundaries, and the associated water intake.

A discussion is included in Section 6.2 regarding the fact that this is the first time, unlike groundwater studies, for surface water studies to be completed in Ontario. With little experience and few “lessons learned” to draw from, the Technical Rules for surface water studies did not prescribe how to carry out vulnerability scoring for Intake Protection Zones. Rather, the Technical Rules requires locally developed methodologies to be used.

A summary of vulnerability scores for the Carleton Place IPZs and the Ottawa municipal drinking water intakes can be found in Table 9-9.

There were 20 potentially significant surface water drinking water threats identified in MVSPA.

System Name	*Potentially Significant Threats*
Carleton Place	*20*

Table 9-iv. Number of Potentially Significant Threats to MVSPA Surface Water.

Table 9-10 is a summary of potentially significant drinking water threats to municipal surface water drinking water systems in the MVSPA. Table 9-11 is a summary of the threats to surface water in the MVSPA, broken down by prescribed drinking water threat category.

There are no issues or conditions identified at any of the municipal surface water intakes in the MVSPA.

Figure 9-5 shows a combination of IPZs and WHPAs to provide a regional perspective of all areas which fall under these classifications. Figure 9-6 shows all vulnerable areas with scores of 8-10.

9.1.5 Climate Change

The Technical Rules require the inclusion of climate change considerations in two ways:

- through documenting current climate change projections available for the region for the next 25 years; and
- by considering how climate change may affect results found in the Assessment Report.

It should be noted that available projection information is based on thirty year intervals, both locally and provincially, and this is the timeline which has been used in the MRSPR climate change discussions.

Weather is already changing in the MRSPR and climate change projections show that it will continue to change. Trend data for the region indicates that some changes in temperature and precipitation patterns have already occurred over the past fifty years. Temperature and precipitation patterns are projected to continue to change in the MRSPR during the next thirty years.

The following highlights some key points:

- A rise in temperatures in both warm and cold seasons in the range of 0-2^{o}C by 2040 is projected;

- Minimum temperatures are projected to increase at a faster rate than maximum temperatures;
- Monthly precipitation patterns and amounts are projected to change;
- Evapotranspiration (ET) is projected to increase. Approximately 60% of water is currently lost through ET, the remainder leaving the region as surface water flow; and
- Weather variability is projected to increase, with increased frequency of weather extremes and events.

Changes in temperature and precipitation may impact groundwater and surface water quality and quantity to varying degrees in the MRSPR. This may in turn affect delineation of:

- Intake Protection Zones;
- Significant Groundwater Recharge Areas; and
- Wellhead Protection Areas.

Other changes which may affect source water:

- The importance of transport pathways on vulnerability scoring may change; and
- Stresses on some subwatersheds within the region may increase.

Further study is required to determine the magnitude of specific impacts in the MRSPR and their importance to Source Protection Planning.

9.2 Considerations for the Source Protection Plan

The technical findings in this Assessment Report will form the foundation of a Source Protection Plan for the Mississippi-Rideau Region. The technical findings will shape the development of policies and inform their implementation on the ground. The Source Protection Plan will be written between 2010 and August, 2012. When working with local municipalities to develop the Plan, the Mississippi-Rideau Source Protection Committee will have to consider all the scientific work that has been collected throughout the development of the Assessment Report, all the input and comments from stakeholder groups and the cost effectiveness of each policy option.

The following topics, among others, will need to be considered as the Plan is prepared.

Policy development process

In preparing a Source Protection Plan, the Mississippi-Rideau Source Protection Committee will work closely with local municipalities and communities to consider the full suite of available tools and policies allowed under the *Clean Water Act*. The province is developing tools and policy options that range from softer tools like education, outreach and incentives to more stringent tools like requiring risk management plans and even prohibition of certain activities.

The Committee will work to propose policies in an open and consultative manner; policies that are effective, economical and appropriate for local communities. They will make use of the available science to assess drinking water threats and issues; and where there is uncertainty, they will be mindful of the precautionary approach. Best practices from other jurisdictions will be considered and policy development will be coordinated with the three adjacent source protection regions for consistency across shared municipalities (discussed further in Section 9.3).

Early Notification and Consultation

We strongly support notifying municipalities and potentially affected property owners early in the planning process and providing opportunities for early consultation. This will help ensure that key stakeholders and property owners are engaged early in the process and involved in the development of the Plan.

Public Involvement

Public participation is crucial to the entire source protection planning process and participation in a number of opportunities throughout the development of this report produced a better report with stronger technical findings. Further opportunities for public involvement will be developed as preparation of the Source Protection Plan gets underway.

Preventative Approach

Source protection in the Mississippi-Rideau region is largely a matter of prevention, rather than reaction, since drinking water resources in the region are generally clean and plentiful at this time. This will create an opportunity for leadership in best management practices and prevention.

Spill response

Some threats result from an emergency or unexpected situation like a spill. There is an existing framework for responding to spills that could contaminate sources of drinking water. It will be important to ensure that all existing and future emergency response plans in the region reference the vulnerable drinking water areas that have been delineated in this Assessment Report and prescribe

appropriate corrective actions in the event of a spill in these areas. This will involve effectively communicating the technical findings to those responsible for developing, maintaining and implementing emergency plans.

Shared interests

Jurisdictional boundaries between provinces, source protection regions and municipalities do not reflect the movement of source water or pollution. This highlights the need for communication and collaboration between these jurisdictions to jointly protect our shared drinking water resources (discussed further in Section 9.3).

Public awareness

As in other parts of Ontario, some residents are not aware of where local drinking water comes from. Educational and signage programs may help improve awareness of and respect for shared drinking water resources.

Education and outreach

Public events hosted by the Conservation Authorities and others about groundwater and surface water have been successful. This suggests there is a demand in the community for clear information about how to protect source water and minimize one’s impact on the environment. People of all ages should have opportunities to learn how their sources of drinking water can be protected.

Incentives

Programs that provide public funds to landowners for beneficial works have also been very successful in the Mississippi-Rideau region. Recent examples include the oversubscribed Environmental Farm Plan and Conservation Authority delivered Rural Clean Water Programs. The Ontario Drinking Water Stewardship Program has also recently funded numerous projects in vulnerable drinking water areas in the Mississippi-Rideau region.

Monitoring

Monitoring has two components. There is the ongoing monitoring of the water quality and quantity conditions that is required to continually gain more understanding of the watershed conditions. As well, the Committee will have to consider monitoring the effectiveness of the tools used in the Source Protection Plan.

Ongoing monitoring of water quality and quantity conditions will be needed because the cumulative impact of issues and threats can only be assessed at the watershed or aquifer scale, and only after a sufficient number of years.

The Committee will also have to consider monitoring the effectiveness of the tools used in the Source Protection Plan. If a particular tool such as education and outreach is not effective in reducing threats to drinking water, the committee may have to adapt and modify the plan to incorporate more effective tools.

The *Clean Water Act* requires Source Protection Plans to indicate how issues and threats will be monitored. Such location-specific efforts will need to be complemented by the maintenance (and potential enhancement) of programs to monitor ambient water quality and quantity. This is because the cumulative impact of issues and threats can only be assessed at the watershed or aquifer scale, and only after a sufficient number of years. Chapter 8 of this Report speaks to the data gaps that affect our understanding of water quality and quantity in the Mississippi-Rideau region.

Municipal land use planning

Amendments to the existing municipal planning documents will be required to ensure that they protect drinking water sources. This will help to prevent new drinking water threats from emerging in vulnerable areas. Future activities in vulnerable areas that pose a risk to source water (and for which the use of risk mitigation measures are deemed insufficient) may be directed to other locations.

Implementation Funding

While there continues to be high interest in local incentive programs, a strong message has been delivered by local municipalities, farmers, businesses and residents that provincial funding should be available to offset costs to property owners resulting from new Source Protection Plan policies. While the *Clean Water Act* does not allow compensation to be paid to affected property owners, it has entrenched in law the Ontario Drinking Water Stewardship Program. This program currently has funding until 2011 to provide grants to undertake early actions close to municipal drinking water systems in advance of approved source protection plans. The Act however, states that the intention of this program is also to provide financial assistance to persons whose activities or properties are affected by the Act. The Mississippi-Rideau Source Protection Committee will continue to lobby the province to fund this program beyond 2011 in order to provide necessary financial assistance to property owners affected by new policies that result from approved Source Protection Plans.

9.3 Matters Affecting Neighbouring Source Protection Committees

Source Protection Regions and Areas adjacent to the Mississippi-Rideau Source Protection Region are:

- the Cataraqui Source Protection Area (to the south);
- the Quinte Source Protection Region (to the west); and
- the Raisin-South Nation Source Protection Region (to the east).

Figure 9-7 shows their location. To date, work has not been done with other adjacent agencies or municipalities to the northwest or outside Ontario.

The following list, developed in cooperation with our neighbouring regions, is a list of matters that the four Eastern Ontario Source Protection Committees are committed to working together on throughout the source protection planning process.

Shared Municipalities

Several of the municipalities in the Mississippi-Rideau region extend into adjacent source protection areas/regions. It is important that neighbouring Source Protection Committees always think in terms of whole municipalities by continuing to working together to coordinate their communications initiatives, information management, technical assessment work and source protection planning work within these shared municipalities.

Coordinated Approach to Developing Source Protection Plan Policies

Eastern Ontario Source Protection Committees must work with one another (and others across Ontario) to develop consistent Source Protection Plan policies as much as possible. They will work together to assess the costs and benefits of various policy alternatives for addressing a risk and they will share draft policies in an effort to develop clearer more consistent Source Protection Plans. Consistency among plans will make it easier for shared municipalities that fall into more than one source protection area/region to implement plans across their whole municipality.

Information Management

Neighbouring Source Protection Committees in Eastern Ontario will look at how source protection information is being organized and stored by those municipalities and source protection authorities who are undertaking assessment and planning work. They will assess how this information will be shared with

others in the community and develop shared protocols that will ensure easy sharing and comparison of information across watershed boundaries.

Regional Groundwater Flow, Significant Groundwater Recharge Areas, and Vulnerability Mapping

Neighbouring source protection committees will discuss technical findings and policy recommendations regarding groundwater to determine if groundwater resources in Eastern Ontario flow between watersheds. If they do then the protection of one aquifer will be of common interest to two or more source protection committees. Significant groundwater recharge areas have been identified as part of the Assessment Reports in each source protection area. It will be helpful to compare mapping of these features across watershed boundaries to eliminate discrepancies or document a rationale for their existence. Since much of the groundwater in the Mississippi-Rideau is considered highly vulnerable to contamination from the surface, Source Protection Committees in Eastern Ontario (who share this condition) will look at how such aquifers are delineated and protected.

Coordinated Approach to Technical Studies on the Ottawa River

The Mississippi-Rideau Source Protection Region shares the Ottawa River as a source of drinking water with municipalities in the Raisin-South Nation Source Protection Region and the Province of Quebec. Both source protection regions are working together with regards to technical studies taking place on the Ottawa River as well as developing an Ontario-Quebec dialogue to discuss source protection.

Sharing of Information with Agencies Responsible for Emergency Response on the Ottawa River

The entire Mississippi-Rideau region drains into the Ottawa River upstream of the Raisin-South Nation Source Protection Region. Therefore, contamination spills in the Mississippi-Rideau could pose a risk to municipalities who draw their drinking water from the Ottawa River downstream in the Raisin-South Nation region. These two Source Protection Committees will transfer their technical knowledge about surface water vulnerability studies to municipalities and other authorities who are responsible for emergency response.