Mississippi Valley Conservation

RIDEAU VALLEY CONSERVATION AUTHORITY

AGENDA

Mississippi-Rideau Source Protection Committee (MRSPC)

February 4, 2010
1:00 pm
Rideau Valley Conservation Authority, Monterey Boardroom
3889 Rideau Valley Drive, Manotick

		Pg.	
1.0	**Welcome and Introductions** a. Agenda Review b. Notice of Proxies c. Adoption of the Agenda (D) d. Declarations of Interest e. Approval of Minutes – January 7, 2010 (D) * draft minutes attached as a separate document f. Status of Action Items – Staff Report Attached (D) …..……..…… g. Correspondence (I): …… 1. PollutionWatch re: Encourage MRSPC to Consider National Pollutant Release Inventory data 2. Ducks Unlimited re: Encourage MRSPC to Protect Wetlands 3. MOE re: MRSPC Assessment Report Due Date Extension Granted 4. Councillor Alex Cullen re: Resignation from MRSPC	 1 4	*Chair Stavinga*
2.0	**Assessment Report Development** – Staff Report Attached ……..……..……. a. *Preliminary Draft* Assessment Report chapters (D): i. Chapter 2 – Watershed Characterization…… b. Preliminary discussion about Assessment Report chapters (D): i. Chapter 8 – Topics for Additional Research ……	10 22 84	*Brian Stratton*
3.0	**Community Outreach** – Staff Report Attached (D) …..…… a. Members & staff report on activities since the last meeting b. Discuss upcoming events & opportunities	85	*Chair Stavinga*
4.0	**Other Business**		*Chair Stavinga*
5.0	**Member Inquiries**		*Chair Stavinga*
6.0	**Next Meeting** – March 4, 2010, 1pm Rideau Valley Conservation Authority, Monterey Boardroom 3889 Rideau Valley Drive, Manotick		*Chair Stavinga*
7.0	**Adjournment**		*Chair Stavinga*

(I) = Information (D) = Decision

Delegations wishing to speak to an item on the Agenda are asked to contact Sommer Casgrain-Robertson at 613-692-3571 ext 1147 or sommer.robertson@mrsourcewater.ca before the meeting.

1.0 f) STATUS OF ACTION ITEMS

Date: January 21, 2010
To: Mississippi-Rideau Source Protection Committee
From: Sommer Casgrain-Robertson, Co-Project Manager
Mississippi – Rideau Source Protection Region

Recommendation:

1. That the Mississippi-Rideau Source Protection Committee receive the following report for information.

Staff & Chair Action Items:

	Issue	Action	Lead	Status
1	Ottawa IPZ studies	Distribute the draft study summaries to the Canadian Security Intelligence Service (CSIS) Determine plant capacity of Britannia and Lemieux Island	Sommer Casgrain-Robertson / Bev Millar Brian Stratton	**In-Progress** Bev provided Sommer with contact information and letters are being prepared.
2	Ontario Drinking Water Standards	Learn how Ontario establishes and reviews its drinking water standards. Consider recommending that the tritium standard be increased	Mary Wooding Chair Stavinga	**In-Progress** Mary will provide a response at the February or March meeting Chair Stavinga will prepare a motion for the March meeting if required
3	Rural Clean Water Programs	Send a letter to Minister Gerretsen highlighting the value of long-term, province-wide funding for rural clean water programs	Sommer Casgrain-Robertson	**In-Progress** Sommer will include a draft letter in the March/April agenda package for consideration
4	Vacant City of Ottawa seat on the MRSPC	Fill the vacancy on the MRSPC	Sommer Casgrain-Robertson	**In-Progress** Sommer is working with City staff to have a new representative appointed by Ottawa City Council.

	Issue	Action	Lead	Status
5	Vacant industry / commercial seat on the MRSPC	Fill a vacancy on the MRSPC	Sommer Casgrain-Robertson	**In-Progress** Applications will be accepted from November 26, 2009 to February 19, 2010. A press release was issued January 21 and was widely distributed (including to local chamber of commerce contacts).
6	Ottawa River Watershed Inter-Jurisdictional Committee	Encourage MOE to take the lead role in establishing an Ottawa River watershed inter-jurisdictional committee	Mary Wooding	**In-Progress** Mary Wooding is organizing a preliminary meeting for the end of March to begin work on establishing an inter-jurisdictional committee for the Ottawa River.
7	Uranium	MVC and local Health Units work together to raise public awareness about naturally occurring uranium in drinking water	Sommer Casgrain-Robertson & Mary Wooding	**In-progress** Jean-Guy Albert agreed to get an update from local health units on the status of their uranium brochure.
8	Site 41	Members would like an update from the Province on Site 41.	Mary Wooding	**Complete** Mary Wooding informed members that Simcoe County Council voted to discontinue construction and all future development of the North Simcoe Landfill Site. The excavated area has been backfilled, the site has been substantially restored, surface grading and seeding will be done this spring and the ministry will continue to monitor the site to ensure the environment is protected.
9	Geothermal Systems	Determine if geothermal systems should be considered a threat to drinking water sources	Sommer Casgrain-Robertson	**On-Going** A lot of information has been collected on this topic, including a technical bulletin from MOE.

Issue		Action	Lead	Status
10	Issues of concern outside the scope of the *Clean Water Act*	Staff develop a section in the Assessment Report to document issues of concern that fall outside the scope of the *Clean Water Act*	Sommer Casgrain-Robertson	**On-Going** A section will be included in the *draft* Assessment Report.
11	Update Web Site	Update the web site	Sommer Casgrain-Robertson	**On-going** Many updates have been made to the web site and staff will continue to improve it.
12	Compensation Models	Staff to collect other compensation models (e.g. Ottawa wetland policy, Alternate Land Use Services).	Sommer Casgrain-Robertson	**In-progress**

MRSPC Member Action Items:

Issue		Action	Lead	Status
1	Members were concerned that attendance might be low at Assessment Report open houses and groups who should be involved in the process are not	Members were asked to provide Sommer with contact information for groups they feel should be involved in the process – they will be added to our mailing list.	All Members	**Ongoing**
2	OFEC Conference Calls & Training Sessions	Richard Fraser will provide the MRSPC with updates on OFEC conference calls & training sessions	Richard Fraser	**Ongoing**
3	Community Outreach opportunities	Members to notify Sommer of potential events and opportunities to engage the public about source protection	All members	**Ongoing**

1.0 g) CORRESPONDENCE

Date: January 21, 2010
To: Mississippi-Rideau Source Protection Committee
From: Sommer Casgrain-Robertson, Co-Project Manager
Mississippi – Rideau Source Protection Region

Attached Correspondence:

Correspondence From:		Regarding:	Response:
1	Canadian Environmental Law Association and Environmental Defence (as the PollutionWatch Program) – January 6, 2010	They provided a copy of their new report "*Protecting the Great Lakes – St. Lawrence River Basin and Drinking Water Sources*". It highlights National Pollutant Release Inventory data and encourages Committees to consider this data when creating their Source Protection Plans.	None required
2	Ducks Unlimited – January 11, 2010	They provided fact sheets on the value of wetlands and encourage Committees to protect wetlands in their Source Protection Plans	None required
3	MOE – January 12, 2010	MOE granted us an Assessment Report due date extension to September 21, 2010.	None required
4	Councillor Alex Cullen – January 12, 2010	Councillor Alex Cullen officially resigned from the MRSPC	None required [see Agenda Item 1.0 f), Action Item #4 for details]

A collaborative project by:

ENVIRONMENTAL DEFENCE

CANADIAN ENVIRONMENTAL LAW ASSOCIATION

PollutionWatch
www.PollutionWatch.org

January 6, 2010

Original transmitted by email

RE: Advance copy of PollutionWatch report, *Protecting the Great Lakes - St. Lawrence River Basin and Drinking Water Sources*

Please find enclosed an advance copy of ***Protecting the Great Lakes - St. Lawrence River Basin and Drinking Water Sources,*** a report prepared by the Canadian Environmental Law Association and Environmental Defence, through its PollutionWatch project (www.PollutionWatch.org). This report is embargoed until Thursday January 7, 2010. In this email, you will also find:

1) a Great Lakes and St. Lawrence River Basin map that includes the 19 source protection areas and regions in Ontario and facilities that reported in 2007 to Canada's National Pollutant Release Inventory (NPRI) and are located in the Great Lakes and St. Lawrence River Basin; and
2) an excel spreadsheet listing the release and transfer data for all facilities located in your source protection area and region that report to Canada's NPRI in 2007.

This report is being forwarded to you because of your current work and interest in protecting Ontario's drinking water sources, through the Source Protection Committee, and Great Lakes and St. Lawrence River Basin. ***Protecting the Great Lakes - St. Lawrence River Basin and Drinking Water Sources*** highlights the pollution levels using data collected through Canada's National Pollutant Release Inventory for Ontario source protection areas, identified through the Drinking Water Protection Program. The report provides a specific focus on the source protection areas that are located in the Great Lakes and St. Lawrence River Basin.

Our organizations would like your Source Protection Committee's careful consideration of the findings and recommendations of this report in your on-going work on evaluating and addressing the threats to Ontario's drinking water sources.

You will receive a printed copy of the report in the mail.

If you have any questions on the findings and recommendations of the report, please do not hesitate to contact Theresa McClenaghan, Executive Director of CELA (416-960-2284) or Mike Layton, Deputy Outreach Director of Environmental Defence (416-323-9521 ext. 257).

Yours truly,

CANADIAN ENVIRONMENTAL LAW ASSOCIATION

Theresa McClenaghan
Executive Director

ENVIRONMENTAL DEFENCE

Rick Smith
Executive Director

Ducks Unlimited Canada

January 11, 2010

Janet Stavinga
Source Protection Committee Chair
Mississippi-Rideau Source Protection Region
Rideau Valley Conservation Authority
3889 Rideau Valley Dr
PO Box 599
Manotick, ON K4M 1A5

Dear Ms. Stavinga:

I am writing on behalf of Ducks Unlimited Canada (DUC) to express our continued interest in the development of your Source Water Protection Plans. As you move from your assessment reports to the development of your source water protection plans please consider **the need to further protect and restore wetlands throughout your watersheds,** as they help protect the quality and quantity of both surface and groundwater as it travels from its source to your drinking water intake zones the natural infrastructure like wetlands that help protect the quality and quantity of both surface and groundwater as it travels from its source to your drinking water intake zones.

Wetlands provide significant natural capital and are integral components of healthy watersheds. In particular they help ensure a continued supply of high quality freshwater by filtering sediment, bacteria, excess nutrients and other contaminants. Wetlands also act as important groundwater recharge and surcharge zones.

Enclosed please find some fact sheets regarding the value of wetlands and their importance to your community's drinking water. The protection of existing wetlands and the restoration of lost ones throughout your watersheds is an important consideration when developing plans to sustainably protect your water supplies. Wetlands are "nature's kidneys" and provide immeasurable values and functions regarding water quality.

DUC has recently produced a series of documents on the many ecological goods and services that wetlands, forests, grasslands and other natural features play in sustaining our waters, reducing greenhouse gases, providing habitat etc. These are available on our website at http://www.ducks.ca/conserve/wetland_values/conserve.html.

The development of source water protection plans is very important in maintaining and improving the quality of water resources within your communities now and for the future. The need to protect intake zones is important as is the need to protect source water throughout your watersheds. Please consider this as you develop your plans.

We wish you the best in the development of your source protection plans. Should you wish to discuss this matter further or the role that wetlands play regarding water quality and the development of your source water protection plans please contact Erling Armson at this office (613 389-0418) or by e-mail at e_armson@ducks.ca.

Yours Truly,

James W. Brennan, BA, MBA
Manager, Provincial Operations Ontario
Ducks Unlimited Canada

Ducks Unlimited Canada
740 Huronia Road, Unit 1, Barrie, Ontario L4N 6C6
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Ministry of
the Environment

Source Protection Programs
Branch

8th Floor
2 St. Clair Ave. West
Toronto ON M4V 1L5

Ministère de
l'Environnement

Direction des programmes de protection
des sources

8e étage
2, avenue St. Clair Ouest
Toronto (Ontario) M4V 1L5

Ontario

Log: ENV1174IT-2010-3

January 12, 2010

Ms. Janet Stavinga
Chair, Mississippi – Rideau Source Protection Committee
c/o Rideau Valley Conservation Authority
3889 Rideau Valley Drive
Manotick, Ontario K4M 1A5

Dear Ms. Stavinga:

Thank you for your letter dated December 11, 2009, in which you request a formal extension to the due date for the submission of your two assessment reports for the Mississippi–Rideau Source Protection Region.

In April 2009 an extension request was submitted to the ministry by the Mississippi-Rideau Source Protection Committee (SPC) requesting an extension for both the Mississippi Valley Source Protection Area and the Rideau Valley Source Protection Area assessment reports due February 5, 2010 and March 16, 2010, respectively. At that time the ministry requested that the Authorities report back to me in the Fall or at a time when more information is known about the status of the technical work.

I understand that MOE staff will be attending your March 2010 SPC meeting to address questions concerning the application of the Director's Technical Rules related to the IPZ for three Inland Rivers studies. I hope that this assistance in addition to several previous staff visits to your committee and working group meetings will resolve the issue with the IPZ studies, allowing the SPC to make a decision and move forward. I would also like to remind you that the onus is on the SPC to ensure that the completion of the assessment reports is completed according to the timelines submitted (or in advance of the timelines) as part of the extension request and that failure to do so will result in the Source Protection Authorities being out of compliance with Ontario Regulation 287/07 S 17 (2) (a) which would then put the Minister in a position to invoke his authority under section 33 (1) of the *Clean Water Act, 2006*.

...2

I have reviewed the rationale provided and the proposed work plan to complete the assessment reports. Based on this information, in accordance with my authority under section 94 of the *Clean Water Act, 2006*, I am granting you and the Mississippi–Rideau Source Protection Committee an extension to the due date of both assessment reports from the dates outlined above to September 21, 2010.

Please note that at this time, these are the last assessment reports that will be submitted to the ministry. Despite granting this extension, I strongly encourage you and your committee to review the proposed schedule for the consultation of the assessment reports and gain some additional efficiency where possible, specifically in the months of April and May 2010, to ensure that this new due date of your assessment reports is met.

I appreciate the amount of hard work the Mississippi–Rideau Source Protection Committee and Source Protection Authorities are doing to ensure that the assessment reports are completed in an efficient manner. I anticipate that this high level of effort will continue in order to complete the prescribed work by your new due date of September 21, 2010.

Sincerely,

Ian Smith, Director
Source Protection Programs Branch
Ministry of the Environment

c: Mark Burnham, Chair, Mississippi Valley Source Protection Authority
Alan Arbuckle, Chair, Rideau Valley Source Protection Authority
Paul Lehman, General Manager, Mississippi Valley Conservation Authority
Dell Hallett, General Manager, Rideau Valley Conservation Authority
Keith Willson, Manager, Source Protection Approvals
Mary Wooding, Liaison Officer, Source Protection Implementation

Alex Cullen

Councillor, Bay Ward, City of Ottawa

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Ottawa

January 12, 2010

Ms. Janet Stavinga, Chair
Source Protection Committee
Mississippi-Rideau Source Protection Region
3889 Rideau Valley Drive
P.O. Box 599
Manotick, ON K4M 1A5

Dear Ms. Stavinga,

Please accept this letter as formal notification that as a result of my decision to pursue the mayoralty for the City of Ottawa I am resigning as a Member of the Mississippi-Rideau Source Protection Committee.

I've enjoyed my work with you and the Committee over the last two years and wish you all the best in your future endeavours.

Yours truly,

Alex Cullen
Councillor, Bay Ward

cc: M. Rick O'Connor, City of Ottawa Clerk and Solicitor

2.0 Assessment Report Development

Date: January 21, 2010
To: Mississippi-Rideau Source Protection Committee
From: Sommer Casgrain-Robertson, Co-Project Manager
Mississippi – Rideau Source Protection Region

Recommendation:

1. That the Mississippi-Rideau Source Protection Committee approve the following chapter for inclusion in the *preliminary draft* Assessment Report:
   - **Chapter 2 – Watershed Characterization**

Recommendation:

2. That the Mississippi-Rideau Source Protection Committee receive the preliminary list of topics for Chapter 8 for information.

February 4, 2010 – MRSPC Meeting
The MRSPC will review a preliminary draft Assessment Report chapter: Chapter 2 – "Watershed Characterization". The Committee will provide feedback to be incorporated into the preliminary draft Assessment Report that will be reviewed and considered by the Committee at their June 3 meeting.

The MRSPC will review and provide feedback on a preliminary list of topics to be discussed in Chapter 8 – "Topics for Additional Research". Staff will use this feedback to prepare a preliminary draft chapter for the Committee to review at their April 1 meeting.

January 7, 2010 – MRSPC Meeting
The MRSPC reviewed *preliminary draft* municipal surface water studies and study summaries for Britannia and Lemieux Island (the City of Ottawa's intakes on the Ottawa River). They received them as *draft* for public consultation so these studies and summaries will be presented to the Mississippi Valley and Rideau Valley Source Protection Authorities on February 17 and January 28 respectively. Copies will also be provided to relevant municipalities and posted for public review and comment. Two public open houses will be held near Britannia and Lemieux Island in late March.

December 3, 2009 – MRSPC Meeting
The MRSPC reviewed a *preliminary draft* Water Budget Chapter for the assessment report. This chapter is now undergoing a communications review and will be included in the *preliminary draft* Assessment Report to be presented to the Committee in June. Once the committee approves the report as *draft* for public consultation, it will be circulated and posted for municipal and public comments. Public open houses will also be held to solicit public feedback.

November 5, 2009 – MRSPC Meeting
The MRSPC reviewed a *preliminary draft* study and study summary that provided:

- An estimated inventory of existing land use activities that pose a potential significant threat to municipal groundwater source water; and
- A list of known documented groundwater quality issues.

This study and summary was approved as *draft* for public consultation and was presented to the Mississippi Valley and Rideau Valley Source Protection Authorities on December 2 and November 26 respectively. It will now be circulated to municipalities for their review and comment. Notices will be sent to property owners where a land use activity has been identified as a potential significant threat once a public consultation schedule has been finalized for the *draft* Assessment Report.

September 3, 2009 – MRSPC Meeting
The MRSPC reviewed *preliminary draft* studies and summaries that provided a Conceptual Water Budget (regional scale), Tier 1 Water Budget (subwatershed scale) and review of Climate Change knowledge. The Committee approved them as *draft* for public consultation. The summaries were presented to the Mississippi Valley and Rideau Valley Source Protection Authorities on September 16 and 24 respectively and will be circulated to municipalities for their review and comment. Summaries will then be posted and made available for public review and comment.

July 9, 2009 – MRSPC Meeting
The MRSPC reviewed *preliminary draft* studies and summaries identifying Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas at the regional scale and approved them as *draft* for public consultation. They were presented to the Mississippi Valley and Rideau Valley Source Protection Authorities on September 16 and August 27 respectively and have been circulated to municipalities for their review and comment. Study summaries will be posted for public review and comment.

June 4, 2009 – MRSPC Meeting
The MRSPC reviewed *preliminary draft* municipal groundwater studies and summaries for Almonte, Munster, Richmond (King's Park) and Westport and approved them as *draft* for public consultation. Copies of the *preliminary draft* summaries were provided to all relevant municipalities and source protection authority members in advance of the meeting. The approved *draft* study summaries were presented to the Rideau Valley and Mississippi Valley Source Protection Authorities on June 25 and July 15 respectively. Study results were then presented to the public at three open houses in late July: Richmond/Munster (July 20), Westport (July 21), and Almonte (July 22).

May 7, 2009 – MRSPC Meeting
The MRSPC reviewed *preliminary draft* municipal surface water studies and study summaries for Carleton Place, Perth and Smiths Falls. They will continue their deliberations at a later meeting following a technical briefing in late August with MOE staff and the study consultants. Once approved as *draft* for public consultation, these studies and summaries will be presented to the Mississippi Valley and Rideau Valley Source Protection Authorities, relevant municipalities and the public for review and comment. Three public open houses will be held in Carleton Place, Perth and Smiths Falls.

April 2, 2009 – MRSPC Meeting
The MRSPC reviewed *preliminary draft* municipal groundwater studies and summaries for Carp, Kemptville and Merrickville and approved them as *draft* for public consultation. These studies and their summaries were provided to municipalities and presented to the Mississippi Valley and Rideau Valley Source Protection Authorities on April 15 and 23 respectively. Study results were then presented at public open houses in Carp (June 8), Merrickville (June 10) and Kemptville (June 11).

Background
Source Protection Committees are required to produce Assessment Reports. These reports will map local sources of drinking water, determine how vulnerable they are to contamination and overuse, and identify what land uses and activities pose a risk. Committees will then use this science to develop Source Protection Plans because they will know where source protection policies are needed and what risks those policies need to address.

The Mississippi-Rideau Source Protection Committee (MRSPC) must develop two Assessment Reports: one for the Mississippi watershed, and one for the Rideau watershed.

The Assessment Reports will contain the following components (underlining means the study has been approved as *draft* for public consultation by the MRSPC):

- Watershed Characterization
- Water Budget
- Vulnerable area delineation
    - Significant Groundwater Recharge Areas
    - Highly Vulnerable Aquifers
    - Wellhead Protection Areas for:
        - Almonte, Carp, Kemptville, Lanark (future planned system), Merrickville, Munster Hamlet, Richmond (King's Park subdivision) and Westport
    - Intake Protection Zones for:
        - Carleton Place, Ottawa (Britannia & Lemieux Island), Perth and Smiths Falls
- Prescribed Threats Summary
- Inventory of existing Issues and Significant Threats for groundwater
- Inventory of existing Issues and Significant Threats for surface water
- Climate Change Review

Due Date
Proposed Assessment Reports are due to the MOE one year after Terms of Reference are approved. Source Protection Committees submit *proposed* Assessment Reports to their Source Protection Authorities, who in turn submit them to MOE for approval.

Terms of Reference were approved for the Mississippi Valley Source Protection Area on February 5, 2009, therefore, a *proposed* Assessment Report for the Mississippi watershed must be submitted to MOE by February 5, 2010. Terms of Reference were approved for the Rideau Valley Source Protection Area on March 16, 2009, therefore,

a *proposed* Assessment Report for the Rideau watershed must be submitted to MOE by March 16, 2010.

Staff hope to combine the two Assessment Reports into one document for the purposes of public consultation because:

- Much of the information is regional and would be repeated in both versions;
- Many municipalities are shared between the Mississippi and Rideau watersheds and it would be onerous for them to review and comment on two stand alone documents;
- It is more convenient for the public and cost effective if both Assessment Reports undergo public consultation at the same time.

This means both Assessment Reports would have to have been completed by February 5, 2010.

The MRSPC requested a due date extension for a number of reasons (finalized Techincal Rules were delayed by the Province, technical studies were delayed by concerns raised by the Committee, more time was needed for effective public consultation). The MOE granted an extension. A *proposed* Assessment Report must now be submitted to MOE by **September 21, 2010**.

Future Amendment Required

The *proposed* Assessment Report that will be submitted by September 21, 2010, will not contain information about the future municipal drinking water system planned for Lanark Village. This information will be identified as a data gap and included in a revised Assessment Report submitted in 2011. Since it is a self contained study, and pertains to a municipal system that does not currently supply people with drinking water, it seemed appropriate to submit it as a future amendment.

Detailed Work Plan and Timeline

The following work plan and timeline breaks the process of developing Assessment Reports into three phases.

Phase 1:

- Completion of background technical studies
- SPC, SPA, municipal and public review of draft findings
- Development of *preliminary draft* Assessment Report chapters
- SPC review of *preliminary draft* chapters

Phase 2:

- Consolidation of chapters into a *preliminary draft* Assessment Report
- SPC review, amendment and approval as “draft for public consultation”
- SPA, municipal and public consultation on the *draft* Assessment Report

Phase 3:

- SPC review of public comments received on *draft* Assessment Report
- Development of *proposed* Assessment Report
- Public consultation on the *proposed* Assessment Report
- Submission of the *proposed* Assessment Report to MOE for approval

Phase 1 Technical Studies

Staff and consultants have been developing background technical studies for a couple of years now. These studies began based on draft technical guidance from MOE and are now being finalized to meet the approved Technical Rules. These studies contain the scientific information the MRSPC needs to complete Assessment Reports.

In spring 2008, a *preliminary draft* Watershed Characterization Report and *preliminary draft* Conceptual Water Budget (based on MOE's draft guidance) were presented to the MRSPC. These studies are currently being updated to meet the final approved Technical Rules and will be brought back to the MRSPC as outlined below.

Once technical studies are completed, and in many cases peer reviewed:

- Staff will develop a summary outlining the study's purpose, methodology and findings (some studies will be grouped into one summary).
- The summary will be presented to the MRSPC for review and possible amendment (the technical study will be provided on CD).
- The summary will be presented to the Source Protection Authorities, then circulated to municipalities, and then the public for review.
  - Summaries will be posted on the web site for comment
  - 11 public open houses will be held.
  - Each open house will focus on the local municipal drinking water system (wellhead protection area or intake protection zone) and provide an overview of regional information from the Watershed Characterization Report, Water Budget Reports and Highly Vulnerable Aquifer and Significant Groundwater Recharge Area studies as available.
  - Full technical studies will be available to anyone on CD
- Everyone will be encouraged to provide feedback and traditional and local knowledge at this early stage so it can be considered when the *preliminary draft* Assessment Reports are being developed.

Staff will develop a *preliminary draft* Assessment Report in collaboration with our neighbouring source protection regions to be consistent where possible.
Individual *preliminary draft* chapters will be brought to the MRSPC for review and comment as soon as they are produced. Chapters will be amended to reflect MRSPC feedback and will be compiled into a *preliminary draft* Assessment Report.

Carp, Kemptville and Merrickville

Municipal Drinking Water Systems (groundwater)

Month	Task	Timeline
March 2009	Golder complete Wellhead Protection Area Studies	**Completed** Early March
	Staff complete Threats Summary	**Completed** Early March
	Staff develop study summaries (reviewed by municipal technical staff)	**Completed** March 16
April 2009	MRSPC review *preliminary draft* study summaries & technical studies (CD). Provide to municipalities before the meeting.	**Completed** April 2

Month	Task	Timeline
May 2009	Send *draft* study summaries & technical studies (CD) to municipalities with invitation to attend open house	**Completed** May 21
	Advertise three open houses (Carp, Kemptville and Merrickville) and comment period	**Completed** May 21
	Send an open house invitation to every property in an area that could score significant threat	**Completed** May 22 - 25
	SPAs review study summaries	**Completed** April 15 & 23
	Make study summaries available at MVC & RVCA offices for public review	**Completed** May 22
June 2009	Hold Open houses for municipal staff & council (afternoon session) and public (evening session)	**Completed** June 8, 10 & 11
February 2010	Post study summaries on web site	Early February
	Collect comments on study summaries	February
	Staff review comments received on technical study findings	February
	Staff prepare *preliminary draft* AR chapter	February
March 2010	MRSPC review summary of public comments and *preliminary draft* AR Chapter	March 4

Carleton Place, Perth and Smiths Falls
Municipal Drinking Water Systems (surface water)

Month	Task	Timeline
April 2009	J.F. Sabourin complete Intake Protection Zone Studies	**Completed** Early April
	Staff complete Threats Summary	**Completed** Early April
	Staff develop study summaries (reviewed by municipal technical staff)	**Completed** April 21
March 2010	MRSPC review *preliminary draft* study summaries & technical studies (CD). Provide to municipalities before the meeting.	March 4
	Send *draft* study summaries & technical studies (CD) to municipalities with invitation to attend open house	March
April 2010	Advertise three open houses (Carleton Place, Perth and Smiths Falls) and comment period	March / April
	Send an open house invitation to every property in an area that could score significant threat	March / April
	SPAs review study summaries	March / April
	Post study summaries on web site and make available at MVC & RVCA offices for public review	March / April
	Hold Open houses for municipal staff, council and public	March / April
	Collect comments on study summaries	April
	Staff review comments received on technical study findings and prepare *preliminary draft* AR chapters	April
	Staff prepare *preliminary draft* AR chapter	April

Month	Task	Timeline
May 2010	MRSPC review summary of public comments and *preliminary draft* AR Chapter	May 6

Almonte, Munster, Richmond (King's Park), and Westport
Municipal Drinking Water Systems (groundwater)

Month	Task	Timeline
May 2009	Malroz complete Wellhead Protection Area Study for Westport; Intera / Golder complete other three studies	**Completed** Early May
	Staff complete Threats Summary	**Completed** Early March
	Staff develop study summaries (reviewed by municipal technical staff)	**Completed** May 19
June 2009	MRSPC review *preliminary draft* study summaries & technical studies (CD). Provide to municipalities before the meeting	**Completed** June 4
July 2009	Send *draft* study summaries & technical studies (CD) to municipalities with invitation to attend open house	**Completed** July 7
	Advertise three open houses (Almonte, Richmond and Westport) and comment period	**Completed** July 10
	Send an open house invitation to every property in an area that could score a significant threat	**Completed** July 7
	SPAs review study summaries	**Completed** June 25 & July 15
	Make study summaries available at MVC & RVCA offices for public review	**Completed** July 16
	Hold public Open Houses	**Completed** July 20, 21 & 22
February 2010	Post study summaries on web site	Early February
	Collect comments on study summaries	February
	Staff review comments received on technical study findings	February
	Staff prepare *preliminary draft* AR chapter	February
March 2010	MRSPC review summary of public comments and *preliminary draft* AR Chapter	March 4

Significant Groundwater Recharge Areas & Highly Vulnerable Aquifers

Month	Task	Timeline
June 2009	Intera / Golder complete studies	**Completed** Early June
	Staff complete Threats Summary	**Completed** Early June
	Staff develop study summaries (reviewed by municipal technical staff)	**Completed** Mid June

Month	Task	Timeline
July 2009	MRSPC review *preliminary draft* study summaries & technical studies (CD).	**Completed** July 9
	Send *draft* study summaries & technical studies (CD) to municipalities for review	**Completed** July 29
August 2009	SPAs review study summaries	**Completed** August 27 & Sept 16
February 2010	Post study summaries on web site	Early February
	Collect comments on study summaries	February
	Staff review comments received on technical study findings	February
	Staff prepare *preliminary draft* AR chapter	February
March 2010	MRSPC review summary of public comments and *preliminary draft* AR Chapter	March 4

Conceptual and Tier 1 Water Budget & Climate Change Review

Month	Task	Timeline
August 2009	Staff, Intera & Delcan complete Tier 1 Water Budget and staff revise Conceptual Water Budget. Jacqueline Oblak complete Climate Change Review	**Completed** August 14
	Staff develop summaries	**Completed** August 18
September 2009	MRSPC review technical studies (CD) and summaries	**Completed** September 3
	Send summaries & technical studies (CD) to municipalities for review and comment	February 2010
	SPAs review summaries	**Completed** September 24
	Post summaries on web site for review and comment	February 2010
	Collect comments on summaries	March 2010
	Staff review comments received on technical study findings	March 2010
November 2009	Staff prepare *preliminary draft* AR chapter	**Completed** November 16, 2009
December 2009	MRSPC review *preliminary draft* AR Chapter	**Completed** December 3

Britannia & Lemieux Island (Urban Ottawa)
Municipal Drinking Water Systems (surface water)

Month	Task	Timeline
Winter 2009	Baird complete Intake Protection Zone Study	**Completed** December 21
	Staff complete Threats Summary	**Completed** Early April

Month	Task	Timeline
	Staff develop study summary (reviewed by municipal technical staff)	**Completed** December 22
January 2010	MRSPC review study summay & technical study (CD). Provide to relevant municipalities before the meeting.	**Completed** January 7
	Send study summary & technical study (CD) to relevant municipalities with invitation to attend open house	February 2010
February 2010	Advertise open house (urban Ottawa) & comment period	February 2010
	SPAs review study summary	January 28 & February 17
	Post study summary on web site and make available at MVC & RVCA offices for public review	February 2010
March 2010	Hold Open house	Late March 2010
	Collect comments on study summaries	April
	Staff review comments received on technical study findings and prepare *preliminary draft* AR chapters	April
	Staff prepare *preliminary draft* AR chapter	April
	MRSPC review summary of public comments and *preliminary draft* AR Chapter	May 6

Groundwater Issues and Significant Threats Inventory

Month	Task	Timeline
October 2009	Dillon complete Threats & Issues Inventory for groundwater	**Completed** Early October
	Staff develop study summary (reviewed by municipal technical staff)	**Completed** October 20
November 2009	MRSPC review study summaries & technical studies (CD). Provide to municipalities before the meeting.	**Completed** November 5
	Send study summaries & technical studies (CD) to municipalities for review	February 2010
	SPAs review study summaries	**Completed** November 26 & December 2
February 2010	Post study summary on web site and make available at MVC & RVCA offices for public review – comments can be submitted during comment period for *draft* AR	February 2010
	Staff prepare *preliminary draft* AR chapter	February 2010
	MRSPC review *preliminary draft* AR chapter	March 4

Watershed Characterization Report

Month	Task	Timeline
	Staff complete Watershed Characterization report.	**Completed** March 2008
	MRSPC review preliminary draft technical study	**Complete** March, May and June 2008
	Staff complete Watershed Characterization report revisions and preliminary draft AR chapter	January 2010
	MRSPC review technical study revisions and preliminary draft AR chapter.	February 4

Surface Water Issues and Significant Threats Inventory

Month	Task	Timeline
	Dillon complete Threats & Issues Inventory for surface water	March 2010
	Staff develop study summary (reviewed by municipal technical staff)	April 2010
	MRSPC review study summary (provide to municipalities before the meeting), technical study (CD) and preliminary dratft AR chapter.	May 6
	Send study summaries & technical studies (CD) to municipalities for review	May 2010
	SPAs review study summaries	May / June 2010
	Post study summary on web site and make available at MVC & RVCA offices for public review – comments can be submitted during comment period for *draft* AR	May / June 2010

Phase 2 *Draft* Assessment Reports

Staff will compile all *draft* Assessment Report chapters into a *preliminary draft* Assessment Report. The MRSPC will review all public comments received on individual technical studies and will consider them when developing a *draft* Assessment Report for public consultation.

Month	Task	Timeline
June 2010	SPC review *preliminary draft* AR. Consider publishing *preliminary draft* AR for public consultation (now *draft* AR)	June 3
	SPC publish *draft* AR on website and make available at MVC and RVCA offices	June 2010
	SPC send copy of *draft* AR to each municipal clerk for comment	June 2010
	SPC send notice of *draft* AR to each person known to be potentially engaging in a significant threat	June 2010

Month	Task	Timeline
	SPC send copy of *draft* AR to each neighbouring SPC for comment	June 2010
	SPC issue notice* on website, in newspapers and at other locations advising the public of the opportunity to view and comment on the *draft* AR	June 2010
	SPC send copy of *draft* AR to SPAs for comment	June 2010
	SPC receive written comments on *draft* AR	July 2010
July 2010	SPC host 2 public meetings to consult on *draft* AR (one meeting in each Source Protection Area)	June / July 2010
	Staff prepare a summary of comments received on *draft* AR and prepare recommendations about how to address them	July 2010

Phase 3 *Proposed* Assessment Reports

Staff will summarize all comments received on the *draft* Assessment Report during public consultation and make recommendations about how these comments could be addressed. The MRSPC will consider all comments when making final revisions to the *draft* Assessment Report.

The MRSPC will forward their *proposed* Assessment Report to the SPAs and post it for a final public consultation period. SPAs will submit the *proposed* Assessment Report to MOE for review and approval along with any public comments they receive or comments they wish to make.

Month	Task	Timeline
August 2010	SPC review summary of comments received on *draft* AR and staff recommendations for proposed changes Consider submitting revised *draft* AR to SPAs and posting for public consultation (now *proposed* AR)	August 12
	Staff prepare *proposed* AR Staff prepare a summary of public comments received on *draft* AR and how they were addressed	August 2010
	SPC publish *proposed* AR on website and make available at MVC and RVCA offices	August 2010
	SPC send copy of *proposed* AR to each municipal clerk for comment	August 2010
	SPC send notice of *proposed* AR to each person known to be potentially engaging in a significant threat	August 2010
	SPC send copy of *proposed* AR to neighbouring SPCs for comment	August 2010
	SPC send notice of *proposed* AR to each person who submitted comments on *draft* AR	August 2010
	SPC issue notice* on website, in newspapers and at other locations advising the public of the opportunity to submit written comments on *proposed* AR to SPAs	August 2010

Month	Task	Timeline
	SPC submit *proposed* AR to SPAs along with a summary of comments received on the *draft* AR and whether they were addressed in the *proposed* AR	August 2010
September 2010	SPAs receive written comments on *proposed* AR	September 2010
	Staff compile comments received	September 2010
	SPAs submit to the Minister of the Environment: - p*roposed* AR - summary of comments received on *draft* AR and how they were addressed; and - new comments received on *proposed* AR	September 21
October 2010	SPAs provide SPC with copy of comments received on *proposed* AR	October 7
	Minister will review the package and approve *proposed* AR or require SPAs to amend them and resubmit	approval timeline unknown
	Once approved the Minister will publish a notice on the Environmental Bill of Rights Registry	Soon after approval
	SPAs publish *approved* AR on web site and make available at other locations	Soon after approval

* Notice will specify deadline for public comments, how to submit comments, locations of public meetings and locations where the ARs can be viewed (electronically and in hard copy).

Assessment Reports will be prepared in accordance with:

- *Clean Water Act, 2006*
- Ontario Regulation 287/07 "General" (amended by O.Reg. 386/08)
- *Technical Rules: Assessment Report* (dated December 12, 2008)

Attachments:

- *Preliminary Draft* Assessment Report Chapter 2 - Watershed Characterization
- Preliminary list of topics to discuss in Chapter 8 - Topics for Additional Research

***Note for Chapter 2**
Please note that the figure titled "Ottawa St. Lawrence Lowland Basin" will be inserted into the figures for this chapter at a later date, and all figures renumbered accordingly. This figure has been included, unnumbered, for review.

2 The Mississippi-Rideau Source Protection Region

The physical and human-based features of a watershed play an important role in defining groundwater and surface water availability, vulnerability, and other characteristics. This section provides descriptions of the watersheds in the MRSPR in terms of non-living (abiotic) features such as topography and geology and living (biotic) terrestrial and aquatic communities and includes information on monitoring programs within the watershed. This chapter also defines human settlement patterns within the region and how these patterns can affect quality and quantity of our water resources.

The Mississippi-Rideau Source Protection Region Watershed Characterization Report (2008) is the key source of information for this chapter and further details on physical and human geography in the MRSPR may be found in that report. Appendix C5 of this chapter includes information on data gaps identified from the Watershed Characterization Report.

2.1 Watersheds in the Source Protection Region

The Mississippi-Rideau Source Protection Region (MRSPR) is located in eastern Ontario, with an area of 8,585 km^2. The region encompasses watersheds and subwatersheds that discharge to the Mississippi River, Rideau River or Ottawa River. Figure 2-1 shows the map of the MRSPR.

The Mississippi-Rideau Source Protection Region is one of 19 watershed regions identified in Ontario's Clean Water Act. The MRSPR consists of all jurisdictional areas of the Mississippi Valley Conservation Authority (MVC) and the Rideau Valley Conservation Authority (RVCA).

2.1.1 Watershed Boundaries

The boundaries of the MRSPR are defined by the boundaries of the Rideau watershed to the east and Mississippi watershed to the west. The Carp River and smaller water courses within the City of Ottawa drain into the Ottawa River and are included in the MRSPR even though, strictly speaking, they are not part of either watershed. As well, the Ontario portion of the Ottawa River which is adjacent to the City of Ottawa is included. As illustrated in Figure 2-1 the two major watersheds are of roughly the same size.

Mississippi River Watershed

The Mississippi River watershed is 3,765 km^2 in size. Headwaters in Mazinaw Lake have an elevation of 325 metres above sea level (masl). The river flows 212 km to a downstream elevation of 73 masl, for a total drop of 252 m and an average slope of 0.1%. These characteristics are summarized in Table 2-1.

Rideau River Watershed

The Rideau River watershed is 3,849 km^2 in size. It extends from Burridge Lake, at an upstream elevation of 163 masl, for 160 km to a downstream elevation of 40 masl, for a total drop of 123 meters and an average slope of 0.08%. These characteristics are summarized in Table 2-2.

Carp River Watershed

The Carp River watershed covers an area of 300 km^2. It flows northwest from Stittsville to Kinburn then bends to the north, emptying into the Ottawa River downstream of Chats Lake at Fitzroy Harbour. The Carp River drops 48.8 m over 45.8 km for an average slope of 0.1%.

Ottawa River Tributaries

Within the boundaries of the City of Ottawa, several smaller streams drain directly into the Ottawa River. The smaller streams include Constance Creek, Still Water Creek, Pinecrest Creek, Shirley's Brook, Watts Creek, Green Creek and Bilberry Creek. The total drainage area to these streams is 672 km^2.

2.1.2 Subwatershed Areas

In total, 20 natural subwatersheds have been identified within the MRSPR. The subwatersheds are identified in Table 2-3 and their locations are shown in Figure 2-1. It should be noted that discussions on the Tier I water budget in Chapter 3 refers to 22 subwatersheds: these subwatersheds were determined by streamflow gauge locations (where available) for the purpose of determining water budget calculations and should not be confused with natural subwatersheds. Figure 3-1 shows the subwatersheds which are delineated in the water budget. Table 2-4 shows major drainage areas of the 20 natural subwatersheds.

2.1.3 Neighbouring Source Protection Areas/Regions

Source Protection areas and regions found adjacent to the MRSPR are the Raisin-South Nation Source Protection Region to the east, Cataraqui Source Protection Area to the south and Quinte Source Protection Region to the south and west. Areas to the north-west of the region include the northern area of Lanark, Frontenac, and Lennox & Addington Counties. Figure 2-2 shows the Eastern Ontario Source Protection Areas and Regions.

2.2 Physical Geography

Physical geography includes bedrock and soil features which have formed in the ancient and recent past and continue to shape our waterways. It also includes biotic communities which have developed in the region. These features all play a role in determining intrinsic water quality and water quantity in the region.

2.2.1 Geology

The MRSPR is part of a larger physiographic region known as the Ottawa-St. Lawrence Lowland (a.k.a. Central-St. Lawrence Lowland) basin. This is a low lying area bound to the north by the Laurentian Highlands of the Canadian Shield, and to the south by the Adirondack Mountains in New York State. The western boundary of this basin is the Frontenac Axis, an extension of the

Precambrian Shield that trends northwest to southeast and connects the Canadian Shield to the Adirondack Mountains.

The Frontenac Axis separates the sedimentary rocks of south-central Ontario from the sedimentary rocks of the Ottawa-St. Lawrence Lowlands. To the east, the Ottawa-St. Lawrence Lowland basin is bounded by the "Beauharnois anticline", a broad geologic structure consisting of gently folded Paleozoic bedrock. The anticline can be seen near the confluence of the Ottawa and St. Lawrence Rivers, and extends north to south from the Canadian Shield to the Adirondack Mountains. *Note: Map 1.2-1 showing the Physiographic Regions and Frontenac Axis (from the Watershed Characterization Report) will be added to this chapter at a later date.

The Precambrian Era includes approximately 80% of the Earth's history and ended about 570 million years ago. Following the Precambrian Era, the Precambrian Shield within Eastern Ontario became flooded by an ancient ocean from the east. The limits of advancement of this ocean are clearly evident near the MRSPR, outlined by the boundary of the Ottawa-St. Lawrence Lowlands. This occurred over 400 million years ago. During the following Paleozoic Era, erosion of the Precambrian landmass, and later the deposition of conglomerates and sandstone along the shallow water shorelines resulted in the Covey Hill and Nepean Formations. As the ocean level increased, carbonate-rich fine-grained sediments were deposited, resulting in the March and Oxford sandstone formations. Subsequently, the ocean retreated and re-flooded many times, creating the limestone, dolostone, and sandstone sequences that currently overlie the Nepean Sandstone Formation.

After the Paleozoic era, a period of extensive faulting occurred followed by another long period of erosion and deposition. During the Quaternary Era, (1.6 million years ago to 8,000 years ago) a period of glaciation covered much of North America in massive sheets of ice. The most recent glaciation in North America, known as the Wisconsin glaciation, retreated from the Ottawa-St. Lawrence lowlands approximately 12,000 years ago. As the ice retreated, the Atlantic Ocean invaded from the east forming a large water body known as the Champlain Sea, which covered the Ottawa-St. Lawrence Lowlands and deposited clays, silts and sands in low lying areas. These deposits provided the foundation for the soils that we see in the region today.

Bedrock Geology

The MRSPR is generally comprised of Precambrian igneous and metamorphic rocks, overlain by Paleozoic sedimentary rocks. The Precambrian Shield exists throughout the entire MRSPR: in the western portion of the region it appears prominently at surface, and east of Perth and Almonte it is covered with Paleozoic sedimentary rocks (the Nepean, March, and Oxford Formations). Groundwater in the MRSPR 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.

Figure 2-5 shows the generalized distribution of bedrock stratigraphy throughout the MRSPR.

The outcropping of the Precambrian Shield in the western portion of the region is a prominent feature of the MRSPR. In the Rideau Valley watershed, the shield appears at surface in the Upper Rideau region, west of Westport. In the Mississippi Valley, the shield appears just southwest of Almonte, and dominates

the landscape upstream from that point. Glaciation of the shield means that the western portion of the two watersheds contains numerous lakes of various shapes and sizes.

Bedrock Faults

Although Eastern Ontario is located well within a stable part of the large North American Tectonic Plate, seismic activity (faulting) still occurs in regions of crustal weakness. The MRSPR is situated in a historically active fault zone called the Western Quebec Seismic Zone (National Resources Canada (NRC) 2006), which extends from the St. Lawrence River near Montreal to Temiscaming, Quebec. The tectonic history within this area has resulted in many faults and fault zones that are evident in both the Precambrian and Palaeozoic bedrock formations (Williams 1991).

Most faults in the MRSPR strike from the southeast to northwest and have vertical displacements exceeding 1000 m (Chapman and Putnam 1984). Figure 2-6 displays a simplified regional version of major faults in the MRSPR. These faults are characterized by a vertical displacement exceeding 200 m, and include the Pakenham, Hazeldean, Gloucester, and Rigaud faults, and the Ottawa River fault series.

When a bedrock layer that acts as an aquifer is displaced by faulting, the horizontal groundwater flow patterns can be disrupted. A fault can also increase vertical hydraulic conductivity (how easily water travels vertically up from the aquifer) by providing a short-cut through the bedrock units to the surface. Rates of downward flow may also be affected. Little specific information is available on how faulting affects local aquifers.

Figure 2-6 illustrates three regional geological cross-sections. Their locations are shown in the top right corner of the Figure.

The cross-sections are:

- Regional Cross Section A-A' - Southwest to Northeast through the MRSPR;
- Regional Cross Section B-B' – North to South through Richmond Area;
- Regional Cross Section C-C' – West to East through Perth Area.

Surficial Geology

The overburden geology distribution within the MRSPR reflects the geological processes (abrasion, deposition and erosion) that have occurred since the end of the Wisconsin glaciation approximately 12,000 years ago. Based on how they are deposited, overburden deposits can be categorized as till, glaciofluvial, glaciomarine and glaciolacustrine deposits. As the Laurentian glacier advanced from the north, eroded materials were transported from the Paleozoic rocks and deposited as till sheets and drumlins over low lying areas and indentations in the bedrock surface. As portions of the glacier melted, material was transported by melt water and deposited on top of the till sheets at the edge of the glacier as glaciofluvial deposits (eskers and glacial outwash fans). Sediments carried by glacial melt waters and subsequently deposited in low-lying lakes are known as glaciomarine deposits.

The weight of the Wisconsin ice sheet resulted in a depression of the earth's crust throughout the area. As a result, after the glacier's retreat, the Atlantic Ocean flowed westward and flooded most of southern Ontario. This flooding

resulted in a bay of water, known as the Ottawa Embayment, covering the entire Ottawa-St. Lawrence Lowland. This body of saline water was called the Champlain Sea, and it deposited massive amounts of silty clay and clay, known as glaciomarine deposits, over the underlying tills and esker deposits. Table 2-6 lists soil texture types.

As the earth's crust rebounded, the Champlain Sea drained gradually to the east, exposing drumlin and esker deposits. The erosion and reworking of these features resulted in a thin layer of sand deposited as the waters retreated. This sand layer is known now as the North Gower Sand Plain and the Edwardsburg Sand Plain physiographic regions.

Figure 2-7 shows the interpreted thickness of overburden materials based on information provided in the MOE water well records. Generally, the overburden thickness within the MRSPR is thin to non existent (less than 1 m). The exception to this is where bedrock valleys near the Ottawa and Rideau Rivers allowed the accumulation of 10 to 30 m of clays and sands. Overburden thicknesses are much greater east of the MRSPR (in the South Nation and Raisin watersheds), where the Palaeozoic bedrock elevation drops and where the deepest parts of the Champlain Sea were located.

2.2.2 Physiography

Bedrock and soil characteristics contribute to the distinctiveness of the river systems in the region. Terrain within the MRSPR is highly variable, but generally slopes from southwest to northeast with a total relief of approximately 430 m.

Figure 2-3 shows the ground surface topography in the MRSPR. The region can be divided into two general areas. The western half (covering about 70% of the Mississippi watershed, and the upper 30% of the Rideau watershed), where Precambrian bedrock outcrops and ground surface elevation is greater than 175 metres above sea level (masl), and the eastern half, where Paleozoic bedrock overlies Precambrian bedrock and ground surface elevation is less than 175 masl.

The highest ground surface elevation in the MRSPR occurs at the Mississippi watershed's most western edge, south of Denbigh, where ground surface is at approximately 470 masl. The lowest ground surface elevation occurs along the shores of the Ottawa River, where ground surface is at approximately 40 masl.

The MRSPR features a complex network of lakes, rivers, wetlands and streams. The western portions of the Region, underlain by Canadian Shield, are speckled with glacially-formed lake systems. The eastern portion is dominated by large riverine systems. Many of these systems are controlled by hydraulic structures, both natural and man-made.

Chapman and Putnam (1984) have categorized the physiography of Southern Ontario, which encompasses the area south of Lake Nipissing and the northern shore of Georgian Bay, into 55 separate and distinct regions. The MRSPR contains seven of these physiographic regions. Of these seven, Algonquin Highlands, Smiths Falls Limestone Plain, and Ottawa Valley Clay Plains are most prevalent, covering 40, 26, and 17 percent of the region, respectively.

The Algonquin Highlands region is characterized by the presence of Precambrian bedrock at or near surface, covered by little or no soil. This

physiographic region covers the south-western portion of the MRSPR, where the topography of the Canadian Shield is apparent.

The Smiths Falls Limestone Plain cuts through the centre of the Rideau watershed, extending from the southern end of the City of Ottawa through to the northern edge of the Cataraqui watershed. It is relatively flat, characterized by shallow, poorly drained soils over limestone or dolostone bedrock.

The Ottawa Valley Clay Flats are apparent at the northernmost edge of the MRSPR, along the shores of the Ottawa River. This region is characterized by thick deposits of clay and ridges of gravel or sand and is considered highly productive agricultural land.

All seven physiographic regions are described in Table 2-5. Figure 2-4 shows the distribution of these physiographic regions within the MRSPR.

2.2.3 Natural Vegetative Cover

Naturally vegetated areas are ecological features that perform various beneficial functions on the landscape and contribute to the quality and quantity of water in the region. In the MRSPR, these areas include woodlands, wetlands, and riparian areas.

The most prominent land cover in the MRSPR is wooded area, covering 3,482 km^2, or 41% of the region. Next are agriculture and a variety of rural land uses, covering 18% and 17% of the region, respectively. These occur primarily in the eastern portion of the MRSPR. Wetlands and waterbodies are also significant in the MRSPR, covering approximately 13% and 7%, respectively. Detailed land use percentages for this section can be found in the Mississippi-Rideau Source Protection Region Watershed Characterization Report (2008) Table 1.2-6.

Woodlands

Woodlands provide a number of beneficial ecological functions, including protecting water quality. Tree canopies reduce the impact of rain on soils and their roots bind the soil, resulting in less soil erosion. This can result in reduced sedimentation of creeks, streams and rivers flowing adjacent to wooded areas. Woodland shading is a factor in reducing water temperatures of adjacent aquatic habitats.

Using the provincial land cover dataset, approximately 41% of the MRSPR is covered by wooded areas. However, the distribution of that coverage is uneven across the region. As shown in Figure 2-8, the majority of wooded area in the MRSPR is found in the western portion of the region. Much of the lower Rideau and eastern Mississippi areas are devoid of woodland. Much of the middle Rideau area and most of the upper Rideau and western and central Mississippi areas are covered with more extensive woody natural vegetation (trees and shrubs).

The MRSPR is located within the Upper St. Lawrence Forest District (L.2) of the Great Lakes - St. Lawrence Forest Region according to Rowe (1972). This forest region is characterized by woodlands of a predominantly deciduous nature. Poorly-drained depressions frequently carry a hardwood swamp type in which Black Ash is prominent. Wet sites are often characterized by Black Spruce or Eastern White Cedar. The latter species is also found on dry, rocky or stony sites.

Wetlands

Wetlands and their surrounding area are known to be important for the control and storage of surface water and the recharge and discharge of groundwater. Vegetation in wetlands reduces water flow which aids in reducing shoreline erosion and trapping sediment that would otherwise enter watercourses. Some wetland plant species are known for reducing contaminant release into waterways through absorption and reduction of chemicals and metals. Wetland plants provide shelter and food for a diverse array of aquatic species as well as being a nursery for amphibious species which spend a portion of their lives in an aquatic environment. Overall, wetland vegetation contributes to the maintenance of water quality and aids in flood control.

A total of 623.4 km^2 of provincially significant wetland and 51.4 km^2 of locally significant wetland in found within the MRSPR (Ontario Natural Resources Values Information System (NRVIS)). This means that evaluated wetlands cover 8% of the geographic area of the MRSPR, while unevaluated wetlands are estimated to cover an additional 5% of the MRSPR.

The distribution of wetlands in the region is uneven, with few wetland features of any note remaining in the lower Rideau or eastern Mississippi regions. However, the limited wetland features remaining in these areas are extremely valuable to the landscape. The most extensive wetland coverage for the MRSPR is found in the middle and upper Rideau and western and central Mississippi regions, most of which has never been evaluated using the Ontario Wetland Evaluation System (OWES).

The Mississippi watershed contains thousands of wetlands, with 52 having been assessed using the OWES (MNR, 1993, 1994, 2002). Of these, 16 have been assessed as locally significant and 36 as provincially significant. In the Mississippi watershed there are 14,931 unevaluated wetlands.

The Rideau watershed also contains thousands of wetlands, of which 89 have been assessed using the OWES (MNR, 1993, 1994, 2002). Of these, 19 have been assessed as locally significant and 70 as provincially significant. In the Rideau watershed there are 13,810 unevaluated wetlands.

Wetland coverage in the MRSPR is shown in Figure 2-9 and detailed in Table 2-7. The wetlands figures include a number of types of wetlands including bog, fen, marsh, swamp, and open water. In addition, the evaluated status of wetlands (provincial or local) can be found in Figure 2-9.

Riparian Areas

The shorelines of individual properties on the Rideau River from Smiths Falls to Ottawa have been classified by RVCA for ecological integrity using a standard protocol. Three reports based on field work and analysis conducted between 2002 and 2004 categorize Rideau River shoreline conditions into four predominant groups: natural, regenerating, ornamental and degraded (Guertin and Schelenz 2002; Stephens 2004, 2005).

Knowing the extent of each these riparian conditions is important due to the essential role that naturalized shorelines can play in water quality protection. The benefits of a healthy buffer of riparian and littoral zone vegetation are extensive. Shorelines in their natural state provide diverse terrestrial and aquatic habitat and perform many hydrologic functions, significantly contributing to the overall health of a water body or watercourse.

Across the MRSPR no comprehensive mapping and assessment of riparian habitat has been completed to date. Ecologists at the RVCA and MVC are working to establish set criteria for riparian assessment.

2.2.4 Aquatic Habitats

The work of the MVC and the RVCA, and their role in fisheries management, has mainly dealt with examining aspects of water quality, monitoring overall health of various water bodies, and protecting aquatic habitat from harmful impacts. These parameters, and specifically information on the status of fish populations and habitat, have been collected via the Ontario Stream Assessment Protocol (OSAP), City Stream Watch, Macro Stream Assessment, Beaver Dam Monitoring, and Municipal Drain Classification monitoring programs. In addition to the parameters listed above, these studies characterize the existing conditions of the watershed and identify opportunities for water quality enhancement through improvement of habitat and adjacent areas, and monitor any changes that may occur.

Macroinvertebrate Communities

The composition of benthic invertebrate communities can be used as indicators of water quality. The main index used in comparisons of water quality is known as the Family Biotic Index (FBI), where each family of invertebrate is given a tolerance value related to water pollution. When an abundance of pollution-intolerant organisms are found, then it may be said that the water quality is good. When the proportion of pollution-tolerant organisms is greater, it can be an indication that water quality is poor.

Benthic populations can be affected by several factors that may or may not have a direct influence on water quality. Substrate composition, flow characteristics, riparian land use and buffer condition, and basic chemical parameters (dissolved oxygen, pH, and temperature) are evaluated when analyzing water quality in relation to benthics.

Both the RVCA and MVC carry out monitoring of macroinvertebrate communities. RVCA has been partnered with the Ontario Benthos Biomonitoring Network (OBBN) since 2003. The scope of the sampling program has grown so that 15 lake sites and 33 stream sites have been sampled twice a year since 2003 for invertebrates as indicators of water quality. MVC has been involved with the OBBN since 2005 and a total of 9 sites have been sampled. The locations of the OBBN sampling sites are presented on Figure 2-10.

In addition to the OBBN monitoring program, the City of Ottawa has sampled for benthic macroinvertebrates since 2000 at many of the urban streams and tributaries in the MRSPR. A total of 131 invertebrate sampling locations within the MRSPR have been used by the City of Ottawa and are listed in Figure 2-10. The sampling locations coincide with the stream water quality sampling stations that the City of Ottawa operates.

RVCA monitoring under this program indicates that the condition of the Rideau River is generally good. The Tay River, Jock River and Kemptville Creek all have benthic communities which are considered to be indicative of good water quality. Sites within the Lower Rideau region have a decreased quality of water. Areas such as Cranberry Creek and Sawmill Creek have low benthic populations and the composition of the benthic communities indicate fairly poor to very poor conditions. This decrease may be a reflection of location (Sawmill Creek is

an urban watercourse) or may indicate poor habitat quality (Cranberry has fairly stagnant water with poor substrate conditions). However, due to the limited time frame of data collection (since 2003), conclusions about water quality based on the presence of benthic species should be made with caution.

Conditions within the MVC have not yet been assessed as the amount of monitoring information is insufficient due to the short period that the program has been in place.

Locations and Types of Aquatic Communities

The composition of aquatic communities is directly affected by water temperature. Fish such as Northern Pike and Muskellunge are cool water fish which thrive in waters in the range of 18 to 25 degrees Celsius. Cold water species such as a number of trout species prefer 10 to 18 degrees Celsius.

Although water temperatures have not been monitored under any type of established protocols, anecdotal evidence indicates that there are a number of cool and cold water streams within the Mississippi and Rideau watersheds. The Mississippi River and some lakes in the Mississippi watershed are well known fishing destinations for cold and cool water species and in the past some lakes and rivers in the watershed have been stocked with these species by MNR. Warm water is considered to be above 25 degrees Celsius.

While some preliminary work has been done to initiate water temperature data collection, staff at RVCA and MVC are currently developing more comprehensive programs.

2.2.5 Species and Habitats at Risk

Ontario has traditionally had a rich diversity of wild plants and animals. More recently, the populations of more than 190 species of plants, fish, mammals, reptiles, amphibians, and birds in Ontario have been identified to be in decline.

Species may be at risk due to a number of reasons. Some common reasons include habitat loss or degradation, incompatible land use and resource management activities, and changes in habitat such as the spread of invasive species or those related to climate change. When there is concern that a species may be "at risk" in the province, the species is reviewed by the Committee on the Status of Species at Risk in Ontario (COSSARO). If a species is classified "at risk" they are added to the Species at Risk in Ontario (SARO) list under one of four categories, depending on the degree of risk:

Extirpated if it lives somewhere in the world, and it at one time lived in the wild in Ontario, but no longer lives in the wild in Ontario

Endangered if it lives in the wild in Ontario but is facing imminent extinction or extirpation

Threatened if it lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it

Special Concern if it lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats.

Thirty-five species of plants, animals, reptiles, and fish on the 2005 SARO list are found in the Mississippi-Rideau Source Protection Region. The Ministry of Natural Resources' Kemptville District office has identified 30 Species at Risk

within the Rideau Valley watershed, and 25 within the Mississippi Valley watershed. In the Rideau Valley, 10 are *endangered*, 8 are *threatened,* and 12 are listed as *special concern*. In the Mississippi Valley, 6 are *endangered*, 9 are *threatened,* and 10 are listed as *special concern*. Table 2-8 and Table 2-9 lists the Species at Risk in the Rideau and Mississippi watersheds respectively.

SARO related projects to address habitat degradation, protection, or other concerns related to the species in question have been done in the region or are currently in progress. Table 2-10 identifies a number of aquatic and terrestrial SARO projects in the MRSPR.

2.2.6 Surface Water Quality

Surface water originates from a variety of sources. It is a combination of water from precipitation (rain and snowfall, including run-off), and groundwater discharge to the surface (baseflow).

The ratio of precipitation to baseflow in surface water affects the water's chemical composition. Typically the chemical composition of precipitation depends on the balance of natural gases within the atmosphere. The chemical composition of groundwater depends on the soil or rock formation that the groundwater emerges from, the length of time that the water is in the ground, and groundwater temperatures. As a result, there are often higher percentages of dissolved solids in water which originated as groundwater than as precipitation.

The chemical composition of surface water can also be altered by natural and anthropogenic factors. Increased streamflows during precipitation events can potentially increase erosion and surface water can react with any mineral solids in the riverbed or in suspension. The presence of organic matter may have an effect. Human activities such as spreading nutrients on adjacent lands or improper placement or inadequate maintenance of septic systems can also have a significant impact on surface water quality. Surface water can also be receiving waters for sewage treatment facilities.

Surface Water Quality Monitoring Programs

A number of surface water quality monitoring programs are currently in operation within the MRSPR. A list of all physical, chemical and biological parameters monitored is provided in Table 2-11. A list of all active surface water quality stations, as of 2006, is presented in Appendix C1. The locations of all active surface water monitoring stations are presented in Appendix C1.

In 2006, there were 70 surface water quality stations within the MRSPR being monitored by the City of Ottawa. Each monitoring location is sampled monthly (when possible) for 45 physical, chemical, and biological parameters. A list of these parameters is provided in Table 2-11 and a list of the OBSWQ monitoring stations is provided in Appendix C1. A detailed summary of the program and results are presented in the Technical Report, Five-Year Analysis 1998 through 2002 composed by the Water Environment Protection Program of the City of Ottawa.

MVC Watershed Watch Lake Monitoring Program

The MVC Watershed Watch program was initiated in 1998 and samples 42 lakes for a number of chemical and physical parameters. Approximately 8 lakes are sampled each year, and all 42 lakes are sampled every five years. Chemical

parameters include Total Phosphates (TP) and chlorophyll. Physical parameters include water clarity (Secchi Disk), pH, temperature, and dissolved oxygen. A list of the MVC Watershed Watch surface water monitoring stations is provided in Appendix C1. Annual reports are compiled for each lake.

RVCA Watershed Watch Lake Monitoring Program

The RVCA Watershed Watch program was initiated in 2002 and as of 2005 involved the sampling of 41 lake sites. Approximately 15 lake sites are sampled each year. Monthly monitoring occurs at varying depths and locations at each lake from late spring to early fall. The bacteriological and chemical parameters monitored include *E. coli*, Dissolved Organic Carbon (DOC), Total Kjeldahl Nitrogen (TKN) and TP. Physical parameters such as water clarity (Secchi Disk), temperature, and dissolved oxygen are also monitored. Annual reports are compiled for each lake. A list of the MVC Watershed Watch surface water monitoring stations is provided in Appendix C1.

Provincial Water Quality Monitoring Network (PWQMN)

As of 2006, there were 21 active PWQMN stations within the MRSPR. Each monitoring location is sampled monthly (when possible) for 36 physical, chemical, and biological parameters. A list of these parameters is provided in Table 2-11 and a list of the PWQMN monitoring stations is provided in Appendix C1.

In 2005, the RVCA maintained and sampled 54 surface water quality monitoring stations. Each monitoring location is sampled monthly, when possible, for 41 physical, chemical, and biological parameters. A list of these parameters is provided in Table 2-11 and a list of the RVCA surface water monitoring stations is provided in Appendix C1.

Surface Water Quality Results

The following are results of surface water quality monitoring programs in the MRSPR on a subwatershed basis. Data presented is from 2000 to 2005 with the exception of the MVC Watershed Watch program (1998-2005) and the OBSWQ monitoring program (2000-2006). A detailed listing of the surface water quality monitoring sites is presented in Appendix C1. The Canadian Council of Ministers of the Environment (CCME) has developed a scoring system to evaluate the level of impairment of surface water. Evaluation is based on the percentage of samples that show no evidence of impairment and are in compliance with any relevant objectives. The categories are as follows:

- Excellent water quality – 95-100%
- Good water quality – 80-94%
- Fair water quality – 65-79%
- Marginal water quality – 45-64%
- Poor water quality – 0-44%

Appendix C2 lists the CCME scoring for each individual water quality station for indicator parameters and presents the CCME scoring for the various subwatersheds.

Surface water quality within the MRSPR is good to excellent according to this system. Generally, water quality within the larger rivers is better than in smaller tributaries. In some instances, local conditions such as the composition of soils and rock and/or human activities may impact the quality of the surface

water. Data availability varies across the region with data being widely available within the City of Ottawa, but relatively sparse in the western portions of the MRSPR.

Figure 2-12 (chloride), Figure 2-13 (TKN), and Figure 2-14 (TP) show elevated concentrations of parameters that are commonly associated with human activities, such as nitrogen compounds and chloride (associated with human waste / water softeners), and sodium chloride (common road salt). Concentrations are highest in areas of higher density development. Additionally, Figure 2-14 indicates that concentrations increase further downstream in the surface water systems.

2.2.7 Groundwater Quality

Groundwater obtains its natural geochemical signature based on the time it spends below the surface and the types of surrounding rock. Groundwater that has been underground for a short period of time, for example, will exhibit chemical characteristics similar to its source (e.g. rainfall or surface water). Conversely, groundwater that resides underground for a long period of time will exhibit chemical characteristics of the dissolved minerals along its flow path. It is also important to note that generally, groundwater found furthest below the surface is oldest. The natural composition of shallow groundwater, therefore, is typically low in Total Dissolved Solids (TDS). TDS concentrations increase with depth, with the highest concentrations found in the deepest (and oldest) groundwater.

Groundwater Quality Data Sources and Monitoring Programs

For the Watershed Characterization technical report, a wide variety of groundwater quality data sources were reviewed. These include:

1. Renfrew County - Mississippi - Rideau Regional Groundwater Study (Golder et al., 2003), which included:
    - Groundwater chemistry from selected bedrock wells (Belanger, 2001) [41 locations]
    - Groundwater chemistry from selected overburden wells (Belanger, 2001) [13 locations]
    - Review of paper copy reports from MOE Regional office in Kingston [115 locations]
    - Leeds and Grenville Regional Groundwater Study (Dillon, 2001) [129 locations]
    - 2002 groundwater sampling program (Golder et al., 2003) [35 locations]
    - Subdivision and quarry reports filed with RVCA - current to 2000 [176 locations]
    - Provincial Groundwater Monitoring Network (PGMN) - current to 2003 [18 locations]
2. 2005 groundwater sampling program as part of Carp Road Groundwater Study (Dillon, 2006) [58 locations]
3. 2005 groundwater sampling program as part of North Gower Groundwater Study (Dillon, 2006) [63 locations]
4. 2005 groundwater sampling program as part of Constance Bay Groundwater Study (Dillon, 2006) [74 locations]

5. City of Ottawa Municipal Well Data - 2001 through 2005 [7 locations]
6. MVC 2007 groundwater sampling program near Crotch Lake [15 locations]

Groundwater Quality Results

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 also have local impacts on the groundwater quality and/or quantity.

Groundwater quality data is widely available within the City of Ottawa and especially for larger rural population communities serviced by domestic wells and septic (Constance Bay, Carp Road Corridor, North Gower). However, groundwater quality data is relatively sparse in the western and southern rural portions of the MRSPR.

Table 2-12 lists parameters with aesthetic objectives or operational guidelines (ODWSOG), or health related criteria in the ODWQS. It also lists the percentage and locations of samples within the MRSPR that exceed these standards. Figure 2-15, Figure 2-16, and Figure 2-17 show the distribution levels of compounds generally associated with human activities. Appendix C4 is a summary of groundwater quality results. It should be noted that there may be elevated concentrations of some or all of these compounds in sections of higher density rural developments such as Constance Bay. Examples include nitrogen compounds and chloride (associated with human waste). Sodium chloride (salt) may also be present in shallow groundwater systems due to human activity though in deeper wells it occurs naturally due to the presence of the Champlain Sea during post-glacial melting and flooding. Since domestic wells often draw from shallow, overburden aquifers, these elevated concentrations may indicate that groundwater is being impacted by human activities. Groundwater obtained from bedrock aquifers throughout the entire region is generally considered to be ‘hard’, and therefore susceptible to scaling and poor taste.

2.3 Human Geography

2.3.1 Municipal Drinking Water Systems

Twelve municipal drinking water facilities exist within the MRSPR. Seven are supplied by groundwater and five by surface water. Groundwater systems service the municipalities of North Grenville (Kemptville), Merrickville, Westport, Mississippi Mills (Almonte), Richmond (King’s Park), Carp, and Munster. Surface water systems service Smiths Falls, Perth, Carleton Place, and the City of Ottawa (two plants, Lemieux Island and Britannia). Figure 2-18 shows these systems and their associated intakes and wells.

The Township of Lanark Highlands is currently seeking construction funding and working on the design of a new municipal groundwater-based drinking water system for the Village of Lanark in Lanark County. The approximate location of the planned Village of Lanark drinking water system in provided on Figure 2-18. This planned system has been studied in accordance with the

environmental assessment process and is included in the Approved Terms of Reference for the Mississippi Valley Source Protection Area.

Table 2-13 lists The Population of Municipal and Non-Municipal Serviced Areas in the MRSPR. The locations of these municipal water systems (including the locations of their associated wells and intakes) and the extent of their service areas are presented in Figure 2-19 and Figure 2-20.

Table 2-14 provides details of the 12 municipal systems, including their maximum permitted and average pumping rates. Maximum pumping rates are regulated by the Ontario Ministry of the Environment's Permit to Take Water (PTTW) program.

2.3.2 Other Regulated Drinking Water Systems

Other types of regulated drinking water systems include:

- small municipal residential systems
- small and large municipal non-residential systems
- non-municipal year-round and seasonal residential systems
- small and large non-municipal non-residential systems

Table 2-15 presents a summary of the different types of communal wells and designated facilities within the MRSPR, based on Ministry of the Environment records. These systems are regulated by the Province of Ontario, under O. Reg 170/03 or O. Reg 252.

O. Reg 170/03 regulates municipal and private water systems that provide water to year-round residential developments or designated facilities that serve vulnerable populations such as children and the elderly. Designated facilities include children's camps, child and youth care facilities, health care and social care facilities, and schools.

O. Reg 252/05 regulates small and large municipal and non-municipal non-residential drinking water, and non-municipal seasonal residential systems. These include motels, churches, restaurants, community halls, arenas, campgrounds, and seasonal trailer parks.

The locations of communal wells and designated facilities (nursing homes, schools, day care facilities) that supply drinking water to the public within the MRSPR are presented on Figure 2-21. All non-municipal water supply wells from the MOE PTTW database are also shown.

It should be noted that the locations of many communal wells within the MRSPR could not be mapped on Figure 2-21 due to incomplete addresses. Table 2-15 presents a summary of all communal wells and designated facilities within the MRSPR, including those that could not be mapped on Figure 2-21.

Within the MRSPR there are 47 communal water supplies that supply residential water on a seasonal basis. These are referred to as non-municipal seasonal residential supplies (NMSRS). These NMSRS are typically trailer parks, campgrounds or other water supplies.

Additionally, within the MRSPR there are 39 communal water systems that supply residential water on a year round basis. These are referred to as non-municipal year-round residential supplies (NMYRRS). These NMYRRS are typically permanent mobile home parks, condominiums or other communal water supplies.

Table 2-15 also lists several other types of non-residential water supply. The non-municipal non-residential water supply facilities include churches, motels, and resorts. The municipal non-residential water supply facilities include community halls, township offices, and sports complexes. Within the MRSPR there are 371 non-municipal and 135 municipal non-residential water supplies.

2.3.3 Settlement Areas

The MRSPR and adjacent lands show evidence of occupation from as early as 5,000 B.C. The area was originally occupied and travelled by various First Nations groups, with Europeans beginning to settle in the region during the late 18th century. Organized military settlements in the early 19th century evolved into the villages of Perth and Lanark. The European settlers cleared the existing dense virgin forests for lumber and developed the fertile clay plains into agricultural areas.

During the 19th century much of the region was used for timber production, mineral extraction, and agriculture. Manufacturing industries such as grist and saw mills, cheese factories and woollen mills were also present. Within the MRSPR agriculture and timber production still represent significant primary land uses.

Today, developed areas represent approximately 5% of the MRSPR, being divided between built-up areas and transportation routes. These developed areas are primarily in the northern portion of the MRSPR. The most significant areas of settlement fall within the amalgamated boundary of the City of Ottawa, as the former cities of Ottawa, Nepean, Gloucester, Vanier, Kanata, and Cumberland. Significant suburban development exists outside the City's greenbelt, in areas once primarily used as agricultural land.

Other principal settlement areas include the towns of Kemptville, Smiths Falls, Perth, Almonte, and Carleton Place. In total there are 20 settlement areas with populations over 500. Land use within these settlement areas is a mixture of residential, commercial, industrial and other land uses. Figure 2-22 shows settlement areas in the MRSPR.

Industrial development typically occurs within larger urban developments, in specifically designated areas. Some industrial land use occurs in the general rural area, typically requiring specific zoning amendments. Heavy industrial land use is generally not permitted within rural hamlet and village development areas.

With the hundreds of lakes and rivers within the MRSPR, many significant regions of waterfront development exist. Closer to settled areas, waterfront development typically consists of permanent homes. In more remote areas, significant seasonal cottage development exists. There is an ongoing shift, however, to redevelop and convert seasonal cottages into permanent year round homes as developed areas and transportation corridors spread outward from the main urban core.

2.3.4 Municipal Boundaries

Within the MRSPR there are 23 lower tier, two single tier and seven upper tier municipalities. A list of the municipalities within the MRSPR is presented in Table 2-16. The municipalities within the MRSPR can be found in Figure 2-1.

Several lower tier municipalities (Township of Athens, City of Clarence Rockland, Township of Edwardsburg - Cardinal, Township of North Dundas, and Township of Greater Madawaska) and upper tier municipalities (United Counties of Prescott and Russell, United Counties of Stormont, Dundas & Glengarry, and Renfrew County) have very small portions of the MRSPR within their boundaries (less than three percent of the area of each respective municipality). The majority of Athens Township is within the Cataraqui watershed region. The majority of the City of Clarence-Rockland, Township of Edwardsburg - Cardinal, North Dundas Township, United Counties of Prescott and Russell, and the United Counties of Stormont, Dundas & Glengarry are within the South Nation-Raisin watershed region.

2.3.5 Federal Lands

Federal lands within the MRSPR fall into several categories. In the City of Ottawa, the federal government owns lands used by a large variety of federal agencies and offices. In addition, the National Capital Commission (NCC), a federal agency, owns and manages official residences, many parks and open spaces, as well as the 'greenbelt' lands (these are agricultural lands and natural areas that ring the metropolitan area). Flowing through the City of Ottawa and to the south and west of the city is the Rideau Canal, with numerous locks and adjacent federal lands. Though there is general public information readily available on areas such as the NCC greenbelt and the Rideau Canal system there is not a consolidated set of information available for all federal lands within the MRSPR.

There are no reserve lands within the MRSPR as defined under the *Indian Act* (Canada).

2.3.6 Population

The total population of the MRSPR in 2006 was approximately 865,000. Table 2-17 presents a detailed breakdown of estimated population by lower/single tier municipality, as per 2006 census dissemination areas. Where a dissemination area boundary crosses the MRSPR boundary, the estimated population is based on the percentage of the dissemination area falling within the MRSPR.

Figure 2-23 maps the population distribution in urban areas. Figure 2-24 shows population density by dissemination area. The urban areas within the City of Ottawa (Barrhaven/Riverside South, Kanata/Stittsville, Orleans, Ottawa), several villages within the amalgamated City of Ottawa (Constance Bay, Manotick, Munster, Osgoode, Richmond), and other urban areas outside of the City of Ottawa (Almonte – Mississippi Mills, Carleton Place, Kemptville – North Grenville, Perth, Smiths Falls) have population densities greater than 1,000 people per square kilometre. Most of the western portion of the MRSPR has a population density of less than 10 people per square km; for example North Frontenac had a population density of 1.7 people per km^2 in the 2006 census.

The MRSPR has significant seasonal population increase associated with cottage and camp development. Although census data does not record seasonal resident populations, municipalities with significant cottage and camp development can experience two to three fold increases in population during the summer months.

Population Projections

Projected populations data was collected from the Ministry of Finance for 2011, 2021, and 2031. The population data is presented on an upper tier or county basis. The projected population for the MRSPR is presented in Table 2-18. Population growth for the MRSPR, referenced to 2001 as the baseline population, is expected to range from 6 – 17% by 2011, 12 – 31% by 2021, and 16 – 44% by 2031. The area projected to have the lowest growth rate is Renfrew County; the area projected to have the largest is the City of Ottawa.

2.3.7 Impervious Surfaces

Areas with buildings, pavement and other built features are generally considered to be impermeable, meaning that precipitation runs off rather than penetrates the ground surface. This can have a number of impacts on both groundwater and surface water. Impermeable surfaces do not allow groundwater recharge. Rain water and snowmelt which cannot soak into the ground will likely enter surface water systems as runoff, often carrying contaminants such as road salt with it.

The provincial Technical rules require that the percent of impervious surface is mapped for each vulnerable area with the intent of identifying areas where road salt may enter source water. Figure 2-25 shows impervious surfaces within the MRSPR on a regional basis. Percentages of impervious surfaces within vulnerable areas of the MRSPR are discussed in Chapters 5 and 6.

2.3.8 Interactions between Physical and Human Geography

Traditionally settlement patterns have been directly linked to degradation of functionality of natural systems. In time, as understanding of these systems and their values increase the potential for reducing the extent of degradation through smart design to retain functionality also increases. Retaining natural ecosystem functionality is increasingly becoming recognized as economically beneficial. The economic viability of allowing natural ability of systems to do things such as moderate water flows and provide contaminant filtering becomes apparent when compared to development and maintenance of facilities to provide these functions. When these natural functions are retained it becomes easier to provide safe drinking water as the “raw” water entering water treatment often carries fewer contaminants.

Woodlands and wetlands within settlement areas in the MRSPR have been reduced, in some areas quite dramatically, when compared to natural coverage prior to settlement. Riparian areas have been modified in many areas. Rather than diverse natural communities we see groomed lawns which may result in reduced water quality and aquatic habitat in settlement areas.

Protection of source water may be at least partially achieved through protection, rehabilitation, and retention of the functionality of natural features such as wetlands which serve to moderate water levels and filter surface waters entering our lakes and rivers. Similarly, naturalization of shorelines and riparian areas restores filtering characteristics, thereby reducing the volumes of contaminants and sediment associated with human activities from entering waterways.

2.4 Ottawa River

Ninety-four percent of the Ottawa River Basin is found outside the MRSPR. The Mississippi and Rideau watersheds are tertiary subwatersheds in the larger Ottawa River watershed which is a secondary subwatershed in the larger Great Lakes-St. Lawrence watershed. The MRSPR is found in the Lower Ottawa Basin.

The headwaters are found northwest of Ottawa, east of the Dozois Reservoir in Quebec. The river is 1130 km long with a watershed drainage area of 146,300 km^2 found both in the provinces of Ontario (35%) and Quebec (65%). The river eventually flows into the St. Lawrence River at Montreal. Figure 2-26 shows the Ottawa River watershed and the MRSPR within.

Thirty storage reservoirs can be found on the river, with the potential to store 14 billion m^3. There are a total of 43 hydroelectric generating stations in the watershed and numerous control structures, including approximately 25 dams in the Mississippi River, 24 dams in the Rideau River, and 19 locks in the Rideau Canal. Integrated operation of the principal reservoirs within the watershed helps to alleviate flood flows in most years (ORRPD 2009).

Surface water quality in the Ottawa River within the MRSPR is influenced by factors in upstream portions of the Ottawa River watershed. The Ottawa River is the primary source of drinking water for City of Ottawa residents, with two water intakes within City boundaries.

2.5 Summary

The MRSPR consists of two subwatersheds of the Ottawa River Basin, the Mississippi and Rideau watersheds, and 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. Surface water in the region includes hundreds of lakes, wetlands, and rivers with large tracts of forest still found, 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.

Settlement consists of the City of Ottawa as well as numerous towns, villages and scattered hamlets in rural areas. Population density varies widely, from the very dense urban areas found in the City of Ottawa to very sparse populations in the western portion of the watershed. Surface water quality in the region is generally good to excellent, with some indications of impairment related to human activity primarily in the vicinity of settlement areas.

Further Information

Further information on the physical and human geography of the MRSPR may be found in the MRSPR Watershed Characterization Report.

References

Mississippi-Rideau Source Protection Region. Mississippi-Rideau Source Protection Region. Water Characterization Report 2008.

Ontario Ministry of Natural Resources. Species at Risk in Ontario. http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276722.html. Accessed December 2009.

Ottawa River Regulation Planning Board (ORRPD). Available: www.ottawariver.ca. Accessed November 2009.

Appendices

Appendix C1 – Surface Water Quality Monitoring Sites (WC Table 2.2-2)
Appendix C2 – CCME Surface Water Quality Scores in the MRSPR (WC Appendix 12)
Appendix C3 – Surface Water Quality (WC Appendix 13)
Appendix C4– Groundwater – Water Quality Summary Results (WC Table 2.3-1)
Appendix C5 – Data Gap Reporting WC (table 1.3-13, Appendix 2, appendices)

Chapter 2
Physical and Human Geography
Tables

Table 2-1
Physical Characteristics of the Mississippi River
Mississippi - Rideau Source Protection Region

Characteristics		
Drainage Area	3,765	km^2
Watershed Length	212	km
Upper Elevation	325	masl
Downstream Elevation	73	masl
Total Drop	252	m
Average Slope	0.1%	

Table 2-2
Physical Characteristics of the Rideau River
Mississippi - Rideau Source Protection Region

Characteristics		
Drainage Area	3,849	km^2
Watershed Length	160	km
Upper Elevation	163	masl
Downstream Elevation	40	masl
Total Drop	123	m
Average Slope	0.08%	

Table 2-3
Mississippi-Rideau Subwatersheds
Mississippi - Rideau Source Protection Region

Mississippi	Ottawa	Rideau
Big Gull	Carp River	Jock River
Buckshot Creek	Ottawa River (MVC)	Kemptville Creek
Clyde River	Ottawa River East	Lower Rideau
CP Dam	Ottawa River West	Middle Rideau
Fall River		Rideau Lakes
High Falls		Tay River
Indian River		
Lower Mississippi		
Mazinaw		
Upper Mississippi		

Table 2-4

Major Drainage Areas

Mississippi - Rideau Source Protection Region

Conservation Area	Watershed	Subwatershed	Area (km2)
MVC	Mississippi River	Big Gull Lake	150
		Buckshot Creek	291
		Clyde River	663
		CP Dam	503
		Fall River	487
		High Falls	203
		Indian River	213
		Lower Mississippi	665
		Mazinaw Lake	357
		Upper Mississippi	233
		Sub-Total	3,765
	Carp River	Carp River	300
	Ottawa River	Tributaries	287
		Total	4,352
RVCA	Rideau River	Jock River	569
		Kemptville Creek	451
		Lower Rideau	757
		Middle Rideau River	823
		Rideau Lakes	450
		Tay River	799
		Sub-Total	3,849
	Ottawa River	East Tributaries	263
		West Tributaries	122
		Total	4,234
MVC - RVCA		**Total**	**8,585**

Notes: MVC - Mississippi Valley Conservation
RVCA - Rideau Valley Conservation Authority

Table 2-5

Physiographic Regions Descriptions

Mississippi-Rideau Source Protection Area

Physiographic Region	Percent MRSPR	Description
Algonquin Highlands	40%	Covers an area of 3,400 km^2 in the MRSPR, and is characterized by shallow to non-existent acidic sandy or stony soils, underlain by Precambrian bedrock. Topographic elevations range from 470 masl to 102 masl (from west to east). The region is heavily forested, with bogs and swamps typically found in low-lying areas. This physiographic region characterizes much of the Canadian Shield.
Smiths Falls Limestone Plain	26%	Covers an area of 2,200 km^2 in the MRSPR, and is characterized by poorly-drained, shallow soil over limestone or dolostone bedrock. The terrain is relatively flat, ranging from 165 masl in the southwest, to 85 masl near the City of Ottawa.
Ottawa Valley Clay Plains	17%	Covers an area of 1,500 km^2 in the northern portion of the MRSPR, along the Ottawa River. Characterized by thick deposits of grey, silty clay interrupted by ridges of rock or sand. The terrain is flat, ranging from 160 masl to 40 masl, and is highly productive as agricultural land.
Georgian Bay Fringe	10%	Covers an area of 860 km^2 in the westernmost portion of the MRSPR, and is characterized by very shallow soil and bare rock. Elevation ranges from 400 masl to 180 masl, and similarly to the Algonquin Highlands, is heavily forested.
Edwardsburg Sand Plain	3%	Covers an area of 270 km^2 in a thin slice along the eastern edge of the MRSPR adjacent to the Smiths Falls Limestone Plain, and is characterized by glaciofluvial (deposited by glacial meltwater) sand deposits overlying bedrock, till or clay. Terrain is relatively flat, with sand ridges and moraines providing some relief.
North Gower Drumlin Field	3%	Covers small, localized areas within the southern portions of the City of Ottawa, totalling 250 km^2. Characterized by a north-south oriented drumlinized till plain, with clay and silt deposits filling the land between the scattered drumlin formations. Terrain is undulating, ranging from 115 to 80 masl, with rounded drumlins protruding up to 30m above the surrounding area.
Russell and Prescott Sand Plains	1%	Covers a small area at the northeastern boundary of the MRSPR totalling 80 km^2, and is characterized by relatively thick sand deposit overlying red and grey clay. Terrain is flat, ranging from 115 to 90 masl, and the sands reach thicknesses between 3 to 10m.

Table 2-6

Summary of Soil Texture
Mississippi - Rideau Source Protection Region

Soil Texture	Total Area (km2)	Percentage of MRSPR (%)
Eroded	249	2.9%
Heavy Clay	78	0.9%
Loam	2,618	30.5%
Loamy Sand	3,510	40.9%
Silty Clay	485	5.6%
Silty Loam	112	1.3%
Sandy Loam	1,535	17.9%
Totals	**8,585**	**100%**

Table 2-7

Wetlands
Mississippi - Rideau Source Protection Region

Wetland Type	MVC			RVCA			Total (km^2)
	Provincially Significant	Locally Significant	Not Significant	Provincially Significant	Locally Significant	Not Significant	
Bog	3.3	0.1		11.0			14.5
Fen	1.7	0.0		4.6	0.2		6.5
Marsh	28.2	3.2		49.2	3.8	0.5	84.8
Open Water	24.9	1.4		16.1	1.4		43.7
Swamp	97.1	12.2		279.1	21.4		409.8
Upland				0.0			0.0
Unclassified			0.3	20.4		3.6	24.3
Totals	**155.2**	**17.0**	**0.3**	**380.5**	**26.7**	**4.1**	**583.7**

Notes: MVC - Mississippi Valley Conservation
RVCA - Rideau Valley Conservation Authority

Table 2-8

Species at Risk in the Rideau Valley Watershed
Mississippi-Rideau Source Protection Region

Common Name	OMNR Status	Species Type
Bald Eagle	Endangered	Bird
Black Tern	Special Concern	Bird
Cerulean Warbler	Special Concern	Bird
Common Nighthawk*	Special Concern	Bird
Henslow's Sparrow	Endangered	Bird
Least Bittern	Threatened	Bird
Loggerhead Shrike	Endangered	Bird
Louisiana Waterthrush	Special Concern	Bird
Peregrine Falcon	Threatened	Bird
Whip-poor-will*	Threatened	Bird
Yellow Rail	Special Concern	Bird
Lake Sturgeon	Special Concern	Fish
Northern Brook Lamprey	Special Concern	Fish
American Eel*	Endangered	Fish
Common Gray Fox	Threatened	Mammal
American Ginseng	Endangered	Plant
Blunt-lobed Woodsia	Endangered	Plant
Butternut	Endangered	Plant
Eastern Prairie Fringed-Orchid*	Endangered	Plant
Flooded Jellyskin	Threatened	Plant
Blanding's Turtle	Threatened	Reptile
Eastern Musk Turtle	Threatened	Reptile
Eastern Ratsnake	Threatened	Reptile
Eastern Ribbonsnake	Special Concern	Reptile
Five-lined Skink	Special Concern	Reptile
Milksnake	Special Concern	Reptile
Northern Map Turtle	Special Concern	Reptile
Snapping Turtle	Special Concern	Reptile
Spotted Turtle	Endangered	Reptile
Wood Turtle	Endangered	Reptile

Notes: * Updated December 2009, update source MNR

Table 2-9

Species at Risk in the Mississippi Valley Watershed
Mississippi-Rideau Source Protection Region

Common Name	OMNR Status	Species Type
Black Tern	Special Concern	Bird
Common Nighthawk*	Special Concern	Bird
Least Bittern	Threatened	Bird
Loggerhead Shrike	Endangered	Bird
Peregrine Falcon	Threatened	Bird
Short-eared Owl	Special Concern	Bird
Whip-poor-will*	Threatened	Bird
Channel Darter*	Threatened	Fish
Lake Sturgeon	Special Concern	Fish
River Redhorse	Special Concern	Fish
American Eel	Endangered	Fish
Common Gray Fox	Threatened	Mammal
Rainbow Mussel*	Threatened	Mussel
American Ginseng	Endangered	Plant
Butternut	Endangered	Plant
Flooded Jellyskin	Threatened	Plant
Blanding's Turtle	Threatened	Reptile
Eastern Musk Turtle*	Threatened	Reptile
Eastern Ribbonsnake	Special Concern	Reptile
Five-lined Skink	Special Concern	Reptile
Milksnake	Special Concern	Reptile
Northern Map Turtle	Special Concern	Reptile
Snapping Turtle*	Special Concern	Reptile
Spotted Turtle	Endangered	Reptile
Wood Turtle	Endangered	Reptile

Notes: * Updated December 2009, update source MNR

Table 2-10

Species at Risk Projects
Mississippi-Rideau Source Protection Region

Project name	SAR targeted	Organization(s)	Description
American Eel Passage	American Eel	MVC, Queens, Plenty Canada	Addressing migration barrier issues
Turtle inventory	SAR Turtles (Blandings, etc.)	MVC, Queens, Plenty Canada	Turtle habitat ID in Mississippi watershed
Field Verification of Eastern Prairie Fringed-Orchid Habitat Modeling in Ottawa	Eastern Prairie Fringed-Orchid, Spotted Turtle	Ottawa Stewardship Council	Habitat field verification of modelling exercise.
Butternut recovery program	Butternut Tree	RVCA, Ottawa Stewardship Counc	Ongoing work to identify healthy seed trees, etc.
Petrie Island Turtle Nesting Habitat Surveys	Northern Map Turtle, Blandings Turtle, Musk Turtle (Stinkpot)	Ottawa Stewardship Council	Survey of Nesting Turtles / Nesting Habitat on Petrie Island
Petrie Island SAR Turtle Nesting Habitat Project	the 3 above-mentioned SAR turtles	Ottawa Stewardship Council	Creation of an artificial nesting site
Ottawa Chimney Swift Nesting Survey and Public Outreach	Chimney Swift	Ottawa Stewardship Council	Landscape Level Survey Planning
Municipal Drains habitat assessment and protection	Aquatic species	RVCA	Review of drains as SAR habitat

Notes: MVC - Mississippi Valley Conservation Authority
RVCA - Rideau Valley Conservation Authority
Queen's - Queen's University

Table 2-11

Surface Water - Water Quality Monitoring Programs
Mississippi - Rideau Source Protection Region

Water Source	Parameter Class	Parameter	Number of Locations Monitored				
			MVC WW	Ottawa[1]	PWQ MN	RVCA SW	RVCA WW
Surface Water	General Chemistry	Alkalinity		70	21	54	
		Ammonia (Total)		70	21	54	
		Ammonia (Unionized)		70			
		Biochemical Oxygen Demand (5 day) - (BOD)			21		
		Chloride		70	21	54	
		Chlorophyll a	39				
		Conductivity		70	21	54	
		Dissolved Organic Carbon - (DOC)		70		54	41
		Dissolved Oxygen - (DO)	39	70	21	54	41
		Hardness		70	21		
		Nitrate + Nitrite		70	21		
		Nitrate				54	
		Nitrite			21	54	
		pH	39	70	21	54	
		Phosphorus (Reactive) - (RP)		70	21	54	
		Phosphorus (Total) - (TP)	39	70	21	54	41
		Secchi Disk	39	70			41
		Sulphate		70		54	
		Temperature	39	70	21	54	41
		Total Kjedahl Nitrogen - (TKN)		70	21	54	41
		Total Suspended Solids - (TSS)		70	21	54	
		Turbidity			21		
	Metals	Aluminum		70	21	54	
		Antimony		70		54	
		Barium		70	21	54	
		Beryllium		70	21	54	
		Bismuth		70		54	
		Cadmium		70	21	54	
		Calcium		70	21	54	
		Chromium		70	21	54	
		Cobalt		70	21	54	
		Copper		70	21	54	
		Iron		70	21	54	
		Lead		70	21	54	
		Magnesium		70	21	54	
		Manganese		70	21	54	
		Molybdenum		70	21	54	

Water Source	Parameter Class	Parameter	Number of Locations Monitored				
			MVC WW	Ottawa[1]	PWQ MN	RVCA SW	RVCA WW
		Nickel		70	21	54	
		Potassium		70	21	54	
		Silicon		70		54	
		Silver		70			
		Sodium		70	21	54	
		Strontium		70	21	54	
		Thallium		70			
		Tin		70		54	
		Titanium		70	21	54	
		Uranium		70		54	
		Vanadium		70	21	54	
		Zinc		70	21	54	
	Biological	Escherichia Coli - (*E.* Coli)		70		54	41
	Totals		**6**	**45**	**36**	**41**	**7**

Notes: MVC WW - Mississippi Valley Conservation - Watershed Watch
Ottawa - City of Ottawa - Surface Water Quality Monitoring
PWQMN - Provincial Water Quality Monitoring Network
RVCA SW - Rideau Valley Conservation Authority - Surface Water Quality Monitoring
RVCA WW - Rideau Valley Conservation Authority - Watershed Watch

1 - Sample locations within the MRSPR only

Table 2-12

Groundwater Quality Exceedences
Mississippi - Rideau Source Protection Region

Parameter	ODWQS Criteria	ODWSOG Criteria	ODWQS or ODWSOG Qualifier	No. of Exceedence Locations	No. of Samples	% of Exceedence
Inorganic Chemicals						
Chloride		250 mg/l	AO	95	3,517	3%
Fluoride	1.5 mg/l		MAC	6	489	1%
Nitrate	10 mg/L		MAC	72	3,235	2%
Sodium		200 mg/l	AO	51	738	7%
Metals						
Iron		0.3 mg/L	AO	264	824	32%
Aesthetics parameters						
Total Dissolved Solids		500mg/l	AO	103	374	28%
Hardness		80-100 mg/l	OG	851	875	97%
Sulphate		500 mg/l	AO	4	2,970	0%
Sulfide (H_2S)		0.05 mg/l	AO	18	116	16%
Turbidity		5 NTU	AO	10	6,701	0%
pH		6.5-8.5	OG	36	2,937	1%
Alkalinity		30-500 mg/l	OG	7	356	2%
Dissolved Organic Carbon		5 mg/l	AO	8	136	6%
Microbiological Standards						
E. Coli	ND		MAC	204	7,624	3%
Total Coliform	ND		MAC	301	7,619	4%

Table 2-13

Population of Municipal & Non-Municipal Water Serviced Areas
Mississippi - Rideau Source Protection Region

Upper/Single Tier	Lower Tier	Name of Municipal Water Service Area	Population in MRSPR[1]	Municipally Serviced Population[2, 3]	Non-Municipally Serviced Population
Frontenac County	Central Frontenac Township		2593		2593
	North Frontenac Township		1543		1543
	South Frontenac Township		801		801
Lanark County	Beckwith Township		6387		6387
	Carleton Place, Town of		9,453	9,453	
	Drummond / North Elmsley		7,118		7,118
	Lanark Highlands Township		4924		4924
	Mississippi Mills, Town of		11,254		6,595
		Almonte		4,659	
	Montague Township		3595		3,035
		Adirondo		560	
	Perth, Town of	Perth	5,907	5,907	
	Tay Valley Township		5,634		5,634
Leeds&Grenville County	Athens Township		43		43
	Augusta Township		810		810
	Edwardsburg - Cardinal Township		5		5
	Elizabethtown - Kitley Township		3,742		3,742
	Merrickville-Wolford, Village of		2,867		1,766
		Merrickville		1,101	
	North Grenville Township		11,756		8,361
		Kemptville		3,395	
	Rideau Lakes Township		6200		6200
	Westport, Village of	Westport	645	645	
Lennox & Addington County	Addington Highlands		362		362
Ottawa, City of			770,006		74,352
		Urban Area[4, 5]		695,654	
Prescott & Russell County	Clarence-Rockland, City of		726		726
Smiths Falls, Town of		Smiths Falls	8,777	8,777	
Stormont, Dundas & Glengar	North Dundas Township		134		134
Renfrew County	Greater Madawaska Township		106		106
		Totals	**865,388**	**730,151**	**135,237**

Notes:
1 - Population data not for entire municipality, Stats Canada 2006 Census by Dissemination Area
2 - Municipally serviced population data collected from Statistics Canada Municipal Water Use Database (MUD)
3 - Population of entirely serviced municipalities adjusted to Stats Canada 2006 Census data
4 - Urban Area of the City of Ottawa includes Barrhaven / Riverside South, Kanata / Stittsville, Orleans and Ottawa
5 - Urban Area also includes municipal service areas of Carp, King's Park, Manotick and Munster

Table 2-14

Details of Large Municipal Water Systems
Mississippi - Rideau Source Protection Region

Facility	Permit Number	Drinking Water System Number	PTTW (m^3/day)	5-year average (2000-2005) (m^3/day)
Almonte	8474-6MJR6X	200001290	6,895	1,831
Britannia	00-P-4139	220003154	360,000	171,968
Carleton Place	6882-686R5M	210000372	12,000	6,318
Carp	3630-62UPSJ	210002272	2,782	311
Kemptville	97-P-4036	220001236	4,490	1,492
	00-P-4138			
	01-P-4061			
King's Park	6540-64UJKL	200007999	2,620	186
Lemieux Island	2642-642LKE	220003207	325,000	162,380
Merrickville	87-P-4101	220001227	4,295	515
Munster Hamlet	3876-6QBL9J	220008006	2,362	433
Perth	5464-6MHL84	220001272	9,092	4,833
Smiths Falls	88-P-4010	220001307	18,100	9,494
Westport	00-P-4134	210001004	1,750	365
	0154-62QJ3N			

Table 2-15

Communal Wells and Designated Facilities
Mississippi - Rideau Source Protection Region

Municipality	Facility Type					
	Non-Municipal Seasonal Residential Supply (NMSRS)	Non-Municipal Year-Round Residential Supply (NMYRRS)	Large Non-Municipal Non-Residential Supply (LNMNRS)	Small Non-Municipal Non-Residential Supply (SNMNRS)	Large Municipal Non-Residential Supply (LMNRS)	Small Municipal Non-Residential Supply (SMNRS)
Addington Highlands	2			12		2
Athens				4		1
Augusta						
Beckwith	1	2		2		1
Carleton Place				3		
Central Frontenac	2		1	22		1
Clarence-Rockland	2	3		5		
Drummond/North Elmsley	1	2		8		
Edwardsburgh - Cardinal	1			9	1	4
Elizabethtown-Kitley			1	13		14
Greater Madawaska	3	2	1	19		3
Lanark Highlands	3	2		12		10
Merrickville-Wolford				3		1
Mississippi Mills	2	2		11		5
Montague	1	1		4		2
North Dundas		1		12		7
North Frontenac	4		2	6		1
North Grenville		1		10		
Ottawa Amalgamated	4	16	3	128	1	49
Perth						
Rideau Lakes	6	4		29	1	17
Smiths Falls				3		
South Frontenac	11	3		23	1	13
Tay Valley	4		2	22		
Westport				1		
Totals	**47**	**39**	**10**	**361**	**4**	**131**

Table 2-16

Mississippi-Rideau Municipalities
Mississippi - Rideau Source Protection Region

Conservation	Upper / Single Tier	Lower Tier
MVC	Frontenac, County of	North Frontenac Township
	Lanark County	Carleton Place, Town of
		Lanark Highlands, Township of
		Mississippi Mills, Town of
	Lennox & Addington, County of	Addington Highlands, Township of
	Renfrew, County of	Greater Madawaska, Township of
RVCA	Frontenac, County of	South Frontenac, Township of
	Lanark County	Montague, Township of
		Perth, Town of
	Leeds & Grenville, United Counties of	Athens ,Township of
		Augusta, Township of
		Edwardsburg - Cardinal, Township of
		Elizabethtown - Kitley, Township of
		Merrickville - Wolford , Village of
		North Grenville, Municipality of
		Rideau Lakes, Township of
		Westport, Village of
	Prescott & Russell, United Counties of	Clarence - Rockland, City of
	Smiths Falls, Town of	
	Stormont, Dundas & Glengarry, United Counties of	North Dundas, Township of
MVC & RVCA	Frontenac, County of	Central Frontenac Township
	Lanark County	Beckwith Township
		Drummond/North Elmsley, Township of
		Tay Valley Township
	Ottawa, City of	

Notes: MVC - Mississippi Valley Conservation
RVCA - Rideau Valley Conservation Authority

Table 2-17

Estimated Population Distribution
Mississippi - Rideau Source Protection Region

Upper/Single Tier	Lower Tier	% Area in MRSPR	2006 Census Population	2006 Population in MRSPR[1]
Frontenac County	Central Frontenac Township	54	4,665	2,593
	North Frontenac Township	71	1,904	1,543
	South Frontenac Township	13	18,227	801
Lanark County	Beckwith Township	100	6,387	6,387
	Carleton Place, Town of	100	9,453	9,453
	Drummond/North Elmsley Township	100	7,118	7,118
	Lanark Highlands Township	91	5,180	4,924
	Mississippi Mills, Town of	89	11,734	11,254
	Montague Township	100	3,595	3,595
	Perth, Town of	100	5,907	5,907
	Tay Valley Township	100	5,634	5,634
Leeds&Grenville County	Athens Township	4	3,086	43
	Augusta Township	19	7,510	810
	Edwardsburg - Cardinal Township	1	6,689	5
	Elizabethtown - Kitley Township	61	10,201	3,742
	Merrickville-Wolford, Village of	100	2,867	2,867
	North Grenville Township	67	14,198	11,756
	Rideau Lakes Township	51	10,350	6,200
	Westport, Village of	100	645	645
Lennox & Addington County	Addington Highlands Township	21	2,512	362
Ottawa, City of	Ottawa, City of	73	812,129	770,006
Prescott and Russell County	Clarence-Rockland, City of	3	20,790	726
Smiths Falls, Town of	Smiths Falls, Town of	100	8,777	8,777
Stormount, Dundas &	North Dundas Township	1	11,095	134
Renfrew County	Greater Madawaska Township	3	2,751	106
		Total		**865,388**

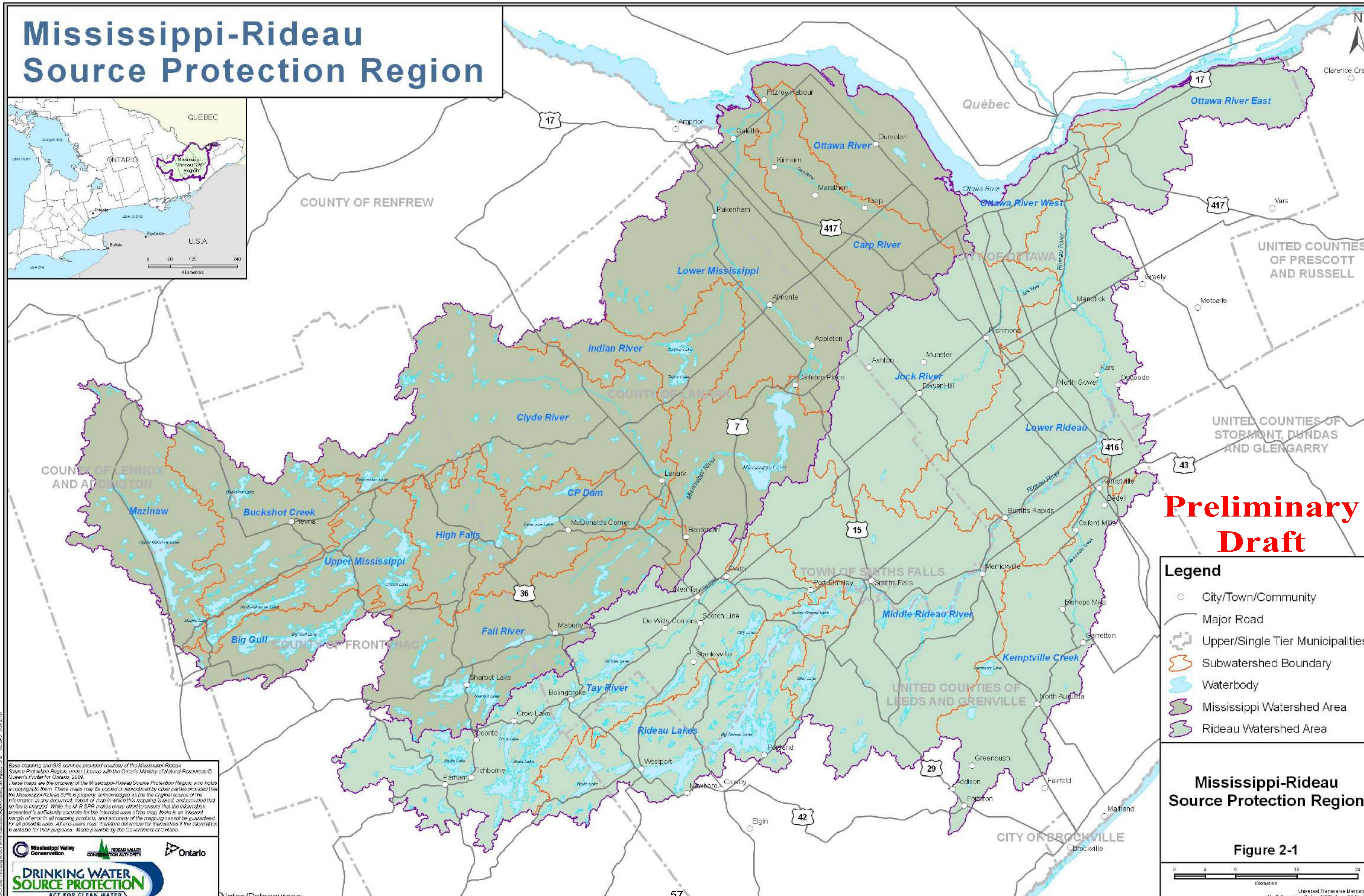
Notes: Population data collected from Statistics Canada 2006 Census by Dissemination Area
1 - Population data not for entire municipality
% in MRSPR based on portion of the area within region.

Table 2-18

Projected Population Distribution
Mississippi - Rideau Source Protection Region

Upper/Single Tier Municipality	Total Population	Total Projected Population			Projected Population Growth (%)		
	2001	2011	2021	2031	2011	2021	2031
Frontenac County	138,606	158,600	172,800	184,200	14%	25%	33%
Lanark County	62,495	72,900	80,400	85,600	17%	29%	37%
Leeds&Grenville County	96,606	106,200	112,200	117,000	10%	16%	21%
Lennox & Addington County	39,461	43,000	45,600	48,000	9%	16%	22%
Ottawa, City of	774,072	904,900	1,014,100	1,116,700	17%	31%	44%
Prescott and Russell County	76,446	89,100	96,700	102,200	17%	26%	34%
Stormount, Dundas & Glengarry	109,522	119,500	124,100	127,900	9%	13%	17%
Renfrew County	95,138	101,200	106,200	110,300	6%	12%	16%
				Average	**12%**	**21%**	**28%**

Notes: Population data collected from Statistics Canada 2001 Census
Projected population data collected from Ministry of Finance
Projected population growth referenced to 2001 population data.



Mississippi-Rideau Source Protection Region
QUEBEC
ONTARIO
U.S.A.
Québec
COUNTY OF RENFREW
CITY OF OTTAWA
COUNTY OF LANARK
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
TOWN OF SMITHS FALLS
UNITED COUNTIES OF LEEDS AND GRENVILLE
UNITED COUNTIES OF PRESCOTT AND RUSSELL
UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY
CITY OF BROCKVILLE
Ottawa River East
Ottawa River West
Ottawa River
Carp River
Lower Mississippi
Indian River
Clyde River
Jock River
Lower Rideau
CP Dam
Buckshot Creek
Mazinaw
High Falls
Upper Mississippi
Big Gull
Fall River
Tay River
Rideau Lakes
Middle Rideau River
Kemptville Creek
Fitzroy Harbour
Arnprior
Galetta
Dunrobin
Kinburn
Marathon
Carp
Pakenham
Almonte
Appleton
Carleton Place
Ashton
Munster
Dwyer Hill
Richmond
Manotick
Greely
Metcalfe
Vars
Clarence Creek
Kars
North Gower
Osgoode
Lanark
Balderson
McDonalds Corner
Plevna
Perth
Glen Tay
Port Elmsley
Smiths Falls
Scotch Line
De Witts Corners
Maberly
Stanleyville
Sharbot Lake
Bolingbroke
Crow Lake
Oconto
Tichborne
Parham
Westport
Newboro
Crosby
Portland
Elgin
Merrickville
Burritts Rapids
Kemptville
Bedell
Oxford Mills
Bishops Mills
Garretton
North Augusta
Greenbush
Addison
Forthton
Fairfeld
Maitland
Brockville
17
417
416
43
7
15
36
29
42
Preliminary Draft
Legend
City/Town/Community
Major Road
Upper/Single Tier Municipalities
Subwatershed Boundary
Waterbody
Mississippi Watershed Area
Rideau Watershed Area
Mississippi-Rideau Source Protection Region
Figure 2-1
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North
Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER
Notes/Datasources:

Mississippi-Rideau Source Protection Region

Preliminary Draft

COUNTY OF RENFREW
COUNTY OF HALIBURTON
COUNTY OF HASTINGS
COUNTY OF PETERBOROUGH
COUNTY OF NORTHUMBERLAND
COUNTY OF LANARK
CITY OF OTTAWA
UNITED COUNTIES OF PRESCOTT AND RUSSELL
UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY
CITY OF CORNWALL
UNITED COUNTIES OF LEEDS AND GRENVILLE
COUNTY OF FRONTENAC
COUNTY OF LENNOX AND ADDINGTON
CITY OF KINGSTON
CITY OF BELLEVILLE
CITY OF QUINTE WEST
CITY OF PRINCE EDWARD COUNTY
Québec
New York State
Lake Ontario

Cobden, Renfrew, Braeside, Arnprior, Pontiac, Gatineau, Aylmer, Hull, Vanier, Gloucester, Nepean, Kanata, Carleton Place, Almonte, Richmond, Beckwith, Lanark, Perth, Smiths Falls, Merrickville, Kemptville, Winchester, Chesterville, Finch, Casselman, Alexandria, Maxville, St. Isidore, Lancaster, Cornwall, Morrisburg, Iroquois, Cardinal, Prescott, Brockville, Athens, Westport, Newboro, L'Ange-Gardien, Buckingham, Masson-Angers, Thurso, Rockland, Plantagenet, Alfred, Hawkesbury, Longueuil, Lachute, Chatham, Yankleek Hill, Bancroft, Big Cedar, Lakefield, Havelock, Norwood, Peterborough, Hastings, Campbellford, Marmora, Madoc, Deloro, Tweed, Sterling, Frankford, Trenton, Brighton, Belleville, Deseronto, Napanee, Newburgh, Bath, Gananoque, Kingston, Wellington, Picton, Bloomfield

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Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario
DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

Notes/Datasources:

Legend

- City / Town
- Major Road
- Upper/Single Tier Municipalities
- Provincial Border
- Waterbody

Source Protection Regions

- *Cataraqui Region*
- *Quinte Region*
- *Raisin Region - South Nation Region*
- *Trent Conservation Coalition Region*
- *Mississippi-Rideau Region*

Source Water Protection Areas and Regions in Eastern Ontario

Figure 2-2

0 5 10 20 30 40
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi-Rideau Source Protection Region

Preliminary Draft

Legend

- City/Town/Community
- Upper/Single Tier Municipalities
- Source Water Protection Area
- Waterbody

Elevation (masl)

- 39 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- 401 - 466

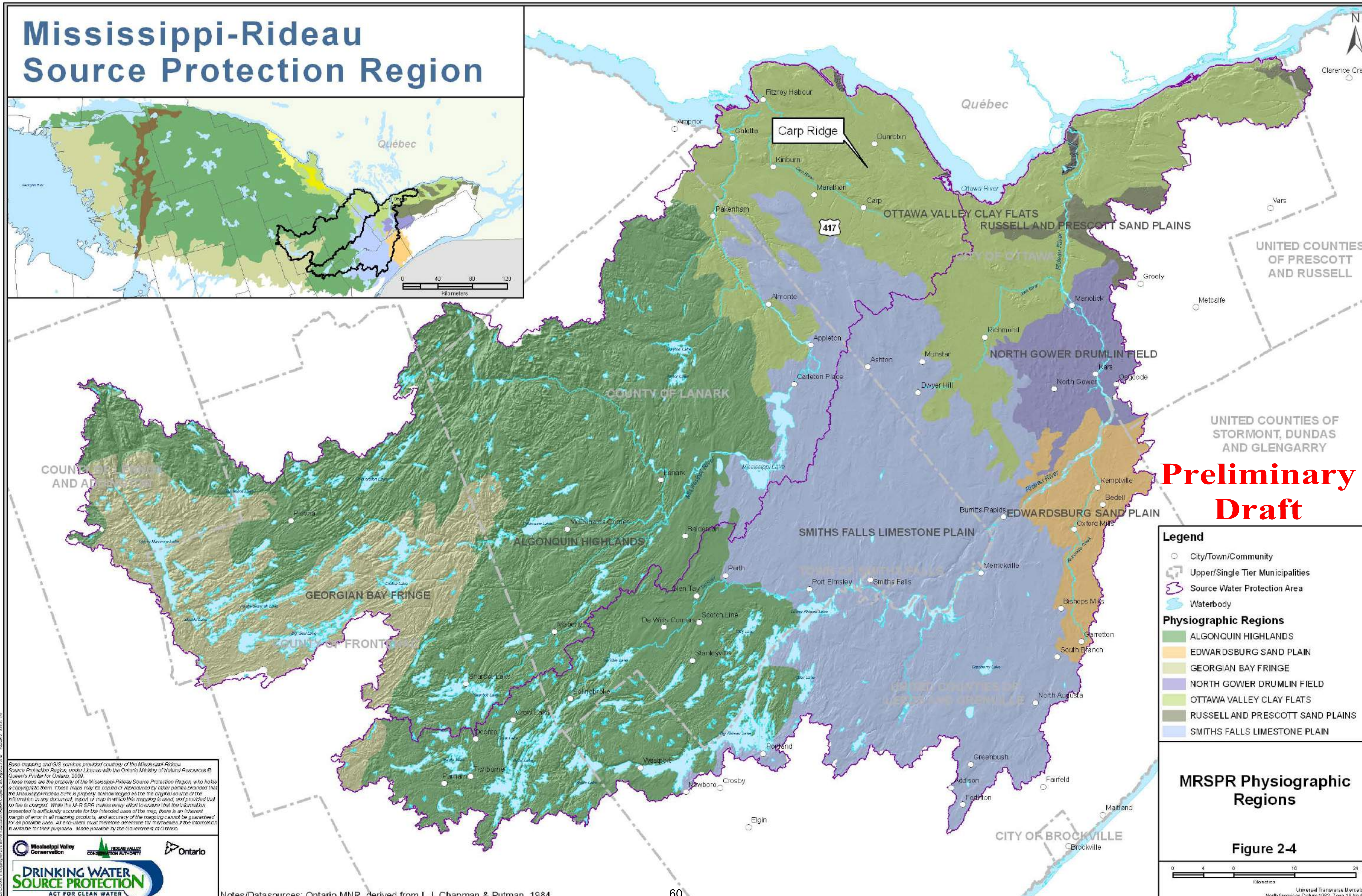
Ground Surface Topography in the MRSPR

Figure 2-3

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Golder Associates; Renfrew-Mississippi-Rideau Groundwater Study, 2003. Hillshade produced from 25m DEM


Mississippi-Rideau Source Protection Region
Québec
Carp Ridge
OTTAWA VALLEY CLAY FLATS
RUSSELL AND PRESCOTT SAND PLAINS
CITY OF OTTAWA
UNITED COUNTIES OF PRESCOTT AND RUSSELL
NORTH GOWER DRUMLIN FIELD
COUNTY OF LANARK
UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY
Preliminary Draft
EDWARDSBURG SAND PLAIN
SMITHS FALLS LIMESTONE PLAIN
ALGONQUIN HIGHLANDS
GEORGIAN BAY FRINGE
COUNTY OF FRONTENAC
CITY OF BROCKVILLE
Ottawa River
Rideau River
Fitzroy Habour
Galetta
Arnprior
Kinburn
Dunrobin
Marathon
Carp
Pakenham
Almonte
Appleton
Carleton Place
Ashton
Munster
Dwyer Hill
Richmond
Manotick
North Gower
Kars
Osgoode
Greely
Metcalfe
Vars
Clarence Creek
Kemptville
Bedell
Oxford Mills
Burritts Rapids
Merrickville
Smiths Falls
Port Elmsley
Perth
Lanark
Balderson
Glen Tay
Scotch Line
De Witts Corners
Maberly
Stanleyville
Sharbot Lake
Crow Lake
Elphin
Plevna
Mississippi Lake
Bishops Mills
Garretton
South Branch
North Augusta
Greenbush
Addison
Forthton
Fairfield
Maitland
Brockville
Portland
Westport
Newboro
Crosby
Elgin
Parham
Tichborne
Legend
City/Town/Community
Upper/Single Tier Municipalities
Source Water Protection Area
Waterbody
Physiographic Regions
ALGONQUIN HIGHLANDS
EDWARDSBURG SAND PLAIN
GEORGIAN BAY FRINGE
NORTH GOWER DRUMLIN FIELD
OTTAWA VALLEY CLAY FLATS
RUSSELL AND PRESCOTT SAND PLAINS
SMITHS FALLS LIMESTONE PLAIN
MRSPR Physiographic Regions
Figure 2-4
Kilometers
Universal Transverse Mercator
North American Datum 1983, Zone 18 North
Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER
Notes/Datasources: Ontario MNR, derived from L.J. Chapman & Putman, 1984.

Mississippi-Rideau Source Protection Region

Preliminary Draft

COUNTY OF RENFREW
COUNTY OF LANARK
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
UNITED COUNTIES OF PRESCOTT AND RUSSELL
UNITED COUNTIES OF LEEDS AND GRENVILLE
CITY OF BROCKVILLE
Québec

Fitzroy Harbour, Arnprior, Galetta, Dunrobin, Kinburn, Marathon, Carp, Pakenham, Almonte, Appleton, Ashton, Carleton Place, Munster, Dwyer Hill, Richmond, Manotick, Greely, Metcalfe, Vars, Clarence Creek, Kars, Osgoode, North Gower, Lanark, Kemptville, Bedell, Burritts Rapids, Oxford Mills, Merrickville, Smiths Falls, Port Elmsley, Bishops Mills, Garretton, South Branch, North Augusta, Plevna, McDonalds Corner, Balderson, Perth, Glen Tay, De Witts Corners, Scotch Line, Maberly, Stanleyville, Sharbot Lake, Bolingbroke, Crow Lake, Oconto, Tichborne, Parham, Westport, Portland, Newboro, Crosby, Elgin, Greenbush, Addison, Fairfield, Forthton, Maitland, Brockville

P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13

A, A', B, B', C, R

Legend

- City/Town/Community
- Regional Cross-Section
- Fault (Sub-surface)
- Upper/Single Tier Municipalities
- Source Water Protection Area

GENERALIZED BEDROCK

Upper Ordovician
- P2 - Carlsbad Formation: siltstone and shale
- P3 - Billings Formation: shale
- P4 - Eastview Formation: limestone and shale

Mid-Upper Ordovician
- P5 - Lindsey Formation: limestone

Middle Ordovician
- P6 - Verulam Formation: limestone and shale
- P7 - Bobcaygeon Formation: limestone
- P8 - Gull River Formation*: dolostone, limestone, shale and sandstone
- P9 - Rockcliffe Formation: sandstone, limestone and shale

Lower Ordovician
- P10 - Oxford Formation: dolostone
- P11 - March Formation: dolostone and sandstone

Cambro-Ordovician
- P12 - Nepean Formation: sandstone
- P13 - Covey Hill Formation: sandstone

Precambrian
- R - All Formations

*East of Renfrew this class also contains limited coverage of Bobcaygeon Formation

Generalized Bedrock Geology in the MRSPR

Figure 2-5

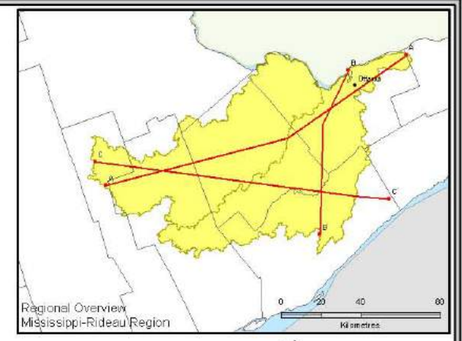
0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

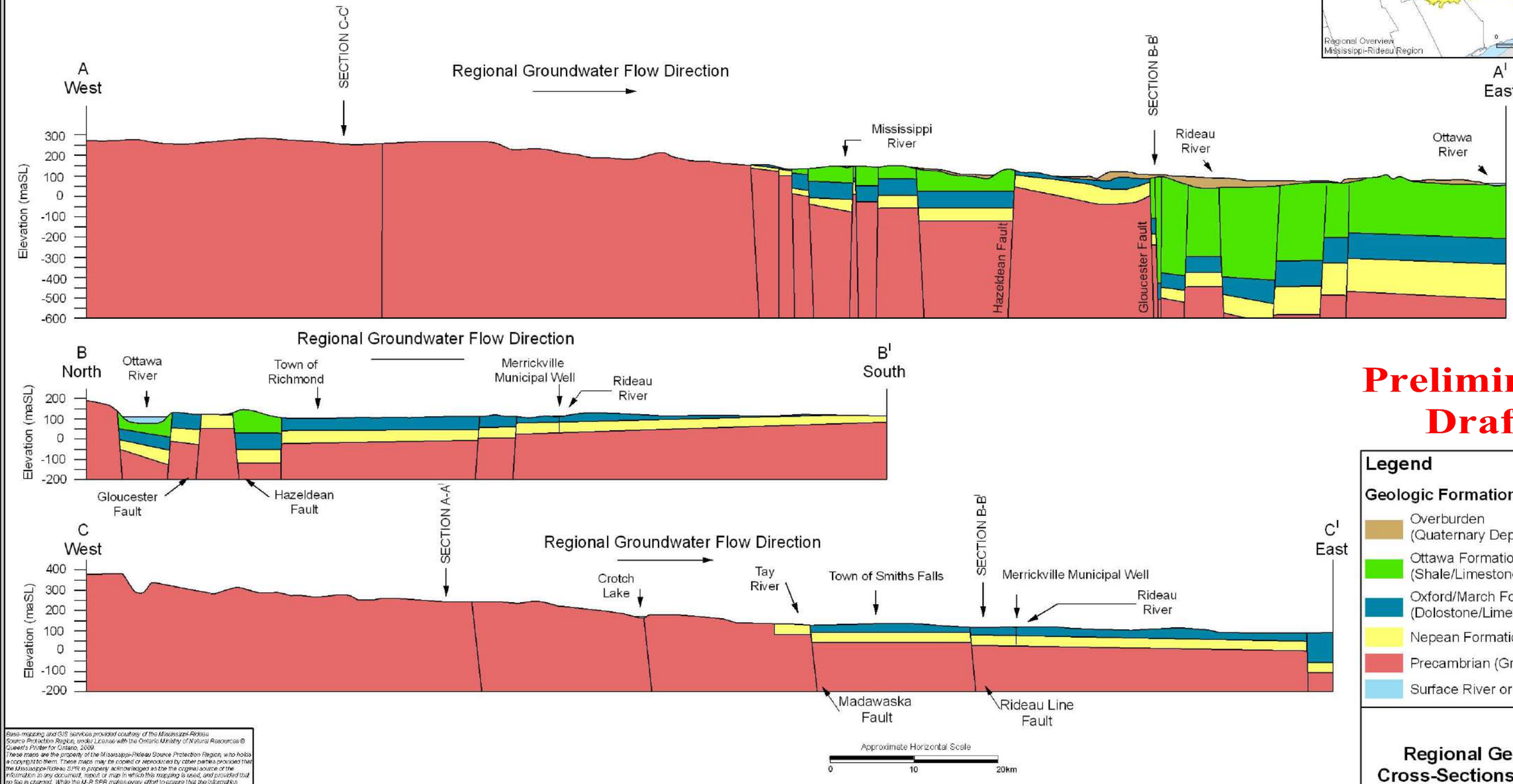
Mississippi Valley Conservation | Rideau Valley Conservation Authority | Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Golder Associates et al.; Renfrew-Mississippi-Rideau Groundwater Study, 2003. Combined MNDM / OGS geology maps at various scales and dates: Precambrian geology and faults from 1:1M scale OGS map 2544. Paleozoic geology from 1:50K scale OGS maps P.2728, P.2729, P.2732, P.2493, P.2494, P.2495, P.2727, P.2723, P.2724, P.2730, P.2731 Note: Generalized data is regional in nature, and intended for use at scales of 1:1,000,000 or smaller. Intent is to provide an overview of bedrock geology in the region.

Mississippi-Rideau Source Protection Region





Preliminary Draft

Legend

Geologic Formation

- Overburden (Quaternary Deposits)
- Ottawa Formation (Shale/Limestone/Sandstone)
- Oxford/March Formations (Dolostone/Limestone)
- Nepean Formation (Sandstone)
- Precambrian (Granite)
- Surface River or Lake

Regional Geologic Cross-Sections (A, B, C)

Figure 2-6

1:24 Vertical Exaggeration

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DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: AA' and BB' were modified from Belanger 2006. CC' was created from MOE water well records (WWIS); this information is regional in nature and not intended for site-specific evaluations. The figure should be used only in conjunction with the accompanying report.

Mississippi-Rideau Source Protection Region

Preliminary Draft

Legend

- City/Town/Community
- Upper/Single Tier Municipalities
- Source Water Protection Area

Overburden Thickness

Value

- 30
- 28
- 26
- 24
- 22
- 20
- 18
- 16
- 14
- 12
- 10
- 8
- 6
- 4
- 2 or less

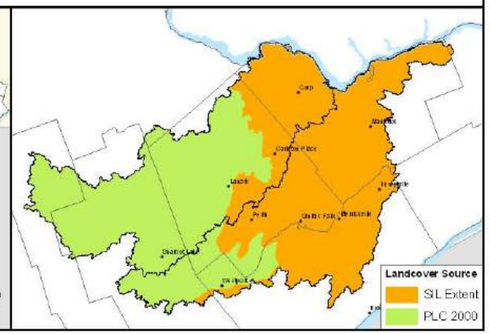
Overburden Thickness in the MRSPR

Figure 2-7

0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Notes/Datasources: Golder Associates et al.; Renfrew-Mississippi-Rideau Groundwater Study, 2003. This information is regional in nature and is not suitable for use in site specific evaluations. The map should only be interpreted in conjunction with the accompanying report.

Mississippi-Rideau Source Protection Region



Preliminary Draft

Legend

- City/Town/Community
- Upper/Single Tier Municipalities
- Source Water Protection Area

Interim Landcover*

Class

- Agriculture
- Rural Land Use
- Bedrock
- Unclassified
- Wooded Area
- Hedgerow
- Wetland
- Waterbody
- Built-up Areas - Pervious
- Built-up Areas - Impervious
- Alvar
- Transportation
- Licensed Pits and Quarries

Land Cover in the MRSPR

Figure 2-8

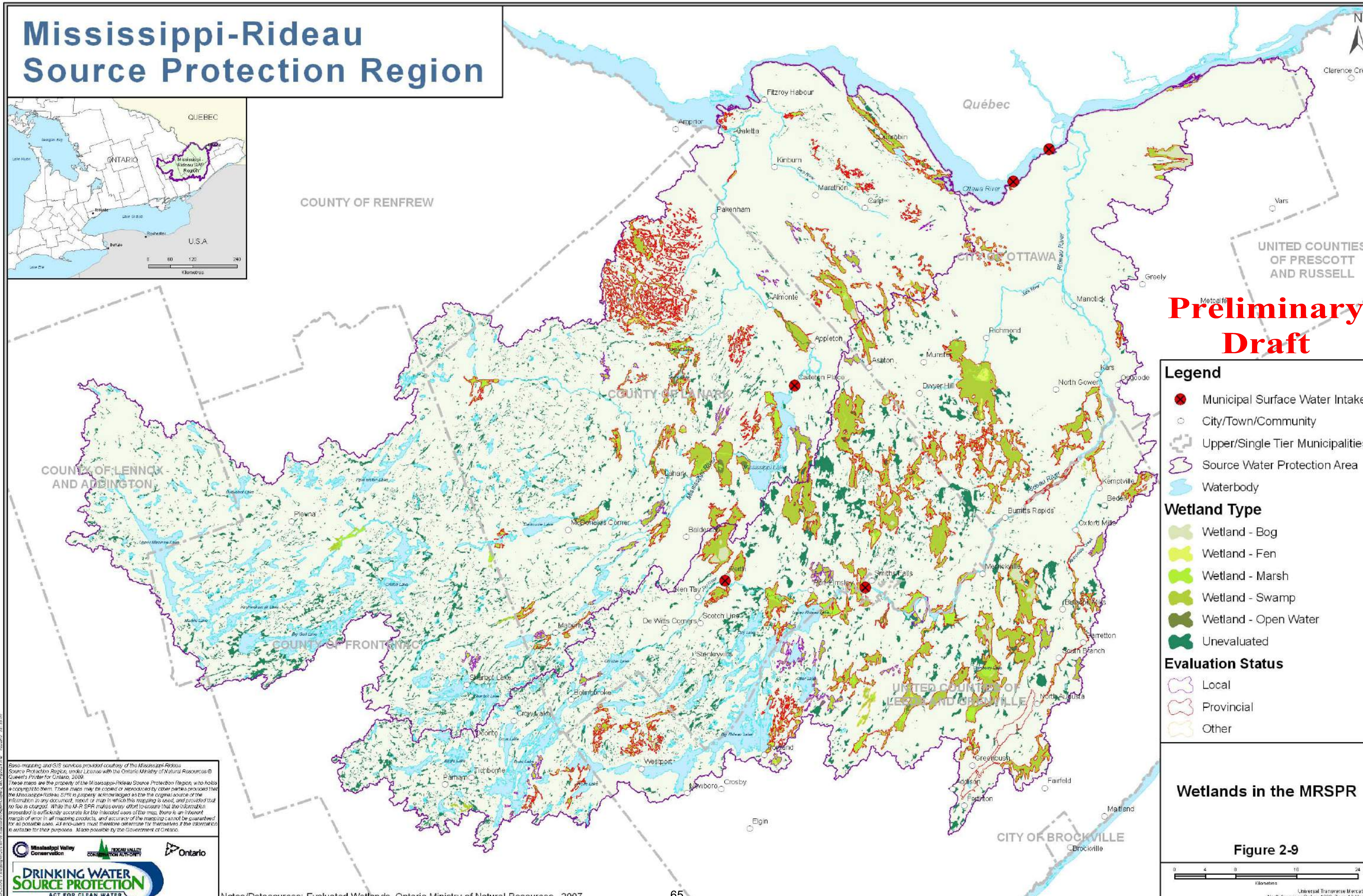
0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: *The displayed Landcover is a merged product, comprised of the SOLRIS Interim Landcover (SIL) product for Southern Ontario, and in the on-shield areas, the Provincial Land Cover 2000 (PLC 2000). The SIL and PLC 2000 landcover categories were cross-mapped according to guidelines as laid out by the Ontario MNR, 2007.

Mississippi-Rideau Source Protection Region



Wetlands in the MRSPR

Figure 2-9

Base-mapping and GIS services provided courtesy of the Mississippi-Rideau Source Protection Region, under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2009.
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Ontario
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Evaluated Wetlands, Ontario Ministry of Natural Resources , 2007.

Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi-Rideau Source Protection Region

Preliminary Draft

Legend

Ontario Benthos Biomonitoring Network

- ● River / Stream / Drain Site
- ● Lake Site
- ⊗ Wetland Site
- ○ City/Town/Community
- Stream
- Upper/Single Tier Municipalities
- Source Water Protection Area
- ▨ Potential Surface Water Recharge Area
- Water Body - Permanent

Potential recharge areas are based on non-topography corrected watertable distances (m) above ground surface.

Aquatic Invertebrates Monitoring in the MRSPR

Figure 2-10

0 4 8 16 24
Kilometres

Universal Transverse Mercator
North American Datum 1983, Zone 18 North

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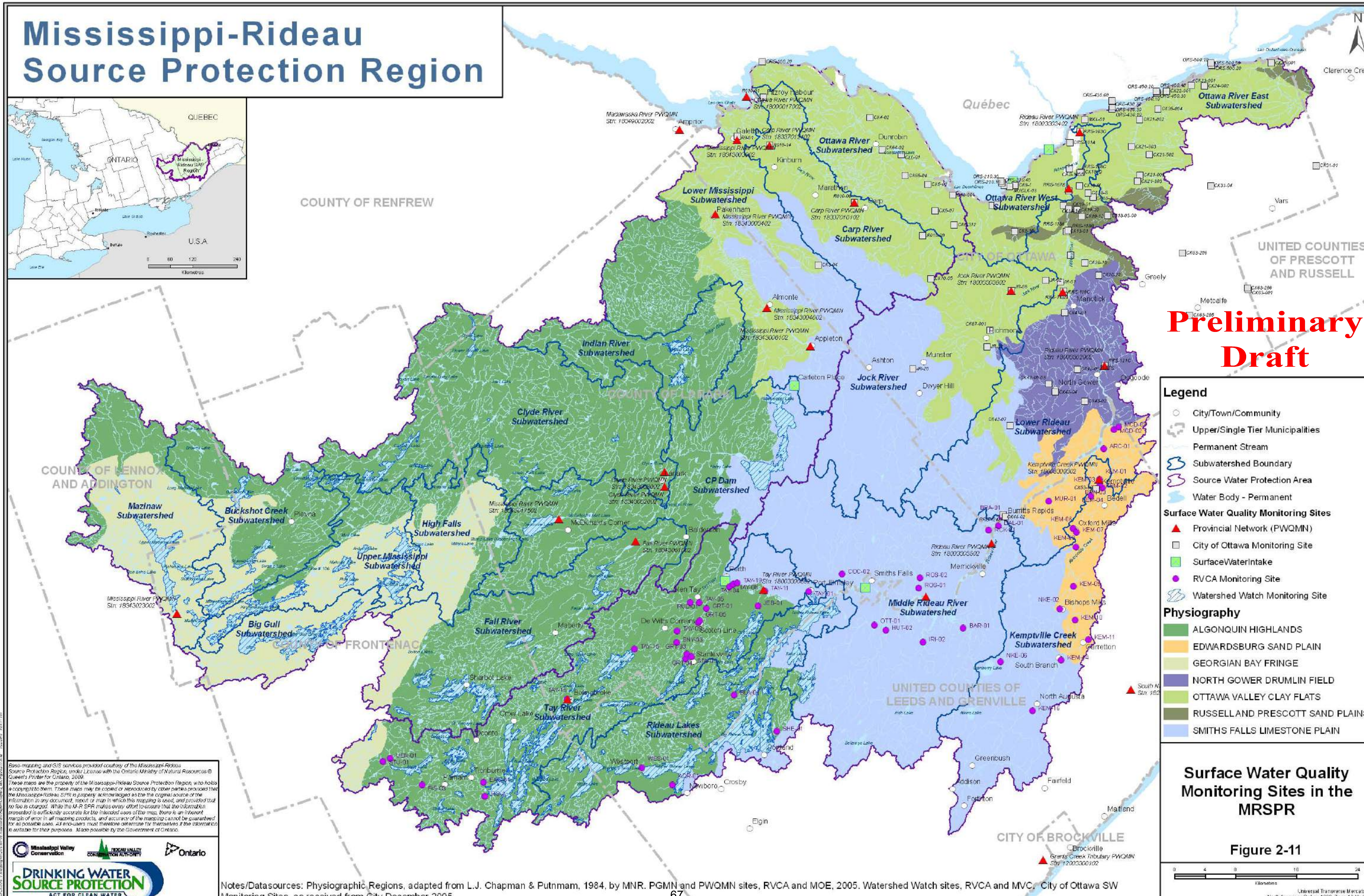
Notes/Datasources: Golder Associates et al., Renfrew-Mississippi-Rideau Regional Groundwater Study, 2003. Dataset: hydra_class.shp, Potential Recharge/Discharge (Fig. 3.3-10). Potential SW recharge areas are those areas identified as potential GW discharge. Benthic monitoring sites, Mississippi and Rideau Valley Conservation Authorities, and the City of Ottawa, 2008. Information is regional in nature and not intended for site-specific use.


Mississippi-Rideau Source Protection Region
QUEBEC
ONTARIO
U.S.A.
COUNTY OF RENFREW
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
COUNTY OF LANARK
CITY OF OTTAWA
UNITED COUNTIES OF PRESCOTT AND RUSSELL
UNITED COUNTIES OF LEEDS AND GRENVILLE
CITY OF BROCKVILLE
Québec
Ottawa River East Subwatershed
Ottawa River Subwatershed
Ottawa River West Subwatershed
Lower Mississippi Subwatershed
Carp River Subwatershed
Indian River Subwatershed
Jock River Subwatershed
Clyde River Subwatershed
CP Dam Subwatershed
Lower Rideau Subwatershed
Mazinaw Subwatershed
Buckshot Creek Subwatershed
High Falls Subwatershed
Upper Mississippi Subwatershed
Big Gull Subwatershed
Fall River Subwatershed
Middle Rideau River Subwatershed
Kemptville Creek Subwatershed
Tay River Subwatershed
Rideau Lakes Subwatershed
Arnprior
Pakenham
Almonte
Appleton
Carleton Place
Ashton
Munster
Richmond
Manotick
North Gower
Osgoode
Kemptville
Burritts Rapids
Oxford Mills
Merrickville
Smiths Falls
Perth
Bishops Mills
South Branch
North Augusta
Greenbush
Addison
Fairfield
Maitland
Brockville
Elgin
Westport
Crosby
Sharbot Lake
Plevna
Lanark
Dunrobin
Kinburn
Fitzroy Harbour
Galetta
Carp
Metcalfe
Greely
Vars
Clarence Creek
Preliminary Draft
Legend
City/Town/Community
Upper/Single Tier Municipalities
Permanent Stream
Subwatershed Boundary
Source Water Protection Area
Water Body - Permanent
Surface Water Quality Monitoring Sites
Provincial Network (PWQMN)
City of Ottawa Monitoring Site
SurfaceWaterIntake
RVCA Monitoring Site
Watershed Watch Monitoring Site
Physiography
ALGONQUIN HIGHLANDS
EDWARDSBURG SAND PLAIN
GEORGIAN BAY FRINGE
NORTH GOWER DRUMLIN FIELD
OTTAWA VALLEY CLAY FLATS
RUSSELL AND PRESCOTT SAND PLAINS
SMITHS FALLS LIMESTONE PLAIN
Surface Water Quality Monitoring Sites in the MRSPR
Figure 2-11
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North
Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER
Notes/Datasources: Physiographic Regions, adapted from L.J. Chapman & Putnmam, 1984, by MNR. PGMN and PWQMN sites, RVCA and MOE, 2005. Watershed Watch sites, RVCA and MVC. City of Ottawa SW Monitoring Sites, as received from City December 2005.

Mississippi-Rideau Source Protection Region

COUNTY OF RENFREW

COUNTY OF LENNOX AND ADDINGTON

COUNTY OF FRONTENAC

COUNTY OF LANARK

CITY OF OTTAWA

UNITED COUNTIES OF PRESCOTT AND RUSSELL

UNITED COUNTIES OF LEEDS AND GRENVILLE

CITY OF BROCKVILLE

Québec

Ottawa River

Mississippi River

Rideau River

Fitzroy Harbour, Arnprior, Galetta, Dunrobin, Kinburn, Marathon, Carp, Pakenham, Almonte, Appleton, Ashton, Munster, Carleton Place, Dwyer Hill, Richmond, Manotick, Greely, Metcalfe, Vars, Clarence Creek, North Gower, Kars, Osgoode, Lanark, McDonalds Corner, Balderson, Perth, Port Elmsley, Smiths Falls, Merrickville, Burritts Rapids, Kemptville, Bedell, Oxford Mills, Bishops Mills, Garretton, South Branch, North Augusta, Plevna, Maberly, Sharbot Lake, Bolingbroke, Crow Lake, Oconto, Parham, Tichborne, Glen Tay, De Witts Corners, Scotch Line, Stanleyville, Portland, Westport, Newboro, Crosby, Elgin, Greenbush, Addison, Fairfield, Fotherton, Maitland, Brockville

Preliminary Draft

Legend

- City/Town/Community
- Upper/Single Tier Municipalities
- Source Water Protection Area
- Waterbody

Chloride Concentration

Average

- < 50.00 mg/L
- 50.00 - 150.00 mg/L
- 150.01 - 250.00 mg/L
- > 250.00 mg/L*

** 250 mg/L is the aesthetic objective as set by Ontario's Ministry of the Environment (MOE). Source: Ontario Drinking Water Standards, Objectives and Guidelines, Revised 2006.*

MRSPR Surface Water Quality, Chloride - Average Concentration

Figure 2-12

0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

Notes/Datasources: Water quality monitoring site locations shown or mapped are those which monitor for the given parameter. Sites that do not collect data for the mapped parameter are not shown. Data is collected by the RVCA, MVC, and the City of Ottawa for the PWQMN, or as part of in-house water quality programs.

Mississippi-Rideau Source Protection Region

Preliminary Draft

Legend

○ City/Town/Community

Upper/Single Tier Municipalities

Source Water Protection Area

Waterbody

Total Kjeldahl Nitrogen Average

● < 0.5 mg/L

● 0.50 - 2.00 mg/L*

● > 2.00 mg/L

** 0.5 mg/L is the guideline as set by Environment Canada. Source: Water Quality Sourcebook, "A Guide to Water Quality Parameters", Inland Waters Directorate, Water Quality Branch, 1979*

MRSPR Surface Water Quality, TKN - Average Concentration

Figure 2-13

0 4 8 16 24
Kilometres

Universal Transverse Mercator
North American Datum 1983, Zone 18 North

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Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
Drinking Water Source Protection
Act for Clean Water

Notes/Datasources: Water quality monitoring site locations shown or mapped are those which monitor for the given parameter. Sites that do not collect data for the mapped parameter are not shown. Data is collected by the RVCA, MVC, and the City of Ottawa for the PWQMN, or as part of in-house water quality programs.

Mississippi-Rideau Source Protection Region

Preliminary Draft

COUNTY OF RENFREW
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
COUNTY OF LANARK
CITY OF OTTAWA
UNITED COUNTIES OF PRESCOTT AND RUSSELL
UNITED COUNTIES OF LEEDS AND GRENVILLE
UNITED COUNTIES OF STORMONT DUNDAS AND GLENGARRY
CITY OF BROCKVILLE
Québec
Ottawa River
Mississippi River
Rideau River
Fitzroy Habour
Arnprior
Galetta
Kinburn
Dunrobin
Marathon
Carp
Pakenham
Almonte
Appleton
Ashton
Munster
Carleton Place
Dwyer Hill
Richmond
Manotick
Greely
Metcalfe
Vars
Clarence Creek
North Gower
Kars
Osgoode
Kemptville
Bedell
Oxford Mills
Burritts Rapids
Merrickville
Smiths Falls
Port Elmsley
Perth
Glen Tay
Scotch Line
De Witts Corners
Maberly
Stanleyville
Bishops Mills
Gametton
South Branch
North Augusta
Lanark
McDonalds Corner
Balderson
Plevna
Sharbot Lake
Bolingbroke
Crow Lake
Oconto
Parham
Tichborne
Westport
Newboro
Crosby
Portland
Elgin
Greenbush
Addison
Fairfield
Fostorton
Maitland
Brockville

Legend

- City/Town/Community
- Upper/Single Tier Municipalities
- Source Water Protection Area
- Waterbody

Total Phosphorus (TP)

Average

- < 0.010 mg/L
- 0.011 - 0.020 mg/L
- 0.021 - 0.030 mg/L
- > 0.030 mg/L*

** 0.030 mg/L is the guideline as set by the Province of Ontario. Source: Provincial Water Quality Objectives, Ontario Ministry of the Environment, 1999*

MRSPR Surface Water Quality, Total Phosphorous - Average Concentration

Figure 2-14

0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

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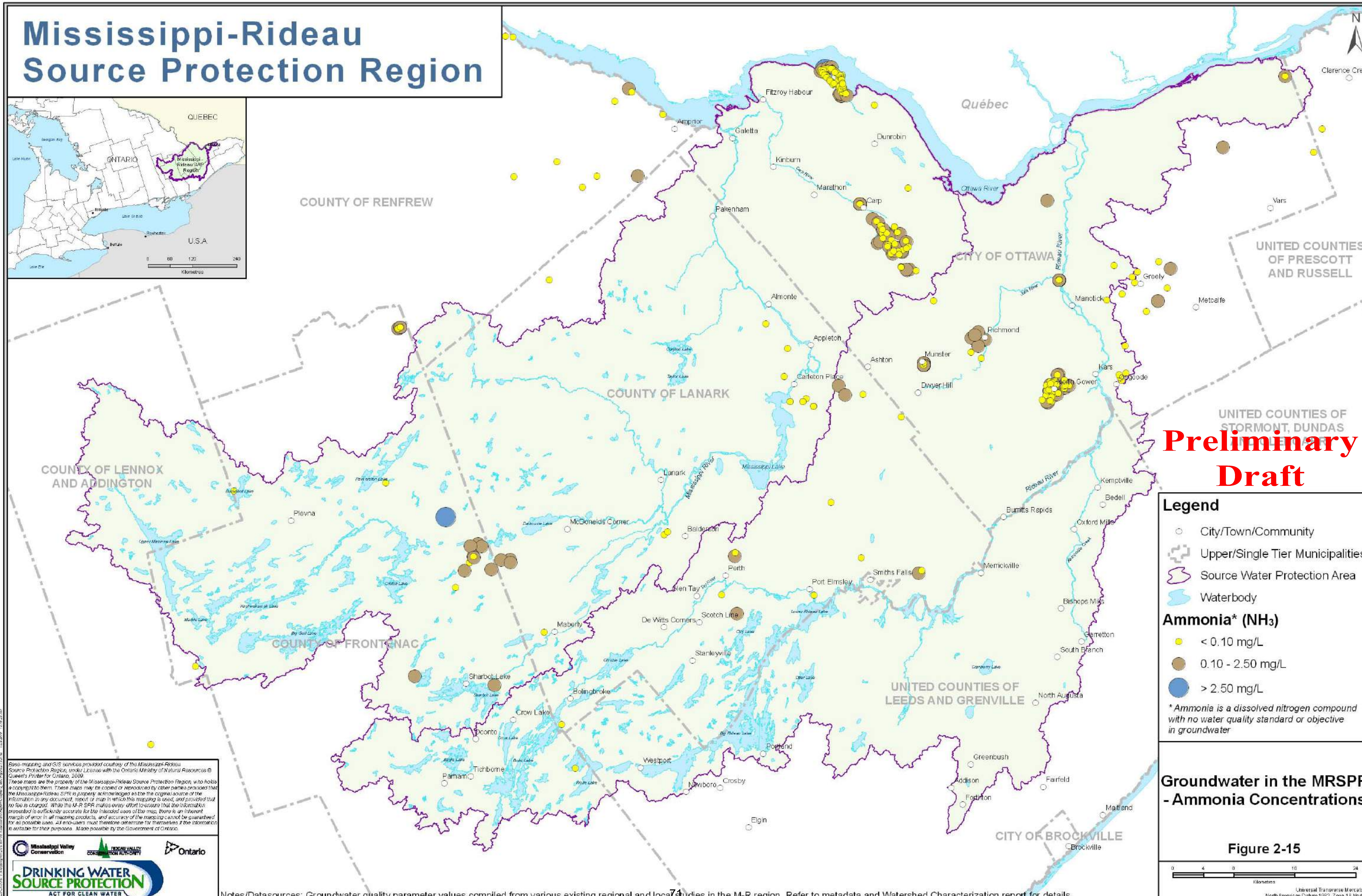
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Water quality monitoring site locations shown or mapped are those which monitor for the given parameter. Sites that do not collect data for the mapped parameter are not shown. Data is collected by the RVCA, MVC, and the City of Ottawa for the PWQMN, or as part of in-house water quality programs.



Mississippi-Rideau Source Protection Region
QUEBEC
ONTARIO
Mississippi-Rideau SPR Region
U.S.A
Kilometres
Québec
Ottawa River
COUNTY OF RENFREW
CITY OF OTTAWA
UNITED COUNTIES OF PRESCOTT AND RUSSELL
COUNTY OF LANARK
UNITED COUNTIES OF STORMONT, DUNDAS
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
UNITED COUNTIES OF LEEDS AND GRENVILLE
CITY OF BROCKVILLE
Preliminary Draft
Clarence Creek
Fitzroy Habour
Arnprior
Galetta
Dunrobin
Kinburn
Marathon
Carp
Pakenham
Vars
Almonte
Greely
Metcalfe
Manotick
Richmond
Appleton
Ashton
Munster
Carleton Place
Dwyer Hill
Kars
North Gower
Osgoode
Rideau River
Mississippi River
Mississippi Lake
Lanark
Kemptville
Bedell
Plevna
McDonalds Corner
Burritts Rapids
Oxford Mills
Balderson
Perth
Merrickville
Smiths Falls
Port Elmsley
Glen Tay
Bishops Mills
De Witts Corners
Scotch Line
Maberly
Garretton
Stanleyville
South Branch
Sharbot Lake
Bolingbroke
North Augusta
Crow Lake
Oconto
Portland
Greenbush
Westport
Tichborne
Parham
Newboro
Crosby
Addison
Fairfield
Forthton
Maitland
Elgin
Brockville
Legend
City/Town/Community
Upper/Single Tier Municipalities
Source Water Protection Area
Waterbody
Ammonia* (NH3)
< 0.10 mg/L
0.10 - 2.50 mg/L
> 2.50 mg/L
* Ammonia is a dissolved nitrogen compound with no water quality standard or objective in groundwater
Groundwater in the MRSPR - Ammonia Concentrations
Figure 2-15
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North
Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER
Notes/Datasources: Groundwater quality parameter values compiled from various existing regional and local studies in the M-R region. Refer to metadata and Watershed Characterization report for details.

Mississippi-Rideau Source Protection Region

Preliminary Draft

COUNTY OF RENFREW
COUNTY OF LANARK
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
CITY OF OTTAWA
UNITED COUNTIES OF PRESCOTT AND RUSSELL
UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY
UNITED COUNTIES OF LEEDS AND GRENVILLE
CITY OF BROCKVILLE
Québec
Ottawa River
Mississippi River
Rideau River

Fitzroy Habour, Arnprior, Galetta, Dunrobin, Kinburn, Marathon, Carp, Pakenham, Clarence Creek, Vars, Greely, Manotick, Metcalfe, Almonte, Appleton, Ashton, Richmond, Munster, Carleton Place, Dwyer Hill, Kars, Osgoode, North Gower, Lanark, Kemptville, Bedell, Burritts Rapids, Oxford Mills, Plevna, McDonalds Corner, Balderson, Perth, Merrickville, Smiths Falls, Port Elmsley, Glen Tay, Bishops Mills, De Witts Corners, Scotch Line, Maberly, Garretton, South Branch, Stanleyville, Charbot Lake, Bolingbroke, North Augusta, Crow Lake, Oconto, Tichborne, Parham, Westport, Rowland, Greenbush, Addison, Fairfield, Forfar, Maitland, Newboro, Crosby, Elgin, Brockville

Legend

- City/Town/Community
- Upper/Single Tier Municipalities
- Source Water Protection Area
- Waterbody

Chloride

- < 50.00 mg/L
- 50.0 - 150.00 mg/L
- 150.01 - 250.00 mg/L
- > 250.00 mg/L*

** 250 mg/L is the aesthetic objective as set by Ontario's Ministry of the Environment (MOE). Source: Ontario Drinking Water Standards, Objectives and Standards, Revised 2006*

Groundwater in the MRSPR - Chloride Concentrations

Figure 2-16

0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario
DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

Notes/Datasources: Groundwater quality parameter values compiled from various existing regional and local studies in the M-R SPR.

Mississippi-Rideau Source Protection Region

COUNTY OF RENFREW

COUNTY OF LENNOX AND ADDINGTON

COUNTY OF FRONTENAC

COUNTY OF LANARK

CITY OF OTTAWA

UNITED COUNTIES OF PRESCOTT AND RUSSELL

UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY

UNITED COUNTIES OF LEEDS AND GRENVILLE

CITY OF BROCKVILLE

Québec

Ottawa River

Mississippi River

Rideau River

Fitzroy Harbour
Arnprior
Galetta
Dunrobin
Kinburn
Marathon
Carp
Pakenham
Clarence Creek
Vars
Greely
Manotick
Metcalfe
Almonte
Appleton
Ashton
Munster
Richmond
Carleton Place
Dwyer Hill
Kars
Osgoode
North Gower
Lanark
Plevna
McDonalds Corner
Balderson
Perth
Port Elmsley
Smiths Falls
Merrickville
Burritts Rapids
Kemptville
Bedell
Oxford Mills
Bishops Mills
Garretton
South Branch
North Augusta
Maberly
De Witts Corners
Scotch Line
Stanleyville
Sharbot Lake
Bolingbroke
Crow Lake
Oconto
Parham
Tichborne
Westport
Newboro
Crosby
Elgin
Portland
Greenbush
Addison
Fairfield
Fotherton
Maitland
Brockville

N

Preliminary Draft

Legend

- City/Town/Community
- Upper/Single Tier Municipalities
- Source Water Protection Area
- Waterbody

Nitrate (NO_3)

- < 1.00 mg/L
- 1.01 - 5.00 mg/L
- 5.01 - 10.00 mg/L
- > 10.00 mg/L*

** 10.0 mg/L is the standard as set by Ontario's Ministry of the Environment (MOE). Source: Ontario Drinking Water Quality Standards, Revised 2006.*

Groundwater in the MRSPR - Nitrate Concentrations

Figure 2-17

0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Groundwater quality parameter values compiled from various existing regional and local studies in the M-R region

Mississippi-Rideau Source Protection Region

HORTON
BONNECHERE VALLEY
ADMASTON/BROMLEY
MCNAB/BRAESIDE
ARNPRIOR
COUNTY OF RENFREW
GREATER MADAWASKA
Québec
Fitzroy Habour
Arnprior
Galetta
Dunrobin
Kinburn
Marathon
Carp
Pakenham
Ottawa River
CLARENCE-ROCKLAND
Clarence Creek
Vars
NATION
UNITED COUNTIES OF PRESCOTT AND RUSSELL
RUSSELL
CITY OF OTTAWA
Rideau River
Greely
Manotick
Metcalfe
MISSISSIPPI MILLS
Almonte
Appleton
Richmond
Ashton
Munster
OTTAWA
Kars
North Gower
Osgoode
Dwyer Hill
CARLETON PLACE
Carleton Place
COUNTY OF LANARK
LANARK HIGHLANDS
BECKWITH
UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY
NORTH DUNDAS
Village of Lanark Planned Municipal Drinking Water System (Groundwater)
Lanark
Mississippi River
Mississippi Lake
Rideau River
Kemptville
Bedell
Burritts Rapids
Oxford Mills
COUNTY OF LENNOX AND ADDINGTON
NORTH FRONTENAC
Plevna
McDonalds Corner
Balderson
DRUMMOND/NORTH ELMSLEY
MONTAGUE
ADDINGTON HIGHLANDS
Perth
Port Elmsley
Smiths Falls
Merrickville
NORTH GRENVILLE
Glen Tay
PERTH
SMITHS FALLS
Bishops Mills
Maberly
TAY VALLEY
De Witts Corners
Scotch Line
MERRICKVILLE-WOLFORD
Garretton
South Branch
COUNTY OF FRONTENAC
Stanleyville
Sharbot Lake
Bolingbroke
UNITED COUNTIES OF LEEDS AND GRENVILLE
North Augusta
AUGUSTA
Crow Lake
Oconto
CENTRAL FRONTENAC
ELIZABETHTOWN-KITLEY
Portland
Greenbush
Tichborne
Parham
WESTPORT
Addison
Fairfield
Newboro
Crosby
Fodrton
RIDEAU LAKES
Elgin
Maitland
SOUTH FRONTENAC
ATHENS
BROCKVILLE
Brockville
STONE MILLS
LEEDS AND THE THOUSAND ISLANDS
FRONT OF YONGE

Preliminary Draft

Legend

- Municipal Groundwater System
- Municipal Surface Water System
- City/Town/Community
- Lower/Single Tier Municipalities
- Upper Tier Municipalities
- Waterbody
- Source Water Protection Area

Municipal Drinking Water Supply Systems in the MRSPR

Figure 2-18

0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources:

Mississippi-Rideau Source Protection Region

Preliminary Draft

Constance Bay
Harbour
Québec
Cumberland
Gerald St
17
St Joseph Blvd
Fairhaven
Notre-Dame-des-Champs
Navan
Maurice St
Desjardins St
Dunrobin
Constance Lake
417
Rideau Canal
Kinburn
Carp River
Carlsbad Springs
Lac Deschênes
Nepean shoreline
CITY OF OTTAWA
Pakenham
Carp
Ottawa
Carling West
Merivale Gardens
Pineglen
Grenfell Glen
Ashdale
Cedardale
Merivale South
Gloucester Glen
Honey Gables
Rideau River
Blakeney
Fallowfield
Heart's Desire
River Rd
Nichol's Island
Greely
Jock River
Manotick Village
Manotick
416
Almonte
Clayton
Indian River
Richmond
King's Park Subdivision
Richmond Village
COUNTY OF LANARK
Appleton
7
Ashton
Munster Hamlet
Kars
Osgoode
North Gower
Carleton Place
Mississippi Lake
Blacks Corners
15
Prospect

Legend

- Major Road
- Upper/Single Tier Municipalities
- Private Service Area
- Municipal Water Service Area
- Development Area
- Waterbody
- Mississippi Watershed Area
- Rideau Watershed Area

Water Service Areas - Ottawa Region

Figure 2-19

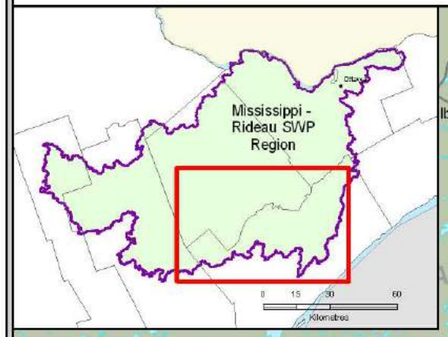
0 1.5 3 6 9
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Municipally serviced areas adapted from municipal infrastructure data. Private service areas adapted from Dillon Consulting Ltd., Urban Wells Study, City of Ottawa 2007.

Mississippi-Rideau Source Protection Region



Mississippi River
Franktown
Gillies Corners
Drummond Centre
Balderson
Wayside
Scott Subdivision
Perth
Glen Tay
Tay River
Port Elmsley
Fagan Lake
Brooke
Maberly
Lower Rideau Lake
Rideau Ferry
Otty Lake
Little Silver Lake
Christie Lake
Stanleyville
Mills Lake
Adams Lake
Bass Lake
Lombardy
Davern Lake
Pike Lake
Round Lake
Otter Lake
Mill Pond
Black Lake
Farrell Lake
Crosby Lake
Little Crosby Lake
Big Rideau Lake
Portland
Westport Sand Lake
Upper Rideau Lake
Westport
Wolfe Lake
Newboro
Nolans Corners
Smiths Falls
TOWN OF SMITHS FALLS
Rosedale
Merrickville
Rideau River
Burritts Rapids
Oxford Mills
Kemptville Creek
Kemptville
Bedell
Oxford Station
Bishops Mills
Carleys Corners
Jasper
Eastons Corners
Newbliss
Cranberry Lake
Roebuck
Toledo
Irish Lake
Atkins Lake
North Augusta
Newboyne
Bellamys Mill
Lehighs Corners
Bellamys Lake
Frankville
Rocksprings
Greenbush
New Dublin
Addison
CITY OF OTTAWA
UNITED COUNTIES OF LEEDS AND GRENVILLE
7
15
29
42
43
416

Preliminary Draft

Legend

- Major Road
- Upper/Single Tier Municipalities
- Waterbody
- Private Service Area
- Municipal Water Service Area
- Development Area
- Mississippi Watershed Area
- Rideau Watershed Area

Water Service Areas - Rideau Lakes Region

Figure 2-20

0 1.5 3 6 9
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Municipally serviced areas adapted from municipal infrastructure data, spring 2007.

Mississippi-Rideau Source Protection Region

COUNTY OF RENFREW

COUNTY OF LENNOX AND ADDINGTON

COUNTY OF LANARK

COUNTY OF FRONTENAC

UNITED COUNTIES OF LEEDS AND GRENVILLE

UNITED COUNTIES OF PRESCOTT AND RUSSELL

UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY

CITY OF OTTAWA

CITY OF BROCKVILLE

Québec

Ottawa River

Rideau River

Mississippi River

Fitzroy Harbour, Arnprior, Galetta, Dunrobin, Kinburn, Marathon, Carp, Pakenham, Clarence Creek, Vars, Greely, Metcalfe, Manotick, Richmond, Ashton, Munster, Dwyer Hill, Kars, Osgoode, North Gower, Kemptville, Bedell, Oxford Mills, Burritts Rapids, Merrickville, Smiths Falls, Bishops Mills, Garretton, South Branch, North Augusta, Almonte, Appleton, Carleton Place, Lanark, Mississippi Lake, Plevna, McDonalds Corner, Balderson, Perth, Port Elmsley, Glen Tay, Maberly, De Witts Corners, Scotch Line, Stanleyville, Sharbot Lake, Bolingbroke, Crow Lake, Oconto, Parham, Tichborne, Westport, Portland, Newboro, Crosby, Elgin, Greenbush, Addison, Fairfield, Fotherton, Maitland, Brockville

17, 417, 7, 416, 43, 15, 36, 29, 42

N

Preliminary Draft

Legend

- City/Town/Community
- Non-Municipal Water Supply PTTW
- Communal Wells
- Major Road
- Upper/Single Tier Municipalities
- Waterbody
- Mississippi Watershed Area
- Rideau Watershed Area

Communal and Designated Facility Well Locations

Figure 2-21

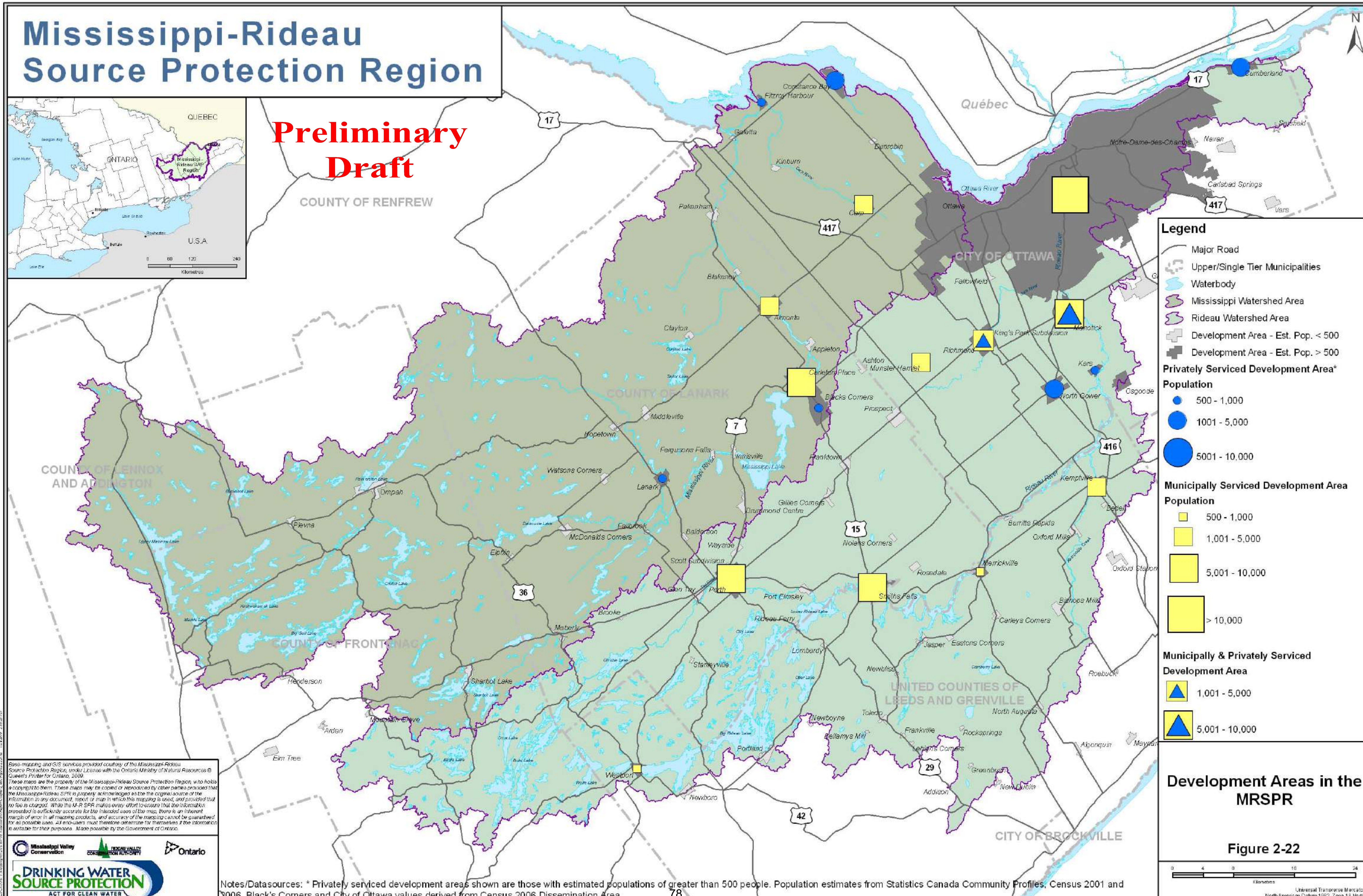
Kilometres

Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Communal well locations, Golder Associates et al., Renfrew-Mississippi-Rideau Regional Groundwater Study, 2003. Designated Facility locations, Ontario MOE 2007. Non-Municipal Communal Water Supplies, Ontario Permit to Take Water, MOE 2008.


Mississippi-Rideau
Source Protection Region
Preliminary Draft
QUEBEC
ONTARIO
Mississippi-Rideau SPR Region
U.S.A
Kilometres
COUNTY OF RENFREW
Québec
CITY OF OTTAWA
COUNTY OF LANARK
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
UNITED COUNTIES OF LEEDS AND GRENVILLE
CITY OF BROCKVILLE
Constance Bay
Fitzroy Harbour
Galetta
Kinburn
Dunrobin
Cumberland
Notre-Dame-des-Champs
Navan
Sarsfield
Carlsbad Springs
Vars
Ottawa River
Ottawa
Carp
Pakenham
Blakeney
Almonte
Clayton
Appleton
Carleton Place
Ashton
Munster Hamlet
Richmond
King's Park Subdivision
Manotick
Fallowfield
Kars
North Gower
Osgoode
Rideau River
Beckwith
Blacks Corners
Prospect
Middleville
Hopetown
Ferguson Falls
Innisville
Mississippi Lake
Franktown
Watsons Corners
Lanark
Mississippi River
Ompah
Plevna
Gillies Corners
Drummond Centre
Kemptville
Bedell
Fallbrook
McDonalds Corners
Balderson
Wayside
Scott Subdivision
Elphin
Burritts Rapids
Oxford Mills
Merrickville
Oxford Station
Rosedale
Glen Tay
Perth
Port Elmsley
Smiths Falls
Brooke
Rideau Ferry
Bishops Mills
Maberly
Carleys Corners
Lombardy
Jasper
Eastons Corners
Stanleyville
Newbliss
Roebuck
Henderson
Sharbot Lake
Toledo
North Augusta
Arden
Mountain Grove
Newboyne
Bellamys Mill
Frankville
Rocksprings
Algonquin
Maynard
Elm Tree
Portland
Lehardy Corners
Westport
Newboro
Greenbush
New Dublin
Addison
17
417
7
15
36
416
29
42
Legend
Major Road
Upper/Single Tier Municipalities
Waterbody
Mississippi Watershed Area
Rideau Watershed Area
Development Area - Est. Pop. < 500
Development Area - Est. Pop. > 500
Privately Serviced Development Area* Population
500 - 1,000
1001 - 5,000
5001 - 10,000
Municipally Serviced Development Area Population
500 - 1,000
1,001 - 5,000
5,001 - 10,000
> 10,000
Municipally & Privately Serviced Development Area
1,001 - 5,000
5,001 - 10,000
Development Areas in the MRSPR
Figure 2-22
0 4 8 16 24
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North
Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER
Notes/Datasources: * Privately serviced development areas shown are those with estimated populations of greater than 500 people. Population estimates from Statistics Canada Community Profiles, Census 2001 and 2006. Black's Corners and City of Ottawa values derived from Census 2006 Dissemination Area.

Mississippi-Rideau Source Protection Region

COUNTY OF RENFREW

Québec

Constance Bay

Fitzroy Harbour

Cumberland

Ottawa

Carp

Pakenham

CITY OF OTTAWA

UNITED COUNTIES OF PRESCOTT AND RUSSELL

Preliminary Draft

Almonte

Manotick

Richmond

Munster Hamlet

Carleton Place

Kars

Osgoode

Blacks Corners

North Gower

COUNTY OF LANARK

COUNTY OF LENNOX AND ADDINGTON

Lanark

Kemptville

Ompah

Perth

Smiths Falls

Merrickville

COUNTY OF FRONTENAC

Sharbot Lake

UNITED COUNTIES OF LEEDS AND GRENVILLE

Portland

Westport

Newboro

CITY OF BROCKVILLE

Legend

- Lower/Single Tier Municipalities
- Upper Tier Municipalities
- Waterbody
- Source Water Protection Area

City/Town/Village

Population

- 500 - 1,000
- 1,001 - 2,500
- 2,501 - 5,000
- 5,001 - 10,000
- *10,001 - 100,000
- > 100,000

** No Towns or Cities fall into this range*

Population Distribution in the MRSPR

Figure 2-23

Kilometres

Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Statistics Canada: Census 2006, 2001; City of Ottawa

Mississippi-Rideau Source Protection Region

Preliminary Draft

Legend

- City/Town/Community
- Upper Tier Municipalities
- Lower/Single Tier Municipalities
- Source Water Protection Area

Population Density, Census 2006

(per square km)

- < 10
- 10 - 50
- 51 - 100
- 101 - 500
- 501 - 1,000
- > 1,000

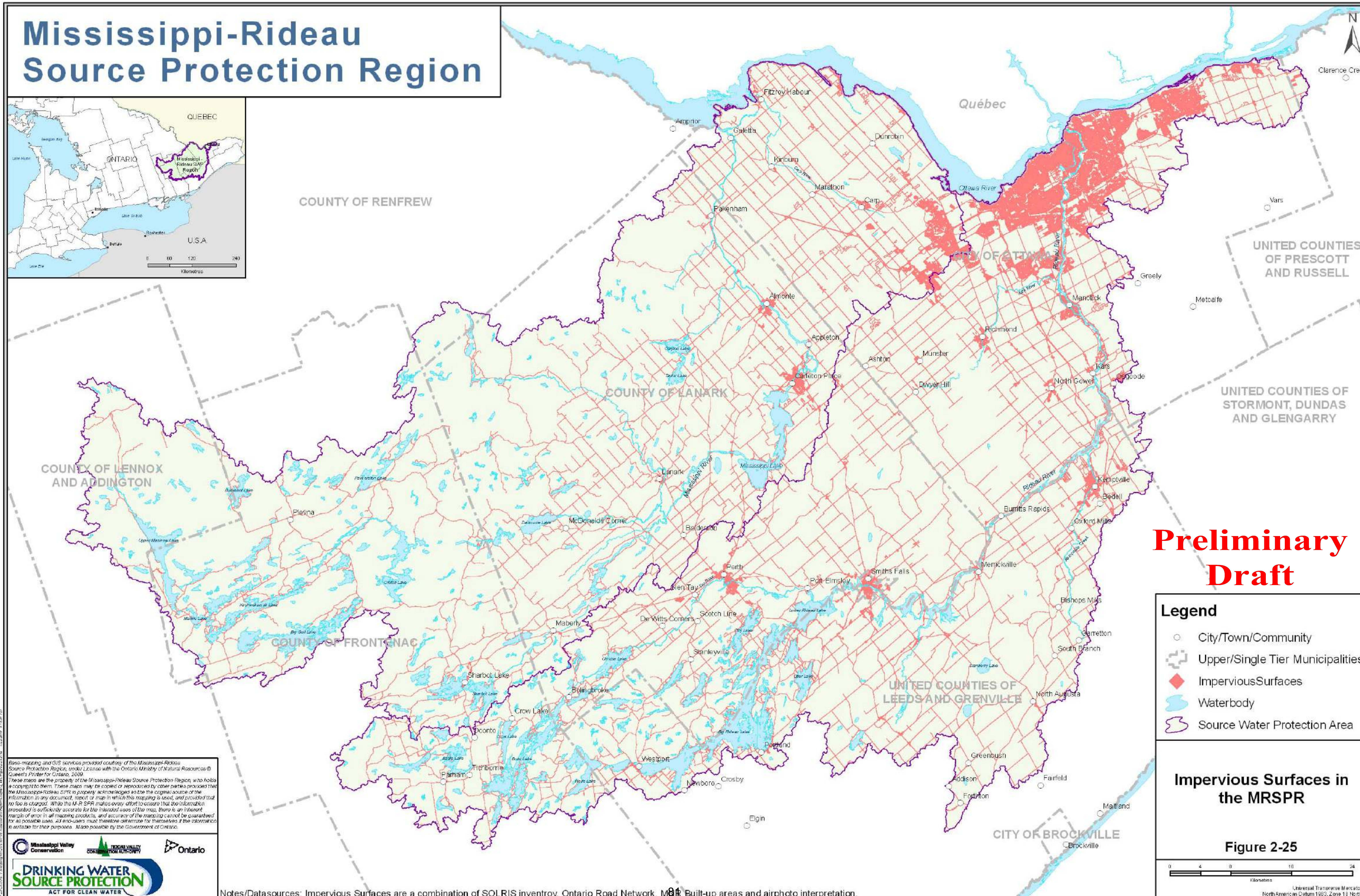
Population Density in the MRSPR

Figure 2-24

Kilometres

Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Notes/Datasources: Statistics Canada: Census 2006 Population, by Dissemination Area.


Mississippi-Rideau
Source Protection Region
QUEBEC
ONTARIO
Mississippi - Rideau SPP Region
U.S.A
Kilometres
COUNTY OF RENFREW
Québec
Ottawa River
CITY OF OTTAWA
Rideau River
Mississippi River
COUNTY OF LANARK
COUNTY OF LENNOX AND ADDINGTON
COUNTY OF FRONTENAC
UNITED COUNTIES OF LEEDS AND GRENVILLE
UNITED COUNTIES OF PRESCOTT AND RUSSELL
UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY
CITY OF BROCKVILLE
Fitzroy Habour
Arnprior
Galetta
Dunrobin
Kinburn
Constance Bay
Marathon
Carp
Pakenham
Almonte
Appleton
Ashton
Munster
Richmond
Manotick
Greely
Metcalfe
Vars
Clarence Creek
Carleton Place
Dwyer Hill
North Gower
Kars
Osgoode
Mississippi Lake
Lanark
McDonalds Corner
Balderson
Plevna
Kemptville
Bedell
Burritts Rapids
Oxford Mills
Perth
Glen Tay
Port Elmsley
Smiths Falls
Merrickville
Bishops Mills
De Witts Corners
Scotch Line
Maberly
Stanleyville
Sharbot Lake
Bellingbroke
Crow Lake
Oconto
Tichborne
Parham
Westport
Portland
Newboro
Crosby
Elgin
Greenbush
Addison
Forthton
Fairfield
Maitland
Brockville
Garretton
South Branch
North Augusta
Preliminary Draft
Legend
City/Town/Community
Upper/Single Tier Municipalities
ImperviousSurfaces
Waterbody
Source Water Protection Area
Impervious Surfaces in the MRSPR
Figure 2-25
Kilometres
Universal Transverse Mercator
North American Datum 1983, Zone 18 North
Base-mapping and GIS services provided courtesy of the Mississippi-Rideau Source Protection Region, under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2009.
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Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
Drinking Water Source Protection
ACT FOR CLEAN WATER
Notes/Datasources: Impervious Surfaces are a combination of SOLRIS inventroy, Ontario Road Network, MNR Built-up areas and airphoto interpretation.

Mississippi-Rideau Source Protection Region

OTTAWA WATERSHED FACTS:

- The Ottawa River drains a total area of more than **146,000 km²** -
- The Mississippi - Rideau Source Protection Region drains just under **9,000 km²**, or **6%** of the Ottawa River watershed -
- The Province of Ontario contains **34%** of the Ottawa Watershed -
- The Province of Québec contains **66%** of the Ottawa Watershed -

N

Ontario

Québec

Upper Ottawa Basin

Blanche

Upper Ottawa - Kinojévis

Montreal (Ont.)

Upper Ottawa - Headwaters

Réservoir Dozois

Upper Gatineau

Réservoir Cabonga

Upper Lièvre

Lower Ottawa Basin

Dumoine

Upper Ottawa - Kipawa

Réservoir Baskatong

Coulonge

Noire

Central Ottawa - Dumoine

Lower Gatineau

Rouge and Nord

Petawawa

Lower Lièvre

Petite Nation

Central Ottawa Basin

Central Ottawa - Bonnechere

Central Ottawa - Mississippi

Upper Madawaska

Lower Ottawa - South Nation

Lower Madawaska

Central Ottawa - Mississippi

Rideau

Elliot Lake

Sudbury

North Bay

Lake Nipissing

Georgian Bay

Sound

Orillia

Barrie

Peterborough

Pembroke

Ottawa

Cornwall

Brockville

Preliminary Draft

Legend

- Cities
- Watercourse
- Waterbody
- Provincial Border
- Mississippi-Rideau Watersheds
- Ottawa River Sub-Basin

Ottawa River Watershed and the MRSPR

Figure 2-26

0 12.5 25 50 75 100

Kilometres

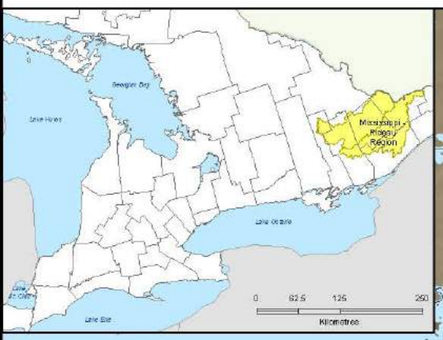
Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation · Rideau Valley Conservation Authority · Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Notes/Datasources: Watershed data from Water Survey of Canada. Drainage from National Hydro Network

Mississippi-Rideau Source Protection Region



Grenville Province

Central St. Lawrence Lowlands

Beauharnois Anticline

Frontenac Arch

MVC

RVCA

SNC

RRCA

QC

CRCA

Québec

Ontario

New York

Vermont

New Hampshire

Pennsylvania

North Bay
Pembroke
Ottawa
Hull
Trois-Rivières
Laval
Montreal
Sherbrooke
Cornwall
Plattsburgh
Burlington
Barrie
Orillia
Owen Sound
Peterborough
Belleville
Quinte West
Kingston
Brockville
Watertown
Oshawa
Vaughan
Brampton
Mississauga
Toronto
Guelph
Kitchener
Waterloo
Stratford
Cambridge
Burlington
Hamilton
Stoney Creek
Woodstock
Brantford
Brant
London
St. Thomas
Niagara Falls
Welland
Port Colborne
St. Catharines
Thorold
Lockport
Buffalo
Cheektowaga
Batavia
Rochester
Irondequoit
Oswego
Syracuse
Utica
Auburn
Cortland
Ithaca
Binghamton
Elmira
Erie
Schenectady
Troy
Albany
Pittsfield

Preliminary Draft

Legend

- Major City
- Major River
- Upper Municipality / County
- Watershed Boundary
- Mississippi-Rideau SWP Region
- Major Water Body
- US - Canada Border

Physiographic Region

- Central St. Lawrence Lowlands
- Grenville Province

Ottawa St. Lawrence Lowland Basin

0 20 40 80 120
Kilometres

Scale: 1:2,000,000

Universal Transverse Mercator
North American Datum 1983, Zone 18 North

Mississippi Valley Conservation
Rideau Valley Conservation Authority
Ontario
Source Water Protection

Topics for Additional Research
(for Chapter 8)

Watershed Characterization

- None identified to date

Water Budget

1. No water budget work was carried out for the City of Ottawa surface water intakes in the Ottawa River.

Groundwater

1. Protection of private wells
2. Identification of potential threats in HVAs and SGRAs
3. July 2009 motion [motion 5-06/09] – as part of the source protection planning process, staff be directed to explore the merits and resource requirements to complete an inventory of land uses within HVAs and SGRAs targeted to specific activities that may have a high potential to release contaminants into groundwater.

Surface Water

1. Intake protection zones for the City of Ottawa surface water intakes go beyond both the provincial and source protection jurisdictions
2. The MRSPC endorses and promotes the creation of an inter-jurisdictional committee to protect water quality, water quantity and ecological integrity of the Ottawa River through a watershed approach, including coordinated research, collaborative development of decision making tools, and coherent and consistent policies, programs and public outreach initiatives for the river.
3. Several concerns about the methodology used to determine the IPZ 2 vulnerability scores. Specific concerns about numerical weighted method used by Baird and JFSA.

Climate Change

1. Further understanding of climate variables and influences on local weather patterns is needed to develop a better understanding of potential changes in climate – quantification of weighting of local influences
2. Identify changes in risk levels of items in threats tables due to projected changes in probability of short term events (e.g. increased or offseason flooding) and longer term seasonal or annual changes (e.g. extended drought)
3. Determine how to incorporate projections of associated changes in precipitation and ET resulting from temperature changes into water budget projections

3.0 Community Outreach

Date: January 21, 2010
To: Mississippi-Rideau Source Protection Committee
From: Sommer Casgrain-Robertson, Co-Project Manager
Mississippi – Rideau Source Protection Region

Recommendation:

1. That the Mississippi-Rideau Source Protection Committee receive the following report for information.

Background
Staff and MRSPC members participate in many different community outreach activities that raise awareness and promote the source protection planning process. These activities include information booths at events, presentations at meetings and articles in newsletters and local papers. It is important that staff and members keep each other informed about the activities they are involved in so that we can coordinate our participation and prepare appropriate materials in advance. This includes coordinating with our neighbouring regions for meetings and events that cover Eastern Ontario.

Past Activities
Members & staff are asked to give a verbal update on any other activities that took place in the past month related to source protection.

1. *Quarterly Chairs Meeting and Project Manager's Meeting*
    - January 25 & 26, Toronto (Sommer and Chair Stavinga attending)
2. *Elizabethown-Kitley Council meeting – Source Protection Update*
    - January 25 (Cataraqui staff presenting)
3. *Athens Council Meeting – Source Protection Update*
    - February 1 (Cataraqui staff presenting)
4. *Rideau Environmental Action League E-Consultation on Residential Storm Water Runoff in Smiths Falls: Concerns and Solutions*
    - January / February (some RVCA staff participating)

Upcoming Activities
Members & staff are asked to give a verbal update about any other activities they know about in the coming months related to source protection.

1. *Rideau Lakes Council Meeting – Source Protection Update*
    - February 15 (Cataraqui staff presenting)
2. *South Frontenac Council Meeting – Source Protection Update*
    - February 16 (Cataraqui staff presenting)
3. *Envirothon Presentation – "Protecting Our Groundwater"*
    - March 23, Carleton Place High School (Sommer presenting)
    - March 25, Perth High School (Sommer presenting)