BAY OF QUINTE REMEDIAL ACTION PLAN
ADVANCEMENT OF POLLUTION PREVENTION & CONTROL PLANS
FOR
BAY OF QUINTE MUNICIPALITIES

PROJECT REPORT

Prepared for:

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Trenton, Ontario
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**ATTACHMENTS**

Attachment 1: Update to the BQRAP Stormwater Management Guidelines, March 2006  
Attachment 2: Template for the Preparation of Pollution Prevention & Control Plans for Napanee, Picton and Deseronto.  
Attachment 3: CD containing above documents and GIS information base for each of Napanee, Picton and Deseronto
1. **INTRODUCTION**

1.1 **Project Scope**

XCG Consultants was retained to assist the Bay of Quinte Remedial Action Plan (BQRAP) with advancing RAP recommendations for preparation and implementation of pollution prevention & control plans (PPCPs) for municipalities located along the Bay.

The Bay of Quinte Remedial Action Plan (BQRAP) Stage 2 Report (September 1993) included the following recommendation:

**BQRAP Stage 2 Report, Recommendation #23**

> The municipalities of Belleville, Deseronto Picton and Trenton should undertake Pollution Control Planning Studies to identify and, where required, implement actions to eliminate the sources of bacterial contamination and other pollutants along their respective waterfronts.

The recommendation for PPCPs for urban areas on the Bay was aimed primarily at the near-shore impacts associated with storm drainage and sewer-system overflows. A primary concern related to these sources is bacteriological contamination and resulting impairment of shoreline areas for recreational use. It is also recognized that a variety of other constituents and contaminants can be associated with urban drainage discharge and sewer system problems, including nutrients (e.g. phosphorous), metals, sediment and debris. All of these contribute to water quality degradation within the Bay of Quinte.

1.2 **Project Activities**

The current project has been undertaken to assist with advancing implementation of PPCPs prepared for Belleville and Trenton in the late 1990s, and with advancing the preparation of PPCPs for Napanee, Picton and Deseronto.

The project has encompassed a number of activities, including:

- Review of the status of implementation of the various recommendations that were made in the Belleville Pollution Control Planning Study (1997) and the Trenton Pollution Control Planning Study (1998).

- Assembling an “information base” for each of the Towns of Napanee, Picton and Deseronto that is intended to provide a starting point for the preparation of PPCPs for those Town areas. The information base for each Town has included consolidation of available drainage system information in GIS (ESRI ArcView).

- Preparation of a “template” or guideline for the preparation of PPCPs for Napanee, Picton and Deseronto.

- Preparation of updated Stormwater Management Guidelines for the BQRAP area that provide consistency with the latest MOE Stormwater Management Planning and Design Manual (March 2003) and help to clarify technical submission requirements for approval of new urban drainage systems.

- Various meetings with staff of the local municipalities to gather information and build awareness of the need for completing the PPCP process.
A final workshop meeting held March 31, 2006 to present results of the project and sort out priorities for further action by the BQRAP and the local municipalities.

This report summarizes the outcome of these activities, and includes the following attachments:

<table>
<thead>
<tr>
<th>Attachment 1</th>
<th>Update to the Stormwater Management Guidelines for the BQRAP Implementation Area</th>
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<tbody>
<tr>
<td>Attachment 2</td>
<td>Template for Preparation of Pollution Control Plans for Napanee, Picton and Deseronto.</td>
</tr>
<tr>
<td>Attachment 3</td>
<td>A CD containing the above documents, as well as the electronic information base collected for each of the Napanee, Picton and Deseronto. For each Town this includes ArcView GIS files providing information on the internal drainage system for each Town area, including locations of storm outfalls, storm pipes, etc.; as well as ancillary files including a spreadsheet that summarizes drainage area information for each storm outfall; photographs of outfalls; and Official Plan information on possible future growth areas as provided by the local municipalities</td>
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</table>
2. PREPARING PPCPs FOR NAPANEE, PICTON AND DESERONTO

2.1 Overview

An important outcome of this project has been the preparation of a template or guideline document to assist the respective municipalities prepare PPCPs for the three Towns.

Another important outcome has been the discussion that has occurred with municipal staff in Prince Edward County, Greater Napanee and Town of Deseronto. These discussions have helped to renew awareness of the need for continued efforts on BQRAP recommendations. All municipalities have expressed their clear interest in assisting with implementing the RAP recommendations regarding PPCP preparation and implementation.

2.2 The PPCP Template

The PPCP template document was prepared in a draft form in November 2005, and then circulated to Quinte Conservation and the Ontario Ministry of Environment (Kingston Regional Office). Comments were received in January 2006, and the document was subsequently finalized. It is provided as Attachment 2.

The March 31, 2006 workshop meeting provided a review of the PPCP template and an overview of how the process was implemented in Belleville and Trenton in the late 1990s.

In summary, the PPCP template outlines a 3-stage process for PPCP preparation:

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Information Gathering and Review</th>
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<tbody>
<tr>
<td>Stage 2</td>
<td>Development of a Stormwater Control Strategy</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Implementation Strategy</td>
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</tbody>
</table>

The PPCP template document provides a detailed description of how to proceed through each of these stages to develop a PPCP that is specific to each Town.

2.3 Developing the Information Base

To assist local municipalities is getting the process under way, this project has included some of the information gathering activities. The focus has been on gathering information about local drainage systems and consolidating that information in GIS. The CD included with this report includes the various ArcView GIS files have been assembled for each of Napanee, Picton and Deseronto, as well as other computer fields that provide useful ancillary information.
The PPCP Template document (Attachment 2) provides a review of the information base that has been assembled to date for each Town, and identifies further information requirements.

3. STORMWATER MANAGEMENT GUIDELINES FOR THE BQRAP AREA

3.1 Updating the Guidelines

Updated guidelines for stormwater management in the BQRAP area have been included in this project.

- The initial BQRAP stormwater management (SWM) guidelines were developed in 1993 in response to RAP Recommendation #33 which states that stormwater quality control is needed for all new urban development.

- At the time, there were no Province-wide guidelines dealing with requirements for stormwater pollutant load control from new urban development. The Ministry of Environment was then in the process of developing such guidelines, which were published in 1994. An updated guidance document was published by MOE in March 2003.

- The updated BQRAP SWM guidelines ensure consistency with the MOE’s Provincial guidelines while also ensuring that the specific BQRAP issues and requirements are addressed.

A draft update to the guidelines was prepared in November 2005, and circulated to Quinte Conservation and the Ontario Ministry of Environment (Kingston Regional Office). The guidelines were then finalized in March 2006. They are included here in Attachment 1.

3.2 Implementation Status

The updated BQRAP SWM guidelines are now in place and are being used by Quinte Conservation to review any applications for approval of drainage systems for new land development. Note that the new guidelines provide some clarification and elaboration on the technical information that needs to be submitted with any land development application.

The new guidelines also address the requirements that should be met when municipalities are considering the design and construction of retrofit stormwater treatment facilities to deal with the impacts of existing storm outfalls.

4. STATUS OF PPCPS FOR TRENTON AND BELLEVILLE

4.1 Overview

As a result of BQRAP Recommendation #23, the then City of Trenton and the City of Belleville embarked on preparation of Pollution Control Plans for the respective cities in 1996.

Trenton’s PCP project was completed in two phases. Phase 1 included extensive monitoring of conditions in the lower Trent River and the Bay of Quinte to determine whether bacteriological contamination was similar to what had been reported by MOE.
investigations carried out in the 1980s. A general conclusion was that conditions appeared to have improved. Phase 2 (completed in 1998) examined various options for the City to pursue to further reduce stormwater contaminant loading to the River and Bay. A number of recommendations related to maintenance of existing storm infrastructure and management of new urban development were made, and these recommendations are being actively implemented by staff of the municipality of Quinte West.

Belleville’s Pollution Control Plan was completed in 1997. The project included monitoring of storm sewer flows, and examination of options for reducing observed levels of contamination in dry-weather and wet-weather discharges to the Moira River and the Bay. The final PCP included recommendations for a number of retrofit end-of-pipe stormwater management facilities along the waterfront. City staff have been acting on the recommendations made in 1997, including efforts to implement end-of-pipe retrofit treatment along the Bay of Quinte waterfront.

4.2 Status Report 2003

A review of the implementation status of the Trenton and Belleville PCPs was prepared by XCG Consultants in 2003. This report provided a review of the status of each recommendation in the respective PCP reports, and reviewed the various issues and roadblocks that exist to full implementation. A copy of the 2003 report is provided on the enclosed CD (Attachment 3) for reference purposes.

4.3 Current Status

The 2003 review of the Trenton and Belleville PCP remains reasonably up-to-date. The following provides further information on current status.

In the case of Trenton, staff of Quinte West Public Works Department continue to implement the PCP recommendations in a number of ways. The cash-in-lieu policy remains active and is being used on a case-by-case basis as new land development proposals are made; the cash-in-lieu fund is used strategically to implement PCP recommendations when and where opportunities arise. City staff regard the cash-in-lieu approach as the main avenue by which the City can dedicate resources to such initiatives as end-of-pipe retrofits. As well, Quinte West recognizes the need for longer-term planning of stormwater infrastructure and has been working cooperatively with Quinte Conservation to ensure that subwatershed studies and/or stormwater planning studies are carried out when appropriate to help deal with pending development proposals.

In Belleville, the situation is similar. The City has a cash-in-lieu policy in place, and is actively attempting to implement end-of-pipe retrofit treatment in conjunction with other stormwater infrastructure upgrades (e.g. end-of-pipe treatment pond at Foster Avenue outfall in conjunction with outlet capacity improvements to deal with local flooding concerns).

Further insight into the current situation and current issues in Quinte West and in Belleville resulted from the workshop meeting held on March 31, 2006 at Quinte Conservation. See below.
5. **Workshop Meeting in March 2006**

5.1 **Scope of Workshop**

Once the PCP template and the updated BQRAP SWM guidelines had been prepared, it was agreed by Quinte Conservation and MOE Kingston office that a workshop meeting should be held to present these documents to staff of the local municipalities. The workshop was also intended as an opportunity to discuss the need for longer-term planning of stormwater management infrastructure, and to discuss ongoing issues related to getting PPCPs prepared and implemented.

The workshop meeting was held on Friday, March 31, 2006 at the offices of Quinte Conservation on Highway 2 in Belleville. The attendees are listed below.

<table>
<thead>
<tr>
<th>Participants at Workshop Meeting held at Quinte Conservation office in Belleville on March 31, 2006</th>
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<tbody>
<tr>
<td>1. Chris Angelo Quinte West Public Works</td>
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<tr>
<td>2. Rick Kester Belleville City Engineer &amp; Commissioner Public Works</td>
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<tr>
<td>3. Brad Wilson Belleville Deputy City Engineer</td>
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<td>4. Adam Wilson Water Resource Engineer, Quinte Conservation</td>
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<td>5. Bob Helliar MOE Kingston office</td>
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<td>6. Barry Burns MOE Kingston office</td>
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<td>7. Barry Jones BQRAP Implementation Manager</td>
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<td>8. Bryon Keene Water Resources Engineer, Quinte Conservation</td>
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<tr>
<td>9. Bill Bouma Clerk/Treasurer, Town of Deseronto</td>
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<tr>
<td>10. Barbara Thompson Councillor, Town of Deseronto,</td>
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<tr>
<td>11. Jo-Anne Egan Manager of Planning, Prince Edward County</td>
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<tr>
<td>12. Tim Beckenham Environmental Planning Tech, Lower Trent Conservation</td>
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<tr>
<td>13. Paul Johanson Biologist, BQ-RAP</td>
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<tr>
<td>14. Joyce Olson Communication Coordinator, BQ-RAP</td>
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<tr>
<td>15. Harold Chard XCG Consultants Ltd.</td>
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The meeting was chaired by Bryon Keene of Quinte Conservation. Presentations on the PPCP template and the updated BQRAP SWM guidelines were provided by Harold Chard of XCG Consultants. The visual presentation material is included on the enclosed
CD. All meeting participants were provided with a paper copy of the updated BQRAP SWM guidelines, as well as a CD containing the presentation material, the PPCP template document and supporting reference material including the MOE’s 2001 “Stormwater Pollution Prevention Handbook”.

The meeting proceeded as an informal discussion amongst the participants, with the presentations providing the overall framework.

5.2 Outcomes

A number of useful discussions did take place amongst the participants, and the results of these discussions are summarized below.

5.2.1 Mechanisms for PPCP Implementation:

Quinte West’s experience with use of cash-in-lieu has been very positive. This provides the mechanism by which the City can actually gather resources to allow for strategic implementation of measures such as end-of-pipe retrofits.

Belleville staff indicated the same, but indicated that in Belleville’s case the formula for calculating cash-in-lieu contributions needs to be reviewed periodically to make sure it is appropriate.

It was noted that cash-in-lieu funding may effectively be the only opportunity or mechanism by which local municipalities can actually implement any stormwater system retrofits. In the face of various competing budget priorities, municipal efforts to minimize tax increases and the relatively low profile of underground infrastructure issues, it can be very difficult to get capital funding for stormwater retrofits. Cash-in-lieu funds and a clear long-term strategy developed from a PPCP can help get things done.

5.2.2 Longer-Term Stormwater Management Planning:

All participants agreed that subwatershed planning or other drainage planning studies are needed to efficiently deal with stormwater planning for new development areas. All municipalities agreed that they see this as essential to minimizing long-term costs for infrastructure maintenance by minimizing the number of separate stormwater management facilities assumed by the municipality.

5.2.3 Regulatory Approvals for New Stormwater Facilities

Local municipalities indicated that they have had concerns about the MOE’s Certificate of Approval conditions for any retrofit stormwater facilities that the municipality may want to implement. Recent experience has been that MOE has been wanting to stipulate specific effluent contaminant concentration targets and monitoring requirements. The municipal concern is that such specific requirements could result in them building a retrofit facility that for whatever reason does not meet specific effluent targets for parameters such as total suspended solids or E. coli, and which would therefore leave the municipality in a situation of non-compliance. This may in the end discourage municipal retrofit initiatives.

It was noted that this concern is being resolved partly through the adoption by Quinte Conservation and the MOE of the updated BQRAP SWM guidelines. The new guidelines move away from specific effluent concentration targets for compliance; instead, facilities need to be designed in a manner consistent with the 2003 MOE
stormwater manual. As well, the new guidelines do not stipulate a specific design requirement for retrofit cases. They instead encourage a “do the best you can” approach to implementing end-of-pipe retrofits, especially in cases where the specific site may pose constraints on the size of facility that is possible or practical.

MOE participants in the workshop acknowledged the municipalities’ concerns, and provided assurances that municipalities will be encouraged to implement retrofit stormwater treatment per the new BQRAP SWM guidelines.

5.2.4 **Updating PPCPs for Trenton and Belleville:**

The PCP for Trenton is now nearly 10 years old, and Quinte West staff noted that an updated is probably needed to ensure that the PCP remains current and reflects recent activity.

Similarly, for Belleville it was noted that some of the recommendations from the 1997 PCP report for construction of end-of-pipe retrofit treatment ponds at specific outfalls may no longer be feasible or acceptable, given evolving plans for Belleville’s waterfront. A review of these types of recommendations is needed to ensure that implementation can in fact take place.

5.2.5 **Formalizing PPCP Recommendations:**

In the above context, it was noted that specific recommendations that result from a PPCP study should be adopted in the formal municipal planning documents (Official Plans, Secondary Plans, etc.) to enable implementation to occur. An example is in Belleville where the 1997 PCP report suggested the construction of end-of-pipe treatment ponds in various waterfront locations. City staff noted that now that they want to actually implement, it has been a challenge to get broad support across the City. It would be easier if at the time the PCP recommendations had been formally adopted within the City’s planning documents.

In the case of Picton, it was noted that Prince Edward County needs to update the Secondary Plan for the Town of Picton; this hasn’t been done since the late 1970s. Updating the Picton Secondary Plan could provide opportunities to enable implementation of any recommendations that would result from preparing a PPCP for Picton.

Overall, the workshop meeting proved to be a very useful exchange between the local municipalities, Quinte Conservation, the BQRAP and the MOE with respect to experience in doing PPCPs and what the implementation issues are.

It was noted by Barry Jones (BQRAP Implementation Manager) that progress on PPCPs for Napanee, Picton and Deseronto is needed to demonstrate progress on the Remedial Action Plan; and noted that there may shortly be funding available from both Provincial and Federal levels to assist in this regard. Local municipalities will be kept up to date.
6. **REFERENCES**


ATTACHMENT 1

UPDATE TO THE BQRAP STORMWATER MANAGEMENT GUIDELINES,
MARCH 2006
1. **INTRODUCTION**

This document provides guidance on requirements for planning, design and approvals of new urban stormwater management systems in new urban development areas in the BQRAP Implementation Area (see Figure 1). It also provides guidance with respect to design and approvals of retrofit stormwater treatment facilities within existing built-up areas. This document is intended to assist development proponents and local municipalities by helping define approval requirements.

This document supercedes and replaces the previous BQRAP SWM guidelines document of May 1993.

2. **STORMWATER MANAGEMENT IN THE MUNICIPAL CONTEXT**

It is widely recognized that effective stormwater management involves a hierarchy of planning and management techniques.

The need for environmental protection, including water quality protection, is generally spelled out in a municipal Official Plan. To ensure proper planning of drainage infrastructure as part of land development planning, watershed plans or subwatershed plans are required for development areas. Watershed/subwatershed plans help support the development of secondary plans.

To identify the necessary stormwater control measures or works within a designated development area, a master drainage plan is required. This provides design guidelines and defines proposed locations and estimated costs for any centralized stormwater control facilities. In general, planning of drainage systems for new development areas should strive to minimize the number of separate stormwater facilities, since the proliferation of relatively small on-site facilities can significantly increase the costs to local municipalities for monitoring and maintenance.

Once a plan is in place, municipalities typically set up a "cash-in-lieu" fund to allow the municipality to accumulate the funds needed to build the required stormwater facilities as needed. A policy of allowing a percentage of the development area to proceed in advance of facility construction can be implemented by the municipality, provided that regulatory agencies such as the Ontario Ministry of Environment provide approval of such an arrangement.

Since the original BQRAP stormwater guidelines (1993) have been in effect, a number of issues related to stormwater planning have been identified. For example, not all Official Plans for Bay of Quinte municipalities contain the foregoing provisions, and the Master Drainage Plan/cash-in-lieu approach is not consistent. Most smaller municipalities are allowing development with small on-site facilities, and this may be creating unforeseen maintenance requirements and unforeseen costs. A consistent and comprehensive approach for stormwater management is needed for new development areas in the BQRAP area, and these guidelines reflect that need.
3. GENERAL STORMWATER DRAINAGE GUIDELINES

3.1 Role of the Local Municipality

1. Municipal Official Plans should recognize stormwater management in the hierarchy of planning and management techniques for new development and contain provisions for watershed plans, sub-watershed plans and master drainage plans as part of secondary plans.

2. Having identified strategies for accommodating new development via centralized stormwater facilities, municipalities should establish "cash-in-lieu" arrangements to support the construction of the required facilities when needed.

3.2 Development Design Requirements

1. Adhere to the guidelines provided in the most recent version of the Ontario Ministry of Environment's "Stormwater Management Planning and Design Manual" (current version dated March 2003).

2. New developments should be designed to incorporate all reasonable and practical means of minimizing direct surface runoff, including:
   - Minimize the amount of impervious area
   - Maximize the amount of existing vegetated area (treed areas, grassed areas) that is retained within the development design, to help maximize opportunity for infiltration (soak away) of surface water.
   - Roof drainage should be diverted on vegetated areas to give the water opportunity to soak into the ground.

3. Drainage systems for new development should be designed using the "minor and major system" approach. The minor system typically conveys all drainage flows generated by precipitation events up to the 5-year return period, and may include ditches, culverts, catchbasins and storm sewers. The major system conveys flows in excess of the capacity of the minor system in such a way as to minimize risk to life or property. The major system may include ditches, swales and other overland flow paths (including roadways).

4. Development proponents are responsible for ensuring that the design of the drainage system complies with current municipal design standards of the local municipality.

5. Small on-site facilities are discouraged and contribution to centralized works as identified in Watershed or Master Drainage Plans are encouraged.

4. STORMWATER QUALITY CONTROL

This section applies to all developments of an area equal to or greater than one hectare.
4.1 New Urban or Rural Development

1. The development proponent is responsible for checking with the local municipality and with the conservation authority to ensure that the design of the drainage system is consistent with applicable Watershed Plans, Subwatershed Plans or Master Drainage Plans.

2. Plan and design the new development in accordance with the MOE SWM Manual, including the following steps:
   - Define and describe the type of development in terms of land use, total imperviousness, directly-connected imperviousness (i.e. how much of the total impervious area will drain directly into the minor system, versus the amount of impervious area that will drain onto vegetated area).
   - Define physical site constraints affecting drainage design and quality control options. These may include geotechnical properties of the local soil including permeability, depth to bedrock, and high water table levels.
   - To address stormwater quality concerns, follow the “treatment train” approach. Examine options for source control, conveyance control and, if necessary, end-of-pipe controls. The MOE SWM Manual provides considerable guidance on options to consider and how to evaluate them.

3. Where the development will include curbed roadways or paved parking areas drained by catchbasins and storm sewers, or otherwise includes collection of surface drainage in pipe systems, then end-of-pipe treatment of the storm sewer outflows will be needed.

4. Any required end-of-pipe stormwater treatment facilities must be designed as follows:
   - Examine options for end-of-pipe treatment using guidance provided in the MOE SWM Manual.
   - Design the end-of-pipe facility in accordance with the MOE SWM Manual. **End-of-pipe stormwater facilities must be designed to provide MOE “Enhanced” level of stormwater treatment (formerly referred to as “Level 1”) as defined in the MOE SWM Manual (March 2003).**
   - If the end-of-pipe facility is to be a treatment pond, then it must be designed to allow routine clean-out of accumulated sediment and debris, including vehicle access to allow the clean-out operation and removal of sediments for off-site disposal. The pond should be designed such it can be hydraulically isolated to allow it to be pumped out if necessary to allow maintenance or clean-out.
   - As a general requirement in the BQRAP Implementation Area, end-of-pipe stormwater facilities do not need to include active effluent disinfection using UV technology or equivalent technology.
   - If the storm pipe outfall to local watercourse or waterbody can reasonably be expected to have a direct impact on water quality at a swimming beach, then active effluent disinfection may be required at the outfall. The development proponent is responsible for determining if disinfection is required through consultation with the conservation authority and the MOE Regional Office.
4.2 Retrofit Measures in Existing Built-Up Areas

1. In general, it is expected that local municipalities will be the proponents in any undertakings to implement retrofit stormwater treatment within existing built-up areas.

2. Planning and design of retrofit strategies should adhere to the same guidelines as listed above for new development situations, with the following exception:
   - Retrofit end-of-pipe treatment facilities should be designed to provide the MOE "Enhanced" (Level 1) treatment level if possible and practical. Designing to achieve the MOE "Normal" (Level 2) treatment level will generally be considered as an acceptable option. Lower levels of treatment may also be considered if the proposed location for retrofit installation poses specific site constraints or issues that make Level 1 or Level 2 treatment not feasible or practical to implement.

3. Retrofit strategies should be developed in close consultation with the conservation authority and the Ontario Ministry of Environment to ensure that final designs are acceptable from the regulatory standpoint.

5. Stormwater Quantity Control for New Development

1. Stormwater quantity control is necessary to ensure that flows released from the development property do not have any adverse downstream impacts on flooding or watercourse erosion.

2. New developments must be designed to adhere to the requirements of the Provincial Policy Statement (March 1, 2005) under Section 3 of the Planning Act. The Policy Statement includes requirements for protecting public health and safety by restricting land development within areas affected by flood hazards, erosion hazards or dynamic beach hazards. Refer to the Policy Statement for specific definitions and requirements.

3. Unless there is in place a Watershed Plan, Subwatershed Plan or Master Drainage Plan that stipulates otherwise, peak flows released from the development property are not to exceed the "pre-development" peaks flows released from the site, for all return periods from 2 years to 100 years. The Regional Storm in the Quinte Conservation and Cataraqui Region Conservation Authority jurisdictions is the 100-year storm. Developments in the Lower Trent Conservation jurisdiction must also safely pass the Timmins Regional Storm.

4. If the development proponent believes that higher peak flows can be released from the site without any adverse upstream or downstream impacts on flood risk or watercourse erosion, then the development proponent will be responsible for conducting all necessary hydrologic and hydraulic studies to prove that this is so to the satisfaction of regulatory authorities including the local municipality and the conservation authority. Prior to making any such submission, the development proponent should consult with the conservation authority to determine the specific technical analyses that will be required to support higher site release flows.
6. APPROVAL SUBMISSIONS AND PROCESS

1. Application for approval of proposed drainage systems for new land developments must be made to the local municipality as part of the overall development approval process administered by the municipality.

2. The conservation authority will assist the municipality by reviewing proposed development plans with respect to drainage and stormwater management requirements set out in these guidelines.

3. Additional approvals may be required depending on the specific design and type of drainage system being proposed. See below.

4. Submissions to the municipality with respect to the proposed development’s drainage system must include the following information:

   a) Design and location of the “minor” drainage system and the “major” drainage system. Plans and drawings showing the engineering design, location and elevation or elevation profile of all system components including ditches, culverts, catchbasins, pipes, manholes and other structures, in accordance with the local municipalities design standards. The development proponent is responsible for obtaining and understanding the local municipal design standards.

   b) Plan showing all contributing drainage areas and showing drainage direction for all impervious areas, including all paved surfaces, roofs and other impervious surfaces. Indicate where roof drains will discharge. Indicate surface drainage direction along roadways and within commercial/industrial parking areas.

   c) In the case of the major drainage system, provide details including: Location of all overland flow routes including locations of outlet to storage facilities or outlets to local watercourses or waterbodies; information on estimated flow depth and flow velocity at peak flow in the 25-year, 100-year and Regional Storm events, at critical locations within the major system including road intersections or other critical locations within the development area.

   d) Clear description of how pre-development peak flows were determined or calculated.

   e) A plan or plans showing any and all proposed facilities for controlling site release flows to the pre-development level, including location and size of any runoff storage facilities. Provide information on maximum water storage volume and water levels in such facilities at each of the design return periods including the Regional Storm event.

5. For proposed facilities for end-of-pipe stormwater treatment, the following requirements apply:

   a) Generally, ownership and operation end-of-pipe stormwater facilities will be assumed by the local municipality once the facility has been completed to the municipality’s satisfaction and all necessary approvals for operation of the facility have been acquired. The development proponent must confirm specific requirements with the local municipality.

   b) The development proponent is responsible for obtaining any and all necessary approvals on behalf of the local municipality as the eventual owner/operator. These approvals will include but are not necessarily limited to Ontario Ministry of Environment approval (Section 53 approval under Ontario Water Resources
The development proponent is responsible for determining approval requirements through discussion with the conservation authority, the local municipality, and the Ontario Ministry of Environment.

c) The MOE s.53 OWRA approval will result in MOE issuing a Certificate of Approval to the municipality for the proposed facility. Generally, the MOE C. of A. will define specific monitoring and reporting requirements. Prior to making application to MOE for this approval, the development proponent is responsible for "pre-consultation" with the MOE Regional office to determine the likely C. of A. conditions. Prior to making the C. of A. application, the development proponent must advise the local municipality of the outcome of the MOE pre-consultation and obtain the local municipality's authorization to proceed with the C. of A. application.

d) The development proponent is responsible for completing any necessary environmental assessment (EA) that may be required under the Ontario Environmental Assessment Act or the Canadian Environmental Assessment Act. The development proponent is responsible for determining what EA requirements apply to the project.

e) Prior to final acceptance of the facility by the municipality, the development proponent must submit to the municipality an Operations & Maintenance Manual for the facility. This manual must clearly describe all operational and maintenance requirements, including all procedures needed to maintain compliance with the MOE C. of A. The manual should include details of any required sampling or testing of facility effluent or facility performance as may be required by the C. of A., and provide standard forms for recording and reporting necessary information. As well, the O&M Manual must include any and all relevant user manuals for any equipment necessary for operation and maintenance of the SWM facility.
Figure 1: Bay of Quinte Stormwater Management Implementation Area
ATTACHMENT 2

TEMPLATE FOR PREPARATION OF
POLLUTION PREVENTION & CONTROL PLANS (PPCPs)
FOR PICTON, NAPANEE AND DESERONTO
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Bay of Quinte Remedial Action Plan
Advancement of Pollution Control Plans for Picton, Deseronto and Napanee

TEMPLATE FOR PCP DEVELOPMENT

1. **BACKGROUND**

The Bay of Quinte Remedial Action Plan (BQRAP) Stage 2 report “Time to Act” sets out 80 recommendations.

1.1 **BQRAP recommendation for PCP Development**

Recommendations No. 21 to 34 were focused on overcoming the Bay of Quinte’s bacterial contamination problems.

Recommendation No. 23 is as follows:

- “The municipalities of Belleville, Deseronto, Picton, Napanee and Trenton should undertake Pollution Control Planning studies to identify, and where required, implement actions to eliminate the sources of bacterial contamination and other pollutants along their respective waterfronts.”

The rationale for this recommendation was that urban beaches in the identified municipalities often experience bacteriological contamination in both wet and dry weather, restricting swimming and other water-contact recreation.

The “Time To Act” report notes the following with respect to causes of bacterial contamination:

- “During the summer months, Bay of Quinte beaches are posted periodically, particularly in urban areas and after storm events. Combined-sewer overflows, sewage by-passing, urban runoff and other uncontrolled sources contribute to the problem in the urbanized areas.” ("Time to Act", P. 77)

- “The spatial pattern of contamination around Quinte municipalities suggests that urban discharge and runoff are primary sources of in-bay bacterial contamination. Few combined storm and sanitary sewer collector systems remain. Where combined sewers persist, adequate sewage treatment plant capacity to avoid overflows generally exists. Combined sewer overflows are therefore infrequent and therefore not a major factor.”

1.2 **Related BQRAP Recommendations**

Other RAP recommendations deal with related issues. These are summarized in Table 1. They target specific sources of bacterial pollution, namely:

1. Sewer system overflows
2. Pet litter wash-off
3. Wildlife
4. Discharges from pleasure boats
5. Faulty or substandard septic systems
Table 1
Summary of Bay of Quinte RAP recommendations related to control of stormwater runoff and sources of bacterial contamination

<table>
<thead>
<tr>
<th>RAP recommendation</th>
<th>Summary</th>
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<tr>
<td>24</td>
<td>Disconnect roof drains and sump pumps from sanitary sewer system</td>
</tr>
<tr>
<td>25</td>
<td>Implement long-range strategies for sewer system inspection,</td>
</tr>
<tr>
<td></td>
<td>maintenance and rehab</td>
</tr>
<tr>
<td>26</td>
<td>Implement water conservation</td>
</tr>
<tr>
<td>27</td>
<td>Enforce domestic pet litter bylaws</td>
</tr>
<tr>
<td>28</td>
<td>Take measures to discourage presence of gulls and control dog access at</td>
</tr>
<tr>
<td></td>
<td>swimming beaches.</td>
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<tr>
<td>29</td>
<td>Routine street cleaning and catchbasin cleaning</td>
</tr>
<tr>
<td>30</td>
<td>Ensure pleasure craft on Trent Severn waterway comply with</td>
</tr>
<tr>
<td></td>
<td>plumbing and boating regs</td>
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<tr>
<td>31</td>
<td>Storm sewers and drainage ditches should be investigated for</td>
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<tr>
<td></td>
<td>sources of dry-weather bacterial contamination</td>
</tr>
<tr>
<td>32</td>
<td>Proper disposal of human wastes and litter generated by ice-fishing</td>
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<td></td>
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<td>33</td>
<td>Stormwater quality control for new urban development</td>
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<td>34</td>
<td>Ontario’s Subwatershed Planning Process should be used as input</td>
</tr>
<tr>
<td></td>
<td>to municipal Secondary Plans (for new urban development areas)</td>
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<tr>
<td>38</td>
<td>Investigate septic systems on properties fronting on the Bay and</td>
</tr>
<tr>
<td></td>
<td>take corrective measures where needed</td>
</tr>
</tbody>
</table>

1.3 Focus of PCPs

Accordingly, the Pollution Control Planning studies (PCPs) called for in Recommendation #23 are most appropriately targeted at diffuse sources from the urban areas. In particular, surface drainage and stormwater runoff should be the focus of PCP development.

Urban stormwater runoff represents not only a source of bacterial contamination but also represents a source of nutrient loadings to the Bay of Quinte. As well, urban stormwater typically carries sediment, grit and debris, along with a range of other contaminants including metals and persistent toxics washed off urban surfaces.

In other words, urban stormwater contributes not only to the bacterial contamination problem, but also has impacts on shoreline aesthetics and on aquatic life and aquatic habitat. Furthermore, urban drainage contributes to build-up of persistent toxics within the Bay of Quinte.
2. **GENERAL CONSIDERATIONS FOR PCP DEVELOPMENT**

This section reviews various considerations and requirements that will dictate how to develop a practical Pollution Control Plan that focuses on the stormwater issue.

### 2.1 Compare Stormwater Pollutant Loads to Other Sources

Within the PCP process, the contaminant loadings delivered to the Bay by urban land drainage need to be compared to other sources and processes affecting conditions in the Bay. This comparative approach is needed to ensure a balanced perspective. Depending on location and other factors, urban drainage may represent a significant problem in terms of local water quality or habitat impacts, or it may represent a relatively minor source.

### 2.2 Emphasize Source Control

The sources of urban runoff pollution need to be carefully considered. These sources will be various processes or activities that deposit contaminants on urban surfaces. Obvious examples include automotive vehicles and resulting contaminant deposition (metals, oil & grease) on asphalt roadways.

A source control strategy is a fundamental component of any PCP:

1. All reasonable and practical measures need to be taken to reduce sources of urban drainage contamination. Relatively simple measures such as better housekeeping practices on industrial/commercial properties, and better compliance with pet-litter control bylaws, can provide benefits at relatively modest cost.

2. Eliminate sewer cross-connections and illegal connections. Cross-connections between the sanitary sewer system and the storm sewer system can occur as a result of incorrect pipe connections during construction projects, or as a result of pipe damage allowing flow to leak from one system to the other. Also, individual property service connections can sometimes get incorrectly connected. Such problems can result in significant sources of sewage contamination entering the storm pipe system. A systematic approach to searching out and eliminating cross-connections is needed, starting with investigations to determine if dry-weather flows at storm outfalls are contaminated.

3. Minimize runoff at the source. Existing drainage systems need to be reviewed to see if some simple at-source measures can be taken to reduce the amount of urban runoff. This could include programs to ensure that roof downspouts drain out onto grassed areas instead of draining onto paved driveways. As well, there may be opportunities to divert drainage from municipal roadways onto grassed park areas to allow it to soak away. Identifying such opportunities requires a reasonably detailed assessment of the
existing drainage system and surface drainage routes, possibly including the need for
detailed local ground surveys to confirm drainage directions and feasibility of
redirecting surface flows to soak-away areas.

With respect to eliminating sewer cross-connections, it should be noted that this can require
considerable investigative effort. If dry-weather outfall sampling indicates contaminated flow,
then the investigation needs to proceed upstream through the tributary storm pipe network to
try to pinpoint the source. This can be time-consuming and expensive. The process will
typically require manhole-to-manhole sampling and testing of dry-weather flow, followed by
dye-testing or smoke-testing of individual private service connections (with cooperation of
home and business owners) to determine if plumbing connections are the source. In some
cases, the investigations may not conclusively identify the source of storm sewer
contamination.

2.3 Develop a Source Control Strategy

A structured review of source control opportunities is needed as an essential component of any
PCP. This program should adhere to the above principles. It should consist of a systematic
review of the existing surface drainage system and land-use practices to identify all reasonable
opportunities; assess feasibility, costs and expected benefits; and then provide a recommended
source-control action plan.

2.4 Consider End-of-Pipe Treatment If and Where Necessary

In many urban areas, there may be limited opportunities for source control to substantially
reduce pollutant wash-off or volume of runoff. Source-control feasibility may be limited by the
fact that adequate drainage of urban properties must be maintained. As well, there are public
health concerns such as those related to West Nile virus that may be at odds with source control
practices that would increase the extent or duration of any ponded water within the urban
environment.

Also, there may be challenges in urban areas serviced by curbed roadways with conventional
catchbasin-to-sewer drainage systems. In such areas, it may be difficult to reduce the amount
of runoff and wash-off from roadway and parking surfaces. These surfaces often account for
the bulk of contaminants carried by urban runoff.

Where it is determined that source control may be of limited feasibility or of limited effect,
alternative measures need to be considered for reducing the contaminant load carried by urban
drainage to local watercourses and water bodies such as the Bay of Quinte. For example, in
areas served by storm sewers, some form of "end of pipe" stormwater treatment is an option.
Various types of stormwater treatment can be considered including

1. Settling ponds
2. Constructed wetlands
3. Underground settling tanks
4. Oil/grit separators: Specially designed chambers for capturing oil and grit

All of these options require some land area at the end of the storm sewer pipe --- at pipe outfalls that are often located along the waterfront shoreline or along tributary creeks and rivers. End-of-pipe treatment will involve a significant capital cost. Also, there will be considerable ongoing operational costs associated with maintaining end-of-pipe facilities, including the costs of routine clean-out and disposal of accumulated sediments collected within these facilities.

The requirement for available land area and the significant costs for end-of-pipe stormwater treatment are the main reasons for ensuring that all possible measures for source control have been examined. The end-of-pipe option needs to be considered as the method of last resort.

2.5 Assess the Benefits and Costs of Various Alternatives

The final PCP will consist of various components including a source-control strategy (which itself may have a number of component measures), new drainage infrastructure such as end-of-pipe facilities, and institutional arrangements needed to ensure implementation, ongoing monitoring and adjustment when needed.

The source-control strategy may include a number of “non-structural” measures such as intensified street sweeping and sewer cleaning, by-law enforcement and public education initiatives. New drainage infrastructure such as treatment ponds or modifications to surface flow patterns can be considered as “structural” measures.

The PCP will therefore consist of various structural and non-structural measures, each with its associated costs and benefits. Various combinations of structural and non-structural measures could be considered in an effort to develop an “optimized” plan that provides maximum benefit at least cost.

However, in practical reality, physical constraints and opportunities will often limit the range of distinct options that are feasible. For example, there may be a limited number of storm outfalls at which there is sufficient land available for installing end-of-pipe treatment as a retrofit measures. Another consideration in developing the final PCP is that it may be difficult to precisely quantify the benefits of some measures.

Nonetheless, it is important that a final set of recommended measures that form the PCP be arrived at through consideration of all available options and opportunities, and analysis of relative benefits and costs of each. In part, this is necessary for the eventual implementation of individual components through processes such as the Municipal Class Environmental Assessment.

2.6 Clearly Define How the PCP Gets Implemented
The technical solution to the problem of stormwater pollution is only one aspect of the final PCP. If the PCP is to be practical, it is fundamental to define how the technical solutions can and will get implemented. Implementation issues are:

1. Who will pay?
2. How can the general public be involved?
3. Who will act as proponent for various components such as developing the source-control strategy or constructing end-of-pipe treatment facilities?
4. What are the regulatory approval requirements for individual PCP components?
5. What performance monitoring is needed to determine if the PCP is working?

The local municipality is responsible for the storm drainage system, land development approvals and land-use planning. Therefore, it will generally be the case that the local municipality is responsible for coordinating the implementation of the PCP. Regulatory agencies such as Quinte Conservation and the Ontario Ministry of Environment will also play an important role. It is therefore important that these agencies be involved in developing the PCPs for individual urban centres such as Picton, Napanee and Deseronto.
3. **Overview of PCP Process**

Preparing a Pollution Control Plan that focuses on urban stormwater impact mitigation is described here as a three-stage process, as follows:

**Stage 1: Information Assembly and Analysis**

**Stage 2: Stormwater Control Strategy**

**Stage 3: Implementation Plan**

The following diagram summarizes the tasks involved in each stage. Details on each task are described in the following sections 4, 5 and 6. This is a generalized description of what needs to be done in each of Picton, Deseronto and Napanee. Subsequent sections of this report discuss specific details and issues for each of the Towns.
Bay of Quinte Remedial Action Plan
Advancement of Pollution Control Plans for Picton, Deseronto and Napanee

TEMPLATE FOR PCP DEVELOPMENT

ADVANCEMENT OF POLLUTION CONTROL PLANS FOR PICTON, NAPANEE AND DESERONTO

PCP PROCESS DIAGRAM

STAGE 1

INFORMATION ASSEMBLY and ANALYSIS

1.1 Assemble drainage system information
1.2 Assemble drainage catchment information
1.3 Confirm sewer separation status
1.4 Review recent surface water quality data
1.5 Dry-weather Outfall Field Survey
1.6 Sewage pumping station review
1.7 Assess other loadings sources
1.8 Conduct Loadings Analysis
1.9 Identify Priority Catchments and Outfalls

STAGE 2

STORMWATER CONTROL STRATEGY

2.1 Target Setting
2.2 Prepare Source-Control Action Plan
2.3 Prepare end-of-pipe treatment strategy
2.4 Review policies for new development
2.5 Benefit/Cost analysis of alternatives
2.6 Recommended Stormwater Control Plan

STAGE 3

IMPLEMENTATION PLAN

3.1 Confirm Component Costs
3.2 Set Priorities
3.3 Identify Public Participation Opportunities
3.4 Confirm Component Approval Requirements
3.5 Define Roles and Responsibilities
4. **Stage 1: Information Assembly, Review and Analysis**

4.1 **Assemble drainage system information**

A basic requirement is to assemble the following information on the storm drainage system. Table 2 provides a summary of what is needed.

<table>
<thead>
<tr>
<th>Information Item</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage conveyance system details</td>
<td>Mapping of the location of all storm sewers, including all manhole locations and ideally all catchbasin locations</td>
<td>Best consolidated within a GIS framework that is designed to allow for addition of information gathered from routine condition assessments of structures, as well as information gathered during routine maintenance and inspection activities</td>
</tr>
<tr>
<td>Outfall locations and elevations</td>
<td>Mapping of all locations of outfalls (outlets) to watercourses and waterbodies (local watercourse or the Bay of Quinte); also need information of elevation of the outfall.</td>
<td>Accurate location mapping and elevation information needed to help with assessing alternative for mitigation; and to assist with routine inspection.</td>
</tr>
<tr>
<td>Drainage catchment information</td>
<td>Details on the land area draining to each outfall.</td>
<td>Needed to assess potential runoff volume and potential pollutant loadings to area watercourses. See below for details</td>
</tr>
</tbody>
</table>
waterbodies; and to assist with identifying opportunities, area by area, for source control or for retrofit end-of-pipe stormwater treatment.

Some judgement will be needed in delineating the town area into a number of drainage sub-areas. In general

- Each storm outlet (i.e. storm pipe outfall, drainage ditch outlet, etc.) should have an associated drainage sub-area mapped out. This is essential for determining the loadings to the Bay from that outlet.
- Each sub-area should generally be of relatively homogeneous land-use. For example, industrial zones should, if possible, be delineated separately from residential areas, since runoff loadings and control opportunities may be quite different.
- Each sub-area should be large enough that it is at an appropriate scale for developing source-control strategies or end-of-pipe retrofit strategies that are specific to the sub-area.

Once the town area’s drainage system has been mapped out, it will generally be a straightforward matter to map out the boundaries of the drainage sub-areas using various types of information including topographic mapping, previous drainage studies, land-use mapping, aerial photography and ground survey.

Table 3 outlines the information required.
Table 3
Drainage Catchment Information Requirements

<table>
<thead>
<tr>
<th>Information Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land area</td>
<td>Total area in hectares</td>
</tr>
<tr>
<td>Existing land use</td>
<td>Percentage of area within general categories: residential, industrial, commercial, parkland, agricultural (cultivated, pasture), wood lot.</td>
</tr>
<tr>
<td>Imperviousness</td>
<td>Percentage of total area that is impervious: including roads, parking areas, walkways, roofs or any other impervious surfaces. An assessment of what percentage of the impervious area is directly connected to (i.e. drains immediately into) the primary drainage system (storm sewer or ditch system) is also need --- see below.</td>
</tr>
<tr>
<td>Type of drainage system</td>
<td>Roadside ditches, storm sewers with catchbasins</td>
</tr>
<tr>
<td>Drainage outlet</td>
<td>ID of final drainage outlet to Bay or local creek or river. Each outlet (storm pipe outfall, ditch outfall) should be assigned a unique ID.</td>
</tr>
<tr>
<td>Internal lot drainage characteristics and connectivity</td>
<td>Where does roof drainage generally go? Onto grassed areas or onto paved areas? Connected to sewer system?</td>
</tr>
<tr>
<td>Surficial soil characteristics</td>
<td>Is local soil well drained? What is textural classification (clay, silt, sand)?</td>
</tr>
<tr>
<td>Known drainage problems</td>
<td>Are there problems with prolonged surface ponding, known flooding problems?</td>
</tr>
</tbody>
</table>
| FUTURE LAND DEVELOPMENT POTENTIAL            | Information on which land parcels may be subject to development or redevelopment that will bring about a significant change in site runoff. The information should be based on review of:  
- Municipal Official Plan and any approved or draft Secondary Plans  
- Existing Zoning By-Law  
For each development area or site, the following information is required  
- Type of proposed development  
- Estimated future site imperviousness  
- Probable type of drainage system  
- Planning status: Is there an applicable Master Drainage Plan, Stormwater Design Plan already submitted to the Municipality? |

4.3 **Confirm Sewer Separation Status**

Once the sewer system has been reviewed, it is necessary to confirm that the Town area is served by separated storm and sanitary sewers. In particular, it is necessary to confirm that the sanitary sewer system is not receiving any direct surface drainage flows via catchbasins or other structures; that is, that the sanitary sewer system is in fact a separated system and not a combined system.
The BQRAP Stage 2 report "Time to Act" 1993 notes that "Where combined sewers persist, adequate sewage treatment plant capacity to avoid overflows generally exists. Combined sewer overflows are therefore infrequent and therefore not a major factor."

For Picton, Napanee and Deseronto, the Town areas are served by nominally separated sanitary sewers; no portion of the respective sewer systems is considered to be a combined system. Nonetheless, within the older portions of these Town areas, there remains some possibility that some catchbasin or roof downspout connections to sanitary pipes may still exist. It is important to determine if this is so, or whether some field investigation is needed to determine if the sanitary sewers are truly separated in all areas.

The step requires input from municipal staff that are most familiar with the sewer system. The outcome should be a list of any specific locations that need further investigation to confirm connectivity.

4.4 Review recent data on receiving water quality

Information on receiving water quality (surface water quality) is needed to help define the impacts of existing stormwater discharges and to assist with assessing the potential benefits of stormwater pollutant load reduction.

The BQRAP recommendations related to stormwater impact mitigation and bacterial contamination reduction were based on a significant amount of data gathering in the 1980s and early 1990s within the Bay of Quinte and tributary areas. Based on this earlier BQRAP work, the impacts of existing stormwater discharges on the Bay are reasonably well understood. Furthermore, there have been numerous studies throughout North America that have quantified pollutant loads carried by urban stormwater and the associated impacts on water quality and aquatic life. In other words, the amount and type of pollutants carried by runoff from various types of urban areas and urban surfaces are now well understood and documented in various research. Given this perspective and the known water-quality impairments in the Bay of Quinte, it is reasonable to state that PCPs for urban areas fronting on the Bay can be prepared without having to spend significant resources on gathering and analyzing more data on stormwater pollution or its local impact.

Nonetheless, the PCP process should include some effort to gather and review any readily available surface water quality data that may help confirm current conditions. Generally, there is expected to be only limited available data on surface water quality in and around the Towns of Picton, Napanee and Deseronto. A review of possible data sources include those listed in Table 4. These sources will provide limited data and it may be difficult to correlate observed water quality with storm events (due to limited sampling frequency and the fact that the sampling was not specifically meant to measure storm impacts).
Table 4
Sources of Surface Water Quality Data

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Type of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health Units:</td>
<td></td>
</tr>
<tr>
<td>Prince Edward Hastings and</td>
<td>Bacteria sampling of surface waters at</td>
</tr>
<tr>
<td>Kingston-Frontenac Lennox &amp; Addington</td>
<td>recreational use areas such as municipal</td>
</tr>
<tr>
<td></td>
<td>waterfront parks</td>
</tr>
<tr>
<td>Ontario Ministry of Environment</td>
<td></td>
</tr>
<tr>
<td>Provincial Water Quality Monitoring</td>
<td>Monthly sampling of standard water-quality</td>
</tr>
<tr>
<td>Network</td>
<td>parameters at selected locations</td>
</tr>
<tr>
<td>Quinte Conservation</td>
<td>Various surface water data and observation</td>
</tr>
<tr>
<td></td>
<td>from ongoing programs</td>
</tr>
<tr>
<td>Local Municipality</td>
<td>Data from raw water intakes for municipal</td>
</tr>
<tr>
<td></td>
<td>water treatments plants</td>
</tr>
</tbody>
</table>

4.5 Dry-weather Field Survey of Storm Outfalls

A field survey of all storm outlets should be carried out. The scope of this investigation is as follows:

Table 5
Dry-weather Field Survey of Storm Outfalls

<table>
<thead>
<tr>
<th>Scope of Investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Outfall Inspection</td>
</tr>
<tr>
<td>1. Confirm location (e.g. using GPS to take coordinates)</td>
</tr>
<tr>
<td>2. Confirm pipe type, pipe material and pipe elevation</td>
</tr>
<tr>
<td>3. General condition assessment</td>
</tr>
<tr>
<td>4. Measure depth of sediment build-up</td>
</tr>
<tr>
<td>5. Record whether there is any blockage due to debris</td>
</tr>
<tr>
<td>6. Record any other problems or concerns</td>
</tr>
<tr>
<td>B Dry-weather Flow Measurement</td>
</tr>
<tr>
<td>1. Is there a noticeable dry-weather outflow from the pipe?</td>
</tr>
<tr>
<td>2. Estimate flowrate by measuring depth of flow and flow velocity if possible</td>
</tr>
<tr>
<td>C Dry-weather Flow Sampling and Testing</td>
</tr>
<tr>
<td>1. Record presence of any debris, visible sheen or foul odours</td>
</tr>
<tr>
<td>2. Sample for lab analysis</td>
</tr>
<tr>
<td>3. Submit to lab for E.coli and BOD analysis</td>
</tr>
</tbody>
</table>

The overall objective of the dry-weather outfall survey is to determine which outfalls, if any, have a significant outflow during dry weather; and whether the flow is contaminated by E.coli.
(an indicator of sewage contamination). Measuring BOD, total phosphorus and ammonia nitrogen can also provide insight into the possible source of any observed bacteriological contamination.

This outfall survey will address BQRAP Recommendation #31. The results will provide the information needed to design a program to seek out and eliminate sources of dry-weather contamination such as sewer cross-connections. This would be part of the PCP’s source control program (see below).

4.6 Sewage Pumping Station Review

Operational data for all sewage pumping stations need to be reviewed with respect to frequency and magnitude of any overflows that may have happened in wet weather.

Municipal sewage pumping stations are typically designed with a high-flow bypass or overflow structure to allow sewage to overflow to the surface drainage system in case of an emergency (e.g. power failure, or extreme precipitation event causing flows to exceed pumping capacity). The frequency and magnitude of overflow at each pumping station will depend on how “leaky” the tributary sanitary sewers are; in other words, how much groundwater infiltration or direct surface inflow can get into the sanitary sewer pipes in wet weather.

For each pumping station the following information should be itemized:

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Sewage Pumping Station Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflow capacity</td>
<td>Diameter and estimated capacity of influent sewer</td>
</tr>
<tr>
<td>Pumping capacity</td>
<td>Number of duty pumps and rated capacity of each pump Total pumping capacity under normal operating conditions</td>
</tr>
<tr>
<td>Ministry of Environment Certificate of Approval</td>
<td>Date of construction of pumping station C. of A. number and date of issue What are the C. of A. requirements for reporting?</td>
</tr>
<tr>
<td>Overflow Structure</td>
<td>Is there an inflow bypass or overflow structure in place? Where does the overflow discharge to? (E.g. does it go to storm sewer or to local watercourse?)</td>
</tr>
<tr>
<td>Overflow History</td>
<td>Recent history of overflows: how many per year, what time of year or weather conditions cause overflow</td>
</tr>
<tr>
<td>Cause of Overflow</td>
<td>Known or probable causes of overflow: identify which areas within the sewer system are known to be leaky or contribute high flows during wet weather.</td>
</tr>
</tbody>
</table>

4.7 Assess Other Loading Sources

Other sources also need to be reviewed, including
Bay of Quinte Remedial Action Plan
Advancement of Pollution Control Plans for Picton, Deseronto and Napanee

*TEMPLATE FOR PCP DEVELOPMENT*

- Municipal sewage treatment plant discharges
- Industrial discharges
- Runoff from local "non-point source" areas such as agricultural lands adjacent to the Town area, or any other areas which may drain through the Town area

Information of discharges from municipal sewage plants will be available from the plant operators (Picton STP operated by Prince Edward County; Deseronto and Napanee STPs operated by Greater Napanee Utilities Commission).

<table>
<thead>
<tr>
<th>STP</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Picton</strong></td>
<td>Expanded in 1994 from rated capacity of 4.43 MLD to 5.40 MLD. At the time, trickling filter serving Prince Edward Heights was decommissioned and flows diverted to Picton STP. The 1994 C. of A. did not incorporate RAP effluent TP limit of 0.3 mg/L; compliance based on monthly average of 1.0 mg/L. Plant consistently in compliance with TP limit and within RAP objective on average annual basis.</td>
</tr>
<tr>
<td>Operated by P.E. County</td>
<td>Plant experiences high wet-weather inflows due to high level of extraneous inflow into collection system. P.E.C. has recently initiated Class EA for full plant upgrade.</td>
</tr>
<tr>
<td><strong>Napanee</strong></td>
<td>This plant was subject to Comprehensive Performance Evaluation under Great Lakes Sustainability Fund STP optimization program circa 1994 (plant then operated by OCWA).</td>
</tr>
<tr>
<td>Operated by G.N.U.</td>
<td>Current C. of A. has monthly average compliance limit for TP of 0.3 mg/L and target TP loading of 2.73 kg/day. Data for 1998-2000 indicated that concentration limit was achieved on average annual basis and loading was about 50% of RAP target.</td>
</tr>
<tr>
<td><strong>Deseronto</strong></td>
<td>Upgraded to provide tertiary level of treatment by installation of Actiflo process for effluent polishing. Current C. of A. incorporates RAP objective of TP of 0.3 mg/L as compliance limit.</td>
</tr>
<tr>
<td>Operated by G.N.U.</td>
<td></td>
</tr>
</tbody>
</table>

For industrial discharges, the MOE District or Regional offices may be able to provide information.

In the case of non-point sources such as adjacent agricultural or undeveloped land, hydrologic analysis will be necessary to estimate land runoff volumes and associated pollutant loads.
4.8 Conduct Loading Analysis

Once the above information is in hand, analysis is carried out to estimate the pollutant loads associated with urban stormwater from the Town area, and compare with estimated loads from other sources. This will place stormwater in context and will help to determine whether the stormwater issue is locally as significant as other sources, in terms of the following:

1. potential impact on bacteria concentrations in local watercourses
2. total annual or seasonal nutrient (especially phosphorus) loading to the local watercourse and the Bay of Quinte
3. total load of other pollutants of concern such as metals.

As noted above, the BQRAP recommendation for PCP preparation for Picton, Napanee and Deseronto was based on previous investigations that concluded that urban stormwater is having significant local impact especially on bacterial pollution of surface water. It is expected that a loading analysis for each Town will confirm this.

It should also be noted that this analysis could require some assessment of the so-called “assimilative capacity” of local watercourses or waterways such as Picton Bay or the Napanee River. This analysis would be geared towards determining the net impact of various pollutant loadings on pollutant concentrations within the watercourse or waterbody. The need for such analysis should be determined at the time that the loading analysis is done. It will depend on the magnitude of loadings relative to the flow volume and dilution capacity of the local watercourse. The loading estimates and some relatively straightforward dilution calculations may immediately reveal that substantial loading reductions are needed to achieve acceptable receiving water quality. Or, on the other hand, the initial estimates may indicate that in-stream impacts could be marginal, in which case more sophisticated analysis of local in-stream impacts is needed to determine whether significant stormwater load reduction will bring about any substantial improvement in local surface water quality.

The initial loadings analysis should provide estimates of the annual and seasonal loadings from the various identified sources. This outcome should be reviewed with Quinte Conservation and the Ontario Ministry of Environment to determine what, if any, analysis of local assimilative capacity may be warranted or required to develop a PCP.

4.9 Identify Priority Catchments and Outfalls

The results of the loading analysis should include comparison of individual storm outfalls and their respective catchment areas in terms of annual and seasonal loadings of indicator bacteria (E. coli), phosphorus and other contaminants of concern within the BQRAP area.

This will lead directly to identifying which existing storm drainage areas and outlets should be considered as priorities for mitigation measures. A ranking of priorities should be developed to assist with development of the PCP’s source control plan and end-of-pipe treatment strategy. Development of these strategies is discussed below.
5. **Stage 2: Stormwater Control Strategy**

Developing a strategy for controlling pollutant loads from urban stormwater for each of Picton, Napanee and Deseronto is the central task in developing a PCP for each Town that fulfills BQRAP Recommendation #23.

5.1 Target Setting

The first step is to develop targets for stormwater pollutant load reduction for each Town.

The loadings analysis will have provided estimates of the total annual and seasonal loads for contaminants of concern. Targets for load reduction need to be based on what is required to meet the BQRAP objectives.

In the case of pollutant loadings from urban stormwater, targets for load reduction can be based on the updated BQRAP Stormwater Management Guidelines (see Appendix A; under review as of December 2005). The BQRAP SWM guidelines reflect MOE’s “Stormwater Management Planning and Design Manual” (March 2003).

The general requirement is that new stormwater discharges be designed based on providing the “Enhanced” level (formerly “Level 1”) of stormwater treatment. This corresponds to long-term average annual removal of total suspended solids of 80% (as an indicator of overall stormwater pollutant load control). The BQRAP guidelines state that this level should be achieved where possible when installing retrofit measures on existing storm outfalls; and that “Normal” level of treatment (70% TSS removal) may be acceptable if local constraints and conditions make the “Enhanced” level impractical or not feasible.

On this basis, the general target that should be adopted in PCPs is to achieve long-term stormwater pollutant load reduction corresponding to 70% to 80% of suspended solids reduction. Previous analysis such as those carried out for the City of Belleville Pollution Control Planning Study (1997) have shown that this can result in similar bacteria load reduction.

Furthermore, recent research has shown that end-of-pipe stormwater treatment in the form of facilities such as settling ponds or tanks, is capable of providing 30% to 80% reduction in total phosphorus load (See Appendix B). A reasonable target for the PCP process is to achieve 50% reduction in urban stormwater TP load.

In summary, it is being recommended here that targets be as follows:

1. For existing built-up areas within Napanee, Picton and Deseronto, the management target should be to reduce stormwater runoff volume and pollutant concentrations so as to achieve 70% to 80% reduction in bacteria load, and 50% reduction in phosphorus load. The ways and means of achieving such reductions will generally bring about reductions of a similar scale in other contaminants such as metals.
2. For new development areas within each Town, stormwater treatment must be provided to comply with the updated BQRAP Stormwater Management Guidelines.

These are targets that are intended to apply equally to each of Picton, Napanee and Deseronto. These targets are “presumptive” in nature, in the sense that they are based on the presumption that by meeting these load-reduction targets, each municipality will be doing what it needs to do in the way of stormwater impact control to help achieve the RAP objectives. The same targets are applied to each Town regardless of the individual circumstances and local receiving water issues, in order that there be a consistent level of stormwater control across the BQRAP area.

5.2 **Prepare source-control action plan**

The PCP needs to include, as an important first step, a structured review of source control opportunities within each Town’s built-up area. This should consist of a systematic review of the existing surface drainage system and land-use practices to identify all reasonable opportunities; assess feasibility, costs and expected benefits. The outcome will be a recommended source-control action plan.

Source control is all about minimizing runoff and minimizing potential for contamination of runoff. Measures that need to be considered include:

- Roof downspout disconnection: rain barrels or divert onto grassed areas
- Optimization of street-sweeping and catchbasin cleaning programs
- Review of pet-litter control measures
- Review of housekeeping practices on industrial and commercial properties to minimize runoff from potential contaminated areas
- Systematic review of municipal road rights-of-way and park areas to find opportunities to reduce runoff

The final source control plan will depend largely on local conditions. Depending on the existing drainage system, development density, urban imperviousness and local soil/drainage conditions, source control may be of limited applicability or may provide only marginal reduction in stormwater runoff.

Once a final source control plan has been prepared, it is necessary to develop an estimate of how much stormwater reduction and pollutant load reduction will result. This information is needed to determine whether further actions are necessary to achieve the desired reduction in the amount of pollutants discharged to local waterways.
5.3 Prepare End-of-pipe Storm Treatment Strategy

For Picton, Napanee and Deseronto, it is likely that the loading and source-control analysis will conclude that some form of end-of-pipe stormwater treatment for existing storm outlets is needed to meet the load-reduction targets and the BQRAP objectives.

A component of the final PCP for each Town will therefore likely be a strategy for retrofitting selected storm outfalls with some form or type of end-of-pipe treatment.

Developing such a strategy will require careful assessment of which outfalls should be considered as priorities, based on comparison of estimated runoff volumes and pollutants from each respective catchment area.

Another critical input to this strategy is determining at which outfalls end-of-pipe treatment is a feasible and practical possibility. This depends on a number of factors including:

- Is there municipally-owned land available at the outfall site, and is there sufficient area available to construct and operate an end-of-pipe treatment facility?

- Will such a facility be compatible with adjacent property use?

- Does use of the available land represent the best use of what may be valuable municipal waterfront property?

Ultimately, implementation of end-of-pipe treatment facilities such as settling ponds or underground tanks will need to proceed via the Municipal Class EA process. The above questions will need to be addressed during this process.

In developing an end-of-pipe stormwater strategy, the final strategy should as much as possible be structured to accommodate future urban development. The general approach should be to try to minimize the number of separate stormwater treatment facilities. This will help reduce the operational complexity and cost of maintaining the system, and will also lead to greater chance of optimum system performance.

Proposed end-of-pipe facilities should as much as possible be situated and designed to accommodate foreseeable urban expansion. This approach will provide the advantage of facilitating development design and approvals, and will provide the municipality with greater assurance that the overall stormwater system is being planned and designed for maximum cost efficiency.

Further discussion on how the PCP should be structured for new urban development is provided below.
5.4 Review Policies and Requirements for New Urban Development

BQRAP Recommendation #33 defines the need for stormwater quality control for new urban development; and recommendation #34 defines the requirement for appropriate Watershed or Subwatershed Planning to assist with stormwater infrastructure planning as part of Secondary Plans for new development areas.

The PCP needs to assist the municipality with fulfilling these recommendations.

A number of issues need to be taken into consideration, as follows.

5.4.1 BQRAP Stormwater Guidelines Update:

The stormwater quality control requirements for new development in the BQRAP Implementation Area have been defined in a guideline document prepared in 1993, and which is now in the process of being updated (as of December 2005). An initial “draft for discussion” version of the updated guidelines is attached to this document as Appendix A.

This proposed update has been undertaken to

- help clarify technical and submission requirements for development proponents
- make the BQRAP guidelines consist with the Province-wide guidelines set out in MOE’s current “Stormwater Management Planning and Design Manual” (March 2003)

The guidelines require that new development be designed to include stormwater management measures that provide MOE “Enhanced” level (formerly “Level 1”) stormwater treatment. Direct disinfection of stormwater discharges is not required, unless there is a reasonable expectation that the stormwater discharge location will have a direct impact on a recreational use area such as a swimming beach. Development proponents are obliged to consult with Quinte Conservation to confirm site-specific requirements.

The new guidelines place emphasis on designing new urban development to minimize the amount of surface runoff and associated pollutant wash-off. In other words, the guidelines encourage a design philosophy in which source control is considered from the outset.

5.4.2 Benefits of Master Planning:

The BQRAP recommendation #34 encourages Watershed/Subwatershed Planning as a means on integrating stormwater planning into the land development approval process via Secondary Plans.

There are significant advantages to local municipalities in adhering to this approach. Most importantly, this approach helps to define stormwater management requirements and infrastructure needs prior to final approval applications for individual development properties. This allow for a more rational and cost-effective design of the overall drainage and treatment
system that can focus on minimizing the number of separate facilities and associated operational and maintenance costs.

At this stage, the final framework for PCP development will be developed after consultation with each municipality to define where current land development pressures are or are expected to be. This will allow the final PCP framework for each of Picton, Napanee and Deseronto to be tailored to each Town’s unique situation. An expected outcome is definition of which areas should be identified as requiring preparation of a master stormwater plan or subwatershed plan, to enable the municipality and Quinte Conservation to deal in a timely and efficient manner with new development as it arises.

5.5 Benefit/Cost Analysis of Alternatives

The foregoing tasks could potentially result in a number of distinct alternatives that could be implemented over time to achieve pollutant load-reduction targets.

The source-control strategy together with the end-of-pipe strategy will encompass various structural and non-structural measures, each with its associated costs and benefits. Various combinations of structural and non-structural measures could be considered in an effort to develop an “optimized” plan that provides maximum benefit at least cost.

However, within each Town area, there will be a number of physical constraints and a limited range of opportunities for retrofit measures. For example, there may be a limited number of storm outfalls at which there is sufficient land available for installing end-of-pipe treatment. Another consideration in developing the final PCP is that it may be difficult to precisely quantify the benefits of some measures.

Because of the various constraints and limited retrofit opportunities within the existing built-up Town areas, there may in fact not be a significant number of discrete alternatives to consider. Nonetheless, the final set of recommended actions that form the PCP for each Town should be arrived at through comparative cost-versus-benefit analysis of feasible options and opportunities. In part, this is necessary for the eventual implementation of individual components through processes such as the Municipal Class Environmental Assessment.

5.6 Recommended Stormwater Control Plan

The final recommended stormwater control plan needs to be clearly defined. Each measure or set of measures that can be implemented separately or independently of the others should be identified as a separate component. Estimated costs for implementing each component need to be defined, along with estimated pollutant load reduction that will be effected by each component. The component breakdown is needed to assist with defining priorities and developing the Implementation Plan: see below.
6. **STAGE 3: IMPLEMENTATION PLAN**

Stage 3 of the PCP preparation is development of an Implementation Plan. This is an important part of the PCP since it describes how the various recommendations will actually be put into action.

The Implementation Plan is developed as follows:

- Confirm costs for each component
- Define priorities
- Identify opportunities for public involvement
- Confirm regulatory approval requirements
- Define institutional roles and responsibilities for each component

### 6.1 Confirming Costs:

The PCP will consist of a number of components, including a source-control strategy and an end-of-pipe strategy. Each of these two “sub-strategies” will have a number of individual components.

Final costs for each component need to be confirmed so that the municipality can develop necessary financial plans, make appropriate funding applications to other government agencies, or make appropriate decisions regarding future development planning.

The final costs need to include full “life cycle” cost assessment for each component so that proper planning for expected annual operational costs can be made.

### 6.2 Setting Priorities

Cost-benefit analysis needs to include an assessment for each component. This will lead to determining which components provide most benefit at least cost. These components should be implemented as top priorities.

Other factors that will affect priority definition will be current versus future opportunities. For example, a proposed end-of-pipe stormwater pond may provide a very favourable benefit-cost ratio, but it may be that implementation should not or cannot proceed until a future urban expansion area is ready to be developed. In this case, the priority for this facility may be delayed until the future development schedule becomes better defined.
6.3 Identify Public Education and Participation Opportunities

Certain components of the recommended plan may benefit from or require public acceptance, public involvement and more effort to educate the public about urban stormwater issues. Examples include the implementation of a roof leader disconnection program or rain-barrel program: Acceptance and participation by home-owners is needed.

The PCP should identify those measures that will rely on public acceptance and participation, and suggest ways to ensure that this happens based on local experience. It is expected that local municipal staff may be in the best position to help with this aspect of the PCP.

6.4 Confirm Regulatory Approval Requirements

The PCP will likely include various measures that require specific regulatory approvals. Examples include:

1. Any proposed stormwater treatment facilities will require final design approval by Ontario Ministry of Environment under the Ontario Water Resources Act.

2. Stormwater facilities must also be planned and designed in accordance with Ontario’s Municipal Class Environmental process. Within this process, the PCP will fulfill the role of a “master planning” study by defining the need for the proposed facility and providing the options analysis (i.e. analysis of alternative solutions) that led to the recommendation for the facility. The Class EA will complete the planning and design process by fulfilling additional requirements for public and governmental consultation, analysis of design alternatives and selection of final design configuration.

3. Depending on design and location details, individual proposed facilities could require additional approvals from the Conservation Authority with respect to floodplain issues or aquatic habitat protection requirements. To the extent possible at the time, the PCP should define these requirements.

Other components of the PCP may not require any specific regulatory approval, but may require approval by Municipal Council. Municipal staff should be asked to review all PCP recommendations to ensure that the final PCP document properly describes implementation requirements.

6.5 Define Roles and Responsibilities

A fundamental component of the Implementation Plan is defining who is responsible for implementing each component of the PCP.
Bay of Quinte Remedial Action Plan
Advancement of Pollution Control Plans for Picton, Deseronto and Napanee

TEMPLATE FOR PCP DEVELOPMENT

As noted above, the local municipality will generally be responsible for coordination, since it is the owner/operator of the drainage system, and is responsible for land development approvals and planning issues.

Quinte Conservation will also play an important role by assisting the local municipality with stormwater planning and design issues, and with acquiring final regulatory approvals for specific works.

The municipality’s role needs to be clearly defined for each component of the PCP. For each component, there needs to be clear definition of which municipal department is responsible, and how implementation can best be integrated within existing procedures and operations. It needs to be recognized that the local municipalities may have limited resources to allocate to additional requirements that may be imposed by the PCP. Therefore, as the PCP is being formulated and finalized, close consultation with each Municipality is needed to ensure that the Implementation Plan is practical and feasible for the municipal departments affected.
7. **TOWN OF NAPANEEN**

7.1 **Current Status on Information Gathering**

To help provide a base of information for development of a PCP for the Town of Napanee, XCG has proceeded to gather and consolidate in a GIS various information related to the storm drainage and sewer infrastructure in the Town.

The information entered into the GIS includes the following:

- Storm sewer pipe network, including each manhole and sewer pipe as a separate entity, including a database with information on pipe size and pipe materials.
- Similar information for the sanitary sewer system.
- Mapping and database for all storm outfalls.
- The land-use schedule (Schedule C) from the current Official Plan for Greater Napanee.
- Delineation of drainage catchment for each outfall, and database with catchment characteristics. This information was presented in XCG's Interim Project Report (March 15, 2005)

Figure 1 presents GIS mapping of storm outfalls and drainage catchment areas within Napanee.

7.2 **Municipal Input and Current Issues**

XCG Consultants held a meeting with Greater Napanee Public Works Department on Thursday, December 15, 2005. In summary the meeting was as follows:

1. The draft update to the BQRAP stormwater Management Design Guidelines (Appendix A) was provided to GN staff, with the request that they review the proposed guidelines and provide any comments to Mr. Bryon Keene of Quinte Conservation.
2. The GIS information assembled by XCG with respect to sewer and drainage infrastructure within the Town of Napanee was presented, including sample mapping of storm and sanitary sewers, and the Official Plan land use layer and a map overlay. Staff noted that they are just now embarking on implementing GIS and are quite interested in seeing how the base information being collected for the PCP project can be integrated with their initiative.
3. Current land development pressures were briefly reviewed. GN staff indicated that the main development pressure is the block of land west of Centre Street North and south of Selby Creek, immediately west of the existing commercial development (Canadian Tire store, etc) along the west side of Centre Street. GN staff indicated that a Secondary Plan is to be developed to support development in this area. GN staff noted that they
recognize the need for some stormwater management planning to hopefully minimize the number of separate stormwater management facilities.

4. XCG also presented an initial draft of the proposed PCP template and requested that GN staff review the document and provide comments to Bryon Keene of Quinte Conservation.

7.3 Next Steps

Much of the information needed to complete a specific PCP template for Napanee has been assembled. The next steps for Napanee are as follows:

1. Receive any comments from Greater Napanee staff by end of January 2006 on the proposed BQRAP stormwater management guidelines, and on the initial draft template for PCP development.

2. Finalize a template for PCP preparation for Napanee as follows:

   - Confirm priorities for planning for new development through further discussions with GN staff.

   - Define specific information requirements needed to support PCP development, based on identifying gaps in the information collected to date. Some immediate information requirements include GIS mapping of property fabric including identification of municipally owned parcels.

   - Prepare initial estimates of pollutant loads for all catchment areas shown in Figure 1 and develop an initial set of priority areas that the PCP should pay particular attention to.
8. **Town of Picton**

8.1 **Current Status on Information Gathering**

Outfall locations and preliminary mapping of outfall drainage areas has been completed (Figure 2), along with development of a GIS database with catchment characteristics. Refer to XCG’s Interim Project Report, March 2005.

The primary information item required is details of the storm sewer and drainage infrastructure within the Town. As previously reported by XCG, there appears to be no available paper or electronic mapping of the storm piping system, although further discussions with PEC staff are needed to confirm.

Information that has been made available through the PEC GIS includes property ownership and lot boundaries, zoning and planning information and topography.

8.2 **Municipal Input and Current Issues**

At this stage, a meeting with PEC staff is needed to focus efforts as needed to complete a practical PCP template for the Town of Picton.

A particular issue affecting PCP development is ongoing work and analysis that PEC has done to support the Class EA for a new sewage plant for the Town. PEC staff need to be consulted with respect to the scope and extent of any analysis that the County has done with respect to reducing wet-weather inflows to the sewage plant, and how this affects total plant loading to Picton Bay, both in term of treated plant effluent, plant bypass and/or increased stormwater discharges due to sewer system improvements or modifications.
9. **TOWN OF DESERONTO**

9.1 **Current Status on Information Gathering**

As previously reported (March 2005) the available drainage system information for Deseronto is quite limited. As with Picton, there appears to be no available paper or electronic mapping of the storm piping system, although further investigations through Greater Napanee Utilities are needed.

The information gathered to date does include full mapping of the sanitary sewer system.

As well, field investigation and Ontario Base Mapping have been used to identify some storm outlet locations and delineate larger-scale drainage areas. See Figure 3.

9.2 **Municipal Input and Current Issues**

At this stage, the main issue with respect to stormwater management in Deseronto is to obtain a better understanding and mapping of the storm drainage system, together with mapping of municipal property parcels so that a strategy for mitigating the impact of existing outlets can be formulated.

Also note that there are land development proposals pending within the Town of Deseronto. Stormwater management in accordance with the updated BQRAP Stormwater Management Guidelines (Appendix A) will be required by Quinte Conservation. A PPCP for Deseronto should address the need for a strategic approach to stormwater management for the Town that could potentially include retrofit treatment of existing outlets that also accommodates new land development.
APPENDIX A

BQRAP STORMWATER MANAGEMENT DESIGN GUIDELINES UPDATE

MARCH 2006
APPENDIX B

EXPECTED PHOSPHORUS REDUCTION BY STORMWATER TREATMENT
EXPECTED PHOSPHORUS REDUCTION BY STORMWATER TREATMENT

1. INTRODUCTION

As part of the PCP advancement project, the stormwater guidelines for the BQRAP Implementation Area are being updated.

In part, the new guidelines are intended to emphasize the benefits of stormwater management in helping reduce phosphorus inputs to the Bay of Quinte and its tributary watercourses. As well, PCP preparation for urban areas fronting the Bay (per BQRAP Recommendation #23) requires development of targets for phosphorus load reduction for stormwater. Information on what degree of phosphorus load reduction is possible through proven stormwater management techniques is useful for the target setting process.

XCG Consultants has undertaken a review of readily available research sources to provide a summary of typical or average observed phosphorus removal efficiency by stormwater management facilities.

2. SOURCES

The following sources of recent research results have been consulted:

- The ASCE’s urban stormwater best management practice (BMP) database, as available through www.bmpdatabase.org. A database query was carried out by XCG in September 2005.

- A recent ASCE report (ASCE et al., 2000) that provides an evaluation and summary of recent data on stormwater facility performance, primarily for end-of-pipe stormwater retention ponds and wetlands.

- Correspondence from Mr. Tim Van Seters of Toronto Region Conservation Authority, consisting of draft tables summarizing performance for seven facilities in the TRCA watershed area that were investigated as part of the Province’s SWAMP program. These tables were provide in a draft form and are still under review by TRCA as part of preparation a summary report expected to be available in early 2006.

With respect to the ASCE database and report, it should be noted that the ASCE information represents a comprehensive compilation and consolidation of research results from various researchers throughout North America, including some of the Ontario SWAMP results.
3. **SUMMARY OF FINDINGS:**

The attached table provides summary of observed total phosphorus (TP) removal efficiencies for individual facilities as taken from the ASCE sources.

In general, the ASCE sources indicate a wide range of observed TP removal in stormwater facilities, with values ranging from less than 10% to over 80%. The majority of observed facility efficiencies are in the range of 30% to 80%.

The TRCA’s SWAMP data summary similarly indicates a wide range of TP removal efficiency, from 22% to as high as 87%. The arithmetic average of all reported TP removal efficiencies is approximately 60% over all seasons; 67% in summer/fall; 54% in winter/spring.

4. **CONCLUSION**

Based on this review of summary information, it appears reasonable to assume for planning purposes that end-of-pipe stormwater management facilities such as settling ponds and tanks, are capable of long-term average TP load reduction of 50% to 60%. A conservative value of 50% is recommended for use in PCP development in the BQRAP area.

5. **REFERENCES CITED**


Toronto Region Conservation Authority, 2005. Draft summary tables of performance of seven stormwater facilities in the TRCA jurisdictional area, as provided by Mr. Time Van Seters of TRCA on September 27, 2005 to XCG Consultants.
<table>
<thead>
<tr>
<th>SWM FACILITY</th>
<th>LOCATION</th>
<th>TYPE</th>
<th>PP Volume m³</th>
<th>Surface Area ha</th>
<th>RECLAIMED LOAD REMOVALS (in mg/m²)</th>
<th>LOAD REMOVALS (in mg/m²)</th>
<th>INFORMATION/EMAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Debary Detention with Filtration Pond</td>
<td>Debary, FL, USA</td>
<td>Retention pond (wet)</td>
<td>1,410</td>
<td>99%</td>
<td>TSS 81% Pb 50% Cu 70% Zn 90%</td>
<td>TSS 81% Pb 50% Cu 70% Zn 90%</td>
<td></td>
</tr>
<tr>
<td>2 The Tanger Office Pond</td>
<td>Tampa, FL, USA</td>
<td>Retention pond (wet)</td>
<td>2,006</td>
<td>71% to 94%</td>
<td>65% to 50% 4% to 6% TSS 97% Pb 80% Zn 85%</td>
<td>TSS 97% Pb 80% Zn 85%</td>
<td></td>
</tr>
<tr>
<td>3 Tower Creek Detention Basin</td>
<td>Ann Arbor, MI, USA</td>
<td>Retention pond (wet)</td>
<td>14,495</td>
<td>27%</td>
<td>TSS 65% Pb 4% Cu 2% Zn 75%</td>
<td>TSS 65% Pb 4% Cu 2% Zn 75%</td>
<td></td>
</tr>
<tr>
<td>4 The Swartie Meto She</td>
<td>Ballinas, WA, USA</td>
<td>Retention pond (wet)</td>
<td>4</td>
<td>3%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>5 Lake Ridge Detention Pond</td>
<td>Woodbury, MI, USA</td>
<td>Retention pond (wet)</td>
<td>2,467</td>
<td>0.4%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>6 Phantom Lake Pond C</td>
<td>Bellevue, WA, USA</td>
<td>Retention pond (wet)</td>
<td>6</td>
<td>37%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
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</tr>
<tr>
<td>7 Midtown Basin Detention Pond</td>
<td>Maplewood, MN, USA</td>
<td>Retention pond (wet)</td>
<td>15,282</td>
<td>2.2%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>8 Le Costa W1</td>
<td>Encinta, CA, USA</td>
<td>Retention pond (wet)</td>
<td>777</td>
<td>0.11%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
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</tr>
<tr>
<td>9 Silver Star Detention Pond</td>
<td>Orlando, FL, USA</td>
<td>Retention pond (wet)</td>
<td>1,448</td>
<td>6%</td>
<td>21% 4% 72% TSS 85% Pb 87%</td>
<td>TSS 85% Pb 87%</td>
<td></td>
</tr>
<tr>
<td>10 Silver Star Detention Pond</td>
<td>Orlando, FL, USA</td>
<td>Retention pond (wet)</td>
<td>1,268</td>
<td>65%</td>
<td>50% 19% 75% TSS 85% Pb 87%</td>
<td>TSS 85% Pb 87%</td>
<td></td>
</tr>
<tr>
<td>11 Lake Munsen</td>
<td>Tallahassee, FL, USA</td>
<td>Retention pond (wet)</td>
<td>1,248</td>
<td>95%</td>
<td>2% 6% 1% 72% TSS 85% Pb 87%</td>
<td>TSS 85% Pb 87%</td>
<td></td>
</tr>
<tr>
<td>12 Center/Spray Wetland</td>
<td>Woodbury, MN, USA</td>
<td>Retention pond (wet)</td>
<td>987</td>
<td>0.2%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>13 Center Ravine Detention Pond</td>
<td>Woodbury, MN, USA</td>
<td>Retention pond (wet)</td>
<td>987</td>
<td>0.2%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>14 Pinellas Park Detention Pond</td>
<td>Pinellas Park, FL, USA</td>
<td>Retention pond (wet)</td>
<td>13,392</td>
<td>10.8%</td>
<td>7% to 11% 25% to 60% 25% to 60% 25% to 60% 25% to 60% 25% to 60%</td>
<td>25% to 60% 25% to 60% 25% to 60% 25% to 60% 25% to 60% 25% to 60%</td>
<td></td>
</tr>
<tr>
<td>15 Duval County Pond 1</td>
<td>Jacksonville, FL, USA</td>
<td>Retention pond (wet)</td>
<td>74</td>
<td>0.2%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
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<tr>
<td>16 Davis Bay</td>
<td>Fremont, CA, USA</td>
<td>Wetland - Channel with wetland bottom</td>
<td>73</td>
<td>0.6%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>17 Hippsled Retention Pond</td>
<td>Ann Arbor, MI, USA</td>
<td>Retention pond (wet)</td>
<td>26,503</td>
<td>0%</td>
<td>10% to 99% 25% to 62% 0% to 25% 40% to 90% n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>18 Lakeside (L1), Runway Bay (R1)</td>
<td>Orlando, FL, USA</td>
<td>Retention pond (wet)</td>
<td>16,135</td>
<td>3%</td>
<td>8% 7% 53% 2% 3% 1% 72% TSS 85% Pb 87%</td>
<td>TSS 85% Pb 87%</td>
<td></td>
</tr>
<tr>
<td>19 Lake McCarson Wetland</td>
<td>Roselle, MN, USA</td>
<td>Wetland - Channel with wetland bottom</td>
<td>74,192</td>
<td>5.8%</td>
<td>60% 50% 70% 30% 64%</td>
<td>60% 50% 70% 30% 64%</td>
<td></td>
</tr>
<tr>
<td>20 Lake McCarson Sedimentation Basin</td>
<td>Roselle, MN, USA</td>
<td>Retention pond (wet)</td>
<td>3,454</td>
<td>1%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>21 Weavery Retention Basin</td>
<td>Lansing, MI, USA</td>
<td>Retention pond (wet)</td>
<td>74</td>
<td>0%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>22 Central Park Wet Pond</td>
<td>Austin, TX, USA</td>
<td>Retention pond (wet)</td>
<td>7,731</td>
<td>5.4%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
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<td></td>
</tr>
<tr>
<td>23 Shadyne Ridge Retention Pond</td>
<td>Suwanee, GA, USA</td>
<td>Retention pond (wet)</td>
<td>16,135</td>
<td>0.9%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
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</tr>
<tr>
<td>24 Coolock Bay Wet pond</td>
<td>Roskin, FL, USA</td>
<td>Retention pond (wet)</td>
<td>74,192</td>
<td>5.8%</td>
<td>60% 50% 70% 30% 64%</td>
<td>60% 50% 70% 30% 64%</td>
<td></td>
</tr>
<tr>
<td>Commonwealth South Central</td>
<td>Tallahassee, FL, USA</td>
<td>Retention pond (wet)</td>
<td>3,454</td>
<td>1%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
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<td></td>
</tr>
<tr>
<td>26 Stormwater facility</td>
<td>Tallahassee, FL, USA</td>
<td>Retention pond (wet)</td>
<td>74,192</td>
<td>5.8%</td>
<td>60% 50% 70% 30% 64%</td>
<td>60% 50% 70% 30% 64%</td>
<td></td>
</tr>
<tr>
<td>27 Shop Creek Wetland (50-54)</td>
<td>Aurora, CO, USA</td>
<td>Wetland - Channel with wetland bottom</td>
<td>74,192</td>
<td>5.8%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>28 Shop Creek Pond (50-54)</td>
<td>Aurora, CO, USA</td>
<td>Retention pond (wet)</td>
<td>5,649</td>
<td>5%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>29 Phantom Lake Pond A</td>
<td>Bellevue, WA, USA</td>
<td>Retention pond (wet)</td>
<td>1,268</td>
<td>90%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
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</tr>
<tr>
<td>30 Phantom Lake Pond B</td>
<td>Bellevue, WA, USA</td>
<td>Retention pond (wet)</td>
<td>1,268</td>
<td>95%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>31 Phantom Lake Pond C</td>
<td>Bellevue, WA, USA</td>
<td>Retention pond (wet)</td>
<td>1,268</td>
<td>95%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>32 Phantom Lake Pond D</td>
<td>Bellevue, WA, USA</td>
<td>Retention pond (wet)</td>
<td>1,268</td>
<td>95%</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td>n/a n/a n/a n/a n/a n/a</td>
<td></td>
</tr>
<tr>
<td>33 Lake Ely</td>
<td>Glen Elgin, IL, USA</td>
<td>Retention pond (wet)</td>
<td>55,507</td>
<td>8%</td>
<td>2% to 6% 8% to 24% 50% to 64% 8% to 24% 50% to 64% 77% to 86% 76% to 86%</td>
<td>76% to 86%</td>
<td></td>
</tr>
</tbody>
</table>