Best Practices:
Municipal Wastewater Treatment Plant Bypass and Spill Prevention & Reporting in the Grand River Watershed

Prepared by:

Grand River Municipal Water Managers Working Group

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TABLE OF CONTENTS

Statement of Intent i

Executive Summary ii

1. Introduction 6

1.1. Background 7

2. Spills and Bypasses in the Grand River Watershed 2002-2006 11

2.1. Municipal Water Managers – Next Steps 13

3. Implications of Spills and Bypasses to The Grand River 13

4. Best Practices 17

4.1. Best Practices for Data Collection and Information Management 17

4.2. Best Practices for Municipalities 21

4.3. Best Practices for the Ministry of the Environment 24

4.4. Best Practices for the Grand River Conservation Authority 25

4.5. Wastewater Treatment Plant Performance Evaluations 26

4.5.1. Background 26

4.5.2. Case Study: City of Guelph 28

4.5.3. Summary 29

Appendix A: Municipal Water Managers Working Group Membership 30

Appendix B: List of Participating Municipalities 31

Appendix C: Municipal Water Managers Working group: Guiding Principles 34

Appendix D: Review of Relevant Legislation and Definitions 35

Appendix E: Downstream Notification Procedure. Ministry of the Environment's Non-Standard Procedure for Sewage Bypasses and Spills in the Grand River Watershed 39

Appendix F: List of Wastewater treatment plants and Corresponding Downstream Users 42

Appendix G: Step Feed 44

STATEMENT OF INTENT

Recent spills and bypasses from municipal sewage infrastructure have created concern among watershed water users. Consequently, the Ministry of the Environment (Ministry) requested that the Municipal Water Managers Working group develop a plan to reduce the frequency and severity of sewage spills and bypasses in the watershed. This report summarizes the discussions and contributions of group members. The group is comprised of senior managers of municipal water and wastewater operations, the Ministry and the Grand River Conservation Authority (GRCA). The GRCA chairs the group and facilitates discussion on issues that go beyond municipal boundaries.

The report was a collaborative effort by 12 watershed municipalities that own and operate sewage works (including wastewater treatment plants and sewage conveyance infrastructure such as pumping stations and sewers), the Technical Services Division and Guelph District Office of the Ministry and the GRCA.

The intent of this report is to identify best practices for watershed municipalities, the Ministry and the GRCA to prevent or better respond to spills and bypasses in the watershed. This report is not intended to replace any provincial or municipal regulatory tool.

The members of the working group take sewage spills and bypasses seriously. They acknowledge that they are undesirable and, under certain circumstances, can affect the health of the river. Working group members have committed to improve communication and implement best practices to reduce the frequency and severity of spills and bypasses in the watershed.

Sandra Cooke
Chair, Municipal Water Managers Working Group
June 3, 2009

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EXECUTIVE SUMMARY

Over the past few years, bypasses or spills from municipal wastewater treatment plants and collection systems in the Grand River watershed have risen in the awareness of water users and the media. There is increased concern of the potential impacts these events may have on river water quality and especially on drinking water. This issue was presented to the Municipal Water Managers Working group in the fall of 2007 by the Ministry of the Environment (Ministry).

The working group is made up of senior managers of municipal water and wastewater services of watershed municipalities that own or operate wastewater infrastructure. The Ministry is also a member of the group, which is chaired by the Grand River Conservation Authority. This group meets regularly to discuss watershed issues such as the assimilative capacity of the rivers to receive wastewater, nonpoint source pollution management, water supply, spill notification and wastewater bypasses in the watershed.

A commitment was made by the working group to discuss the issue and document best practices with the aim to reduce the frequency and severity of spill and bypass events in the watershed.

The Ministry prepared a report that summarized the general causes of spills and bypasses in the watershed between 2002 and 2006. The report was based on the information in the Ministry's information management system. The causes of spills and bypasses documented in the report included: weather-related (infiltration/inflow); power failure; equipment failure; maintenance/repairs; damaged/blocked sewers; and others of unknown causes. The Ministry's report formed the basis for the discussions by working group members.

This report is the product of the discussions among group members and documents the Best Practices for all agencies involved.

A review of the Ministry's report highlighted the need for improved understanding of the implications of sewage spills and bypasses in the watershed; improved information management and data collection; better communication among the Ministry, wastewater treatment plant operators, municipalities and Grand River Conservation Authority; and a need for implementing best practices for improved management of sewage in the watershed.

The water managers working group members agreed that not all bypasses and spills affect river water quality. Raw sewage is of much higher concern to downstream municipal users than sewage that has undergone partial tertiary (advanced) treatment. Further, the volume, the circumstances under which a spill or bypass occurred such as the type of event (i.e. wet weather versus dry weather) and timing of the event (e.g. spring versus summer) and proximity to drinking water intakes must be taken into account when assessing the impact of a spill or bypass on a receiving water body. Therefore, an analysis was done to determine which types of bypasses are of higher concern. Health Unit staff were also consulted to confirm which bypasses and spills warrant higher concern. Bypasses of higher concern include those that discharge unchlorinated /disinfected raw or primary sewage. Further analysis of the Ministry's data illustrated that of the 136 bypass and spill events between 2002 and 2006, only one-quarter (34) of the events were deemed to be of

higher concern. Most of these bypasses were caused by large amounts of water flowing into the sewer system during wet weather such as snowmelt or heavy rains which overwhelmed the treatment plants causing bypasses. This is referred to as high inflow and infiltration into the wastewater treatment plant. Consequently, aggressive inflow and infiltration programs must be put in place to reduce the effects of wet weather on wastewater treatment plants. Additional best practices include backup-power at all wastewater treatment plants and pumping stations that are close to water courses. Back-up equipment should also be readily available.

It was recognized early in the process that improved information management is critical to clearly communicate accurate and relevant information to all downstream municipal users. As a result, a key outcome of this process was the development of the *Sewage Discharge Notification Form* to standardize the information reported to and collected from the Ministry. Better information will allow Water Managers to make more informed decisions. Further, the Ministry's *Non- Standard Procedure for Reporting Spills and Bypasses in the Grand River Watershed* was revised to reflect the information in the new form and actions are underway to accommodate this information in the Ministry's internal information management system.

Bypass and spill events can also be caused by limitations in the design, administration, maintenance or operation of a wastewater treatment plant. These can be overcome by new or improved operating techniques or approaches. The City of Guelph demonstrated that a wastewater treatment plant optimization program raised the overall performance of the plant. By implementing the Composite Correction Program, Guelph improved its effluent quality and reduced the frequency and volume of bypasses substantially. Haldimand County has also started a wastewater treatment performance evaluation on the Dunnville and Caledonia wastewater treatment plants with the aim to improve effluent quality and reduce the frequency of spills and bypasses. A wastewater treatment plant performance evaluation pilot for the watershed is a key recommendation in this report.

In summary, heightened awareness of spills and bypasses in the Grand River watershed and their potential impact on downstream users has generated a great deal of discussion among Municipal Water Managers of the Grand River watershed. Although it is not feasible to expect that all bypasses or spills will be eliminated in the watershed, there is consensus that effort must be made by all agencies to improve information management and communication and implement best practices to reduce the frequency and severity of these events.

Many actions have already been completed as a result of many meetings and the preparation of this report. Many of the issues and concerns that were raised regarding spills and bypasses in the watershed stemmed from inconsistent collection, interpretation and communication of information. The following lists the recommendations that have been made under two key objectives that were defined through this process:

Objective 1: Improve information management and communication

R**ecommendation 1.** All wastewater treatment plant and wastewater collection system operators should start to use the draft *Sewage Discharge Notification Form* following its introduction at an operator training workshop in the fall of 2009.

Recommendation 2. The Ministry of the Environment should make provisions in their procedures and their Integrated Divisional System (IDS) for accommodating the additional information collected and reported by wastewater treatment plant and sewage conveyance operators using the new Sewage Discharge Notification Form.

Recommendation 3. A workshop should be held for wastewater treatment plant and wastewater collection system operators, municipal staff and interested Health Unit staff to review spills and bypass reporting procedures for the Grand River Watershed including the draft *Sewage Discharge Notification Form*. An annual workshop for wastewater plant and collection operators should be considered to promote training and best practices.

Recommendation 4. The new reporting procedures, including the Ministry's updated N*on-Standard Procedure for Reporting Spills and Bypasses in the Grand River watershed* and the *Sewage Discharge Notification Form* should be reviewed annually to evaluate its effectiveness with all watershed municipalities and agencies. The annual review can be facilitated by the Water Managers working group.

Recommendation 5. The current closure notification procedures for municipalities and wastewater treatment plant operators should be reviewed with the Ministry and if determined feasible, a new closure notification procedure be developed as part of the N*on-Standard Procedure for Reporting Spills and Bypasses in the Grand River* watershed.

Recommendation 6. Municipalities that own or operate wastewater treatment plants, drinking water treatment plants and wastewater collection systems should review internal communication procedures to ensure that there is a consistent approach for documenting and communicating relevant information on spills and bypasses.

Recommendation 7. Progress made in implementing the best practices outlined in this report should be reported annually. The Water Managers Working Group for the Grand River Watershed can be the forum for reporting progress and sharing information on Best Practices.

Objective 2: Implement Best Practices

Recommendation 8. Watershed municipalities should implement aggressive programs to reduce inflow and infiltration to lower the number of weather-related wastewater treatment plant bypasses.

Recommendation 9. Back-up power and equipment or appropriate procedures should be available at all pump stations and wastewater treatment plants.

Recommendation 10. Watershed municipalities should give appropriate consideration to prioritizing capital infrastructure renewal projects that would benefit the Grand River and its tributaries.

Recommendation 11. The Grand River Conservation Authority develop a time-of-travel model to improve the estimated travel times under steady-state conditions for watershed municipalities to help them better plan to deal with spills and bypasses.

Recommendation 12. Watershed municipalities should conduct regular wastewater treatment plant infrastructure and performance reviews with the end goal of achieving good, economical effluent and a reduction in the frequency and severity of bypasses.

Recommendation 13. The Ministry of the Environment should encourage and support a wastewater treatment plant performance evaluation pilot for the Grand River watershed.

1. INTRODUCTION

The Grand River watershed covers approximately 6800 square kilometers and is home to a growing population of close to one million people. There are five major urban areas -- Kitchener, Waterloo, Cambridge, Guelph and Brantford – as well as many towns and villages such as Grand Valley, Drayton, Arthur, Elora, Fergus, Elmira, Paris, St George, Caledonia, Cayuga and Dunnville. The watershed is also home to some of the most intensively farmed lands in the province.

The Grand River system is highly valued by watershed residents for its fishery, recreational, natural heritage and cultural amenities. The people of the Grand River watershed depend on the river for two essential functions:

- the Grand and several of its tributaries receive treated effluent from 28 municipal wastewater treatment plants; and
- it is a source for drinking water supplies for municipal water systems serving about 600,000 people.

Because of those dual uses, municipalities and residents are particularly sensitive to the problems of spills and sewage treatment plant bypasses. Concerns have also been raised about the impact of spills and bypasses on the natural environment. See Figure 1 for the locations of sewage treatment plants and drinking water treatment plants in the watershed.

In the fall of 2007, the Ministry approached the Municipal Water Managers Working group to develop a document of best practices to reduce spills and bypasses from municipal infrastructure to the Grand River system. The working group is made up of senior managers of municipal water and wastewater services. The Ministry is also a member and it is chaired by the Grand River Conservation Authority (GRCA) [See Appendix A for list of members; Appendix B for list of participating municipalities]. Staff of the Ministry drafted a report that summarized the general causes of spills and bypasses in the watershed [See Section 3.0: Spills and Bypasses in the Grand River Watershed]. The report formed the basis for discussions by working group members on the causes of spills and bypasses and proposed best practices to reduce their occurrence. Working group members drafted the Guiding Principles [See Appendix C] as a foundation for this report.

The intent of this report is to:

- improve information management and communication among municipalities, the Ministry and the GRCA by using common language and terminology. This should reduce uncertainty in the information being communicated to downstream municipalities and improve the response of drinking water treatment plant operators to spills and bypasses; and
- summarize best practices for the agencies involved including municipalities, the Ministry and the GRCA to prevent or better respond to spills and bypasses.

1.1. BACKGROUND

Wastewater assimilation is a significant use of the Grand River and its tributaries. There are 28 municipal wastewater treatment plants (Figure 1; Table 1) that discharge treated effluent into the Grand River and several tributaries: the Speed, Conestogo, and Nith rivers as well as Fairchild Creek.

Of the 28 plants, 15 plants have more advanced tertiary treatment; 9 plants have secondary or basic treatment. There are four municipal lagoons that discharge seasonally. Each wastewater treatment plant is regulated by the Ministry. Each wastewater treatment plant is issued a Certificate of Approval which documents the effluent quality criteria for the plant as well as other operational requirements such as monitoring. Generally, Certificates of Approval allow *bypasses* of wastewater in 'emergency conditions'. An overview of the pertinent regulations and guidelines for wastewater treatment plants is in Appendix D.

Bypass, spill and overflows are terms used to describe events that result in sewage reaching natural water bodies:

> A wastewater treatment plant ***bypass*** means the bypassing of a process within a sewage treatment works with the associated sewage flows being returned to the sewage treatment flow and discharging to the environment through the final effluent outfall of the sewage treatment plant.
>
> The Environmental Protection Act defines a ***spill*** as a discharge of a pollutant from a structure, vehicle or other container into the natural environment that is abnormal in quality or quantity.[1] Sewage discharged to the environment from overflows at pumping stations or from blocked sewers are considered a spill.
>
> Wastewater ***overflows*** is a term used to describe a discharge to the environment from a sanitary sewer collection system or from a sewage treatment works at a location other than the final effluent outfall or downstream of the routine sampling point for the final effluent.
>
> Depending on the circumstances, both *bypasses* and *overflows* can be considered spills under the Environmental Protection Act (EPA) as they can meet the legal definition in Part X of the Act. In other circumstances, a bypass or an overflow may not be considered a spill under the EPA as the discharge does not meet the legal definition. Despite the legal definition, the term *spill* is commonly used to refer to discharges from wastewater treatment plants and systems. In this report, the term *spill* is used in conjunction with *bypasses* to reflect the common usage of the word not the legal definition.

Spills and bypasses can occur in dry or wet weather conditions for various reasons. Spills may occur in both dry and wet weather conditions as a result of accidents, human error or equipment problems.

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[1] Government of Ontario. 1990. Environmental Protection Act, Part X.

When a bypass occurs, wastewater effluent is diverted past certain treatment processes to safeguard the plant and the community it serves. The bypass of wastewater effluent is permitted when the inflow of sewage and excess water exceed the design capacity of the treatment plant. An operator can also start a bypass when there is a local public health benefit such as reducing sewage backups into local homes. Wet-weather bypasses usually occur when the treatment plant is inundated with extremely high volumes of water from snowmelt or rain. Bypasses that occur during dry conditions are usually caused by technical, maintenance or operational disruptions. Generally, wet weather bypasses pose a lower risk to the receiving river than dry weather bypasses because the sewage is diluted due to the higher flows.

There are no combined sanitary sewer-storm sewer systems in the watershed. In the Grand River watershed, the sanitary sewer systems are designed to carry only wastewater to the wastewater treatment plants. Stormwater systems are designed to carry only stormwater to ditches and streams. In other parts of Ontario, some communities continue to have combined sewer systems which carry both wastewater and stormwater to a municipal wastewater treatment plant. These combined systems have provisions to divert raw sewage and stormwater directly to rivers (or lakes) during wet weather when there is too much stormwater.

Even though there are no combined sanitary-sewer systems in the Grand River watershed, some property owners have made unauthorized connections of their own stormwater systems (sump pumps, downspouts, footing and foundation drains, etc.) to the sanitary sewer system. In these communities, the increase in stormwater to the municipal wastewater system can exceed the capacity of the wastewater treatment plant. Further, there can be a significant influx of groundwater into aging sewer mains with groundwater infiltrating into the sanitary system through cracks and loose joins in the pipes. In some circumstance, such as after a major storm or during the spring runoff, the result is a heavy load of water coming into a sewage treatment plant. The high volumes can stretch or exceed the capacity of the plant. Operators may be faced with bypassing some of the treatment processes to route the water to its receiving stream to protect the plant, the sewage infrastructure and private properties. This results in a bypass that is reported to the Ministry.

All wastewater treatment plant bypasses or spills are reported to the Ministry of the Environment's Spills Action Centre [1-800-268-6060]. In the event of a spill or bypass, the Spills Action Centre (SAC) has a procedure for contacting all downstream users such as drinking water treatment plants and other relevant agencies (e.g. GRCA, health units, Environment Canada and Health Canada) to ensure that information is transferred in a timely manner. The procedure, the Non-Standard Procedure for Sewage Bypasses and Spills in the Grand River Watershed [See Appendix E], describes who needs to be informed and in what order they should be contacted for all events bypass or spill events in the watershed.

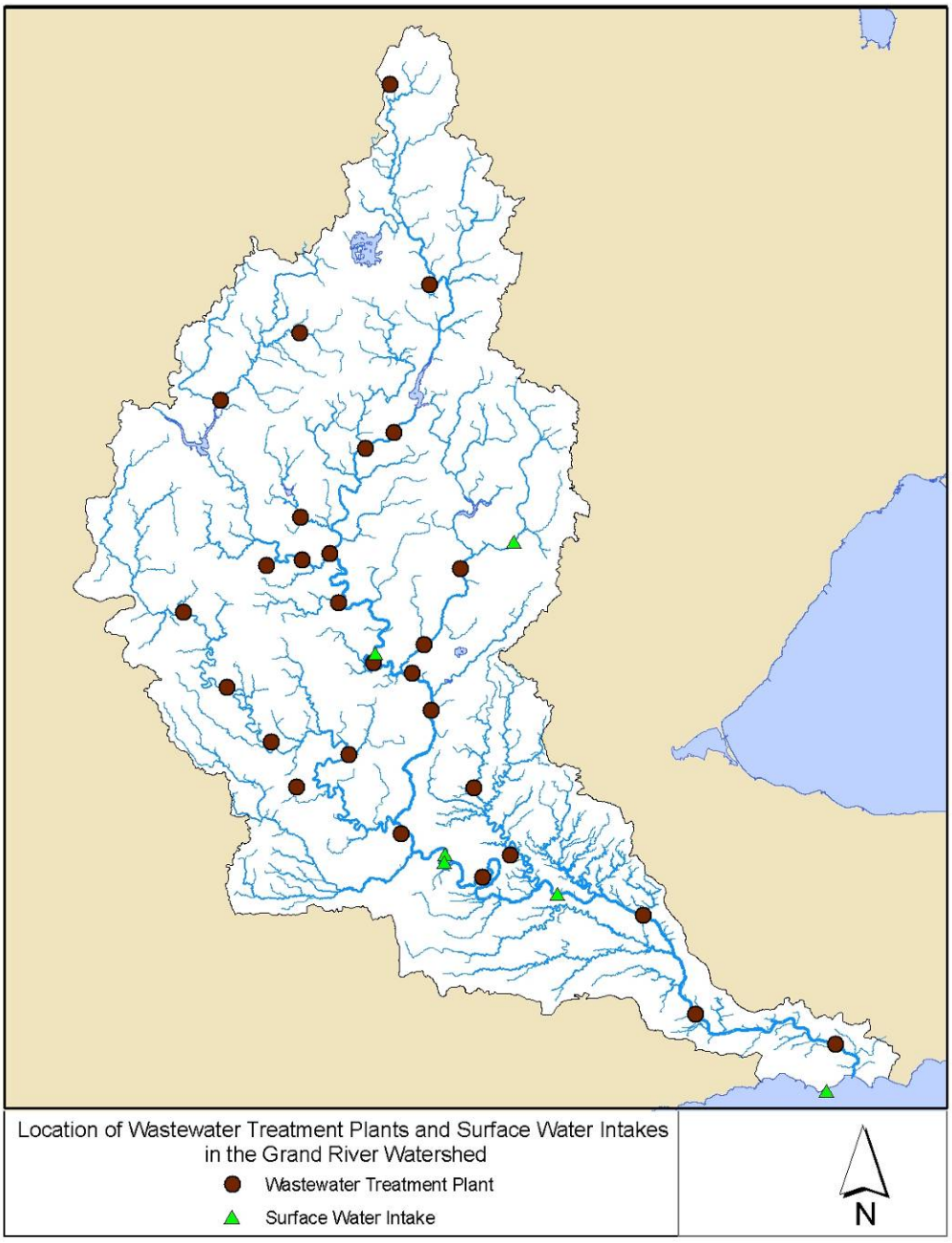

Figure 1. The location of municipal drinking water intakes and municipal wastewater treatment plants in the Grand River watershed.

Table 1. List of Municipalities operating wastewater treatment plants in the Grand River watershed.

MUNCIPALITY	PLANT NAME	OPERATOR	Water Course
Wellington North	Arthur WPCA	Private operator	Conestogo River
City of Brantford	Brantford WPCP	Private operator	Grand River
Centre Wellington	Elora WPCP	Municipal	Grand River
Centre Wellington	Fergus WPCP	Municipal	Grand River
County of Brant	Paris WPCP	Private operator	Grand River
County of Brant	St. George WPCP	Private operator	Fairchild Creek
County of Brant	Cainsville Lagoon	Private operator	Fairchild Creek
County of Oxford	Drumbo WPCP	Municipal	Nith River
County of Oxford	Plattsville Lagoon	Municipal	Nith River
Southgate	Dundalk Lagoon	Municipal	Foley Drain to Grand R.
East Luther Grand Valley	Grand Valley WPCP	Private operator	Grand River
City of Guelph	Guelph WPCP	Municipal	Speed River
Haldimand	Cayuga WPCP	Private operator	Grand River
Haldimand	Dunnville WPCP	Private operator	Grand River
Haldimand	Caledonia WPCP	Private operator	Grand River
Mapleton	Drayton Lagoon	Private operator	Conestogo River
Region of Waterloo	Elmira WPCP	Private operator	Canagagigue Creek
Region of Waterloo	Galt WPCP	Private operator	Grand River
Region of Waterloo	Kitchener WPCP	Private operator	Grand River
Region of Waterloo	Baden/New Hamburg WPCP	Private operator	Nith River
Region of Waterloo	Preston WPCP	Private operator	Grand River
Region of Waterloo	Waterloo WPCP	Private operator	Grand River
Region of Waterloo	Hespeler WPCP	Private operator	Speed River
Region of Waterloo	St. Jacobs WPCP	Private operator	Conestogo River
Region of Waterloo	Wellesley WPCP	Private operator	Nith River
Region of Waterloo	Ayr WPCP	Private operator	Nith River
Region of Waterloo	Alt Heidelberg Estates	Private operator	Heidelberg Creek
Region of Waterloo	Conestogo Golf Course Estates	Private operator	Grand River

[Appendix F lists the wastewater treatment plants and corresponding downstream users]

2. SPILLS AND BYPASSES IN THE GRAND RIVER WATERSHED 2002-2006

Staff at the Ministry prepared a report that described the frequency and causes of 136 spills/bypasses in the Grand River watershed between 2002 and 2006. The following five points below highlight the main causes of spills and bypasses from municipal infrastructure, including wastewater treatment plants, pumping stations, and sewer mains:

1. Equipment Failure or Lack of Back-up Power

Thirty percent of all of the recorded spills and bypasses were from equipment failures or lack of back-up power.

2. Weather-related

Thirty-two percent of the spills and bypasses were weather related and a result of high inflow and infiltration into the sewer systems.

3. Maintenance/repairs

Maintenance and repairs account for 10 percent of the total number of events summarized in the Ministry's report. It should be noted that scheduled maintenance activities and equipment shut-downs have to be reported to the Ministry and therefore were included in the Ministry's summary report.

4. Damaged block sewers

Damaged or blocked sewers accounted for 10 percent of the total spills and bypasses.

5. Other events

A specific cause for 18 percent of the reported spills and bypass could not be determined using the information in the ministry's information management system.

Figures 2 and 3 are from the report '*Spills and Bypasses in the Grand River Watershed, 2002-2006'*. They illustrate the main causes of spills and bypasses in the Grand River watershed. Figure 2 includes the bypasses from the Cayuga wastewater treatment plant which experiences significant inflow and infiltration which has historically resulted in frequent bypasses while Figure 3 illustrates the causes of spills and bypasses in the watershed excluding the Cayuga wastewater treatment plant. Even with the removal of the Cayuga events, the primary cause of spills and bypasses is still weather-related.

It is important to note that Haldimand County has since installed an equalization tank to contain excess wastewater/ stormwater at the Cayuga wastewater treatment plant which has resulted in a significant reduction in bypass events at the plant[2].

[2] P. Mungar, Haldimand County, pers. comm.

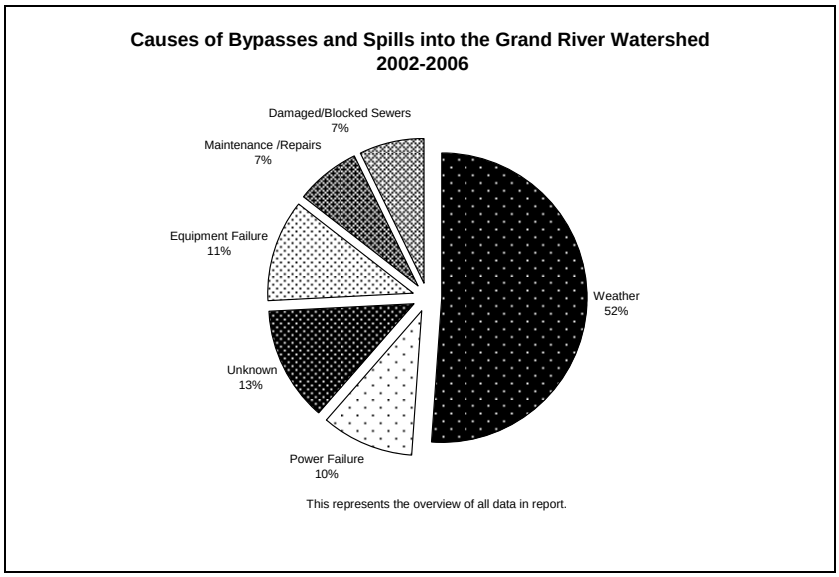

Figure 2. Causes of bypasses and spills in the Grand River Watershed 2002-2006 . Figure from Ministry of the Environment's report: *Spills in the Grand River Watershed* (2007)

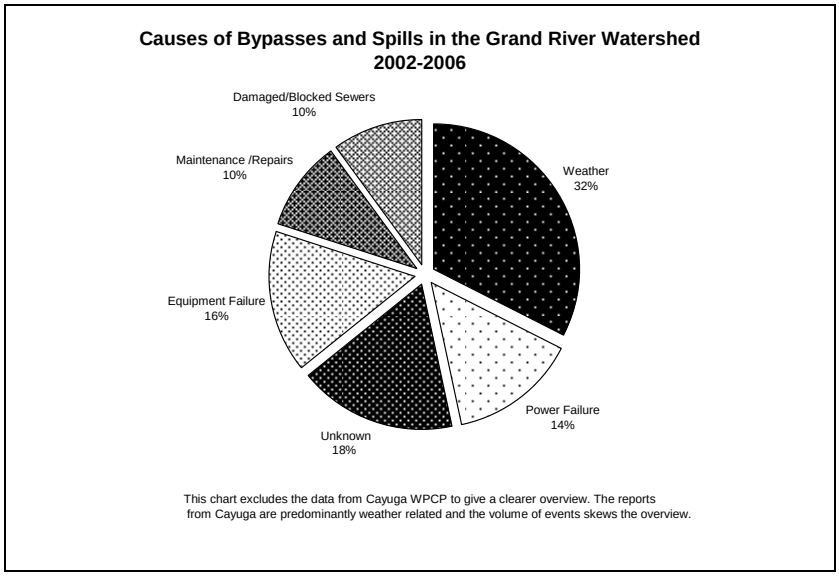

Figure 3. Causes of bypasses and spills in the Grand River Watershed 2002-2006 (excluding bypasses from the Cayuga WWTP) . Figure from Ministry of the Environment's report: *Spills in the Grand River Watershed* (2007)

2.1. MUNICIPAL WATER MANAGERS – NEXT STEPS

The ministry report gave a general indication of the causes of bypasses and spills in the Grand River watershed but it did not provide an assessment of the relative risk they had on downstream users. A more detailed assessment of the ministry's data was needed to determine the relative risk of these events. The working group members agreed to provide expert judgment to determine the relative risk of the various types of bypasses and spills based on the type of contaminant that was discharged. As a result, the section '*Implications of Spills and Bypasses to the Grand River*' was prepared.

It became clear that common terminology was required to promote consistent understanding of the information reported to and collected by the Spills Action Centre. As a result of this finding, staff at the ministry reviewed the *Non-standard Procedure for Reporting Spills and Bypasses in the Grand River watershed*. Although operators were diligent in notifying the Ministry of the Environment of any spills and bypasses, it became apparent that there was not a consistent approach for reporting the appropriate information to the Ministry. As a result, the information in the Ministry's information management system was sometimes incomplete. Consequently, the focus of many working group meetings was on developing a more consistent reporting process with clearly defined terminology to improve information management and communication and identify best practices or approaches that can be implemented to reduce the frequency and severity of spills and bypasses in the watershed.

3. IMPLICATIONS OF SPILLS AND BYPASSES TO THE GRAND RIVER

A comprehensive study of the impacts of spills and bypasses on a large river such as the Grand River would be cost prohibitive and likely yield limited results. However, it is important to understand the relative risk or level of concern from different types of bypasses or spills so that downstream users can take appropriate action. Each spill or bypass to the Grand River has unique circumstances that require specific information to allow water managers to make informed decisions. They need to know:

- volume;
- the type of contaminant (i.e. raw sewage versus tertiary treated effluent);
- the environmental conditions (i.e. wet vs dry weather, summer or springtime); and
- proximity to drinking water intake;

To get a greater understanding of the consequences of spills and bypasses, further analysis was done of the ministry's information to determine the relative risk or level of concern to downstream users. The following section describes this analysis.

The ministry collects information in its Integrated Divisional System (IDS) which is a comprehensive information management system used by many divisions. In the IDS, there are

numerous categories describing the type of contaminants spilled or bypassed (e.g. Contaminant Type; see Table 2). Information on the volume of sewage discharged, when available, is also kept in IDS.

A preliminary analysis of the Ministry's data records estimated that the total volume of sewage bypassed or spilled between 2003 and 2005 was approximately 200,448 m^3. This volume represents less than 0.01% of the total river volume flowing through Brantford over the same time period. Although this analysis indicates that the total volume of sewage bypassed during this time period was extremely low, additional information such as environmental conditions and proximity to drinking water intakes is needed to make informed water management decisions. Further, more detailed information, such as identifying the type of sewage being discharged as opposed to the treatment process being bypassed, would assist with understanding the relative risk posed by these events. Therefore, the information in the ministry's report was then reorganized by the type of contaminant that was discharged in each event and professional judgment was used to determine which events posed higher concern to downstream users. The categories were assigned rankings of 'Low', 'Moderate' or 'High' Level of Concern based on the professional judgment of working group members. Table 3 lists the 10 categories of sewage bypasses by contaminant type, the number of incidents that occurred in each category between 2002 and 2006, and the assigned Level of Concern. Figure 4 illustrates the number of bypasses or spills between 2002 and 2006 according to level of concern to the river and downstream users. Of the 136 events reported to the Spills Action Centre, 34 events (25%) were classified as having a higher level of concern to downstream water users. Most (102) events were of moderate or low concern.

Table 2. List of Contaminant Types in the Ministry's Information Management System (i.e. IDS) and their corresponding definition.

IDS* Contaminant Type	Definition
Sewage, Raw Unchlorinated	Sewage that has not undergone any treatment and is not chlorinated
Sewage, Raw Chlorinated	Sewage that has not undergone any treatment but is chlorinated
Sewage, Primary Unchlorinated	Sewage that has undergone primary treatment and is not chlorinated
Sewage, Primary Chlorinated	Sewage that has undergone primary treatment and is chlorinated
Sewage, Secondary Unchlorinated	Sewage that has undergone both primary and secondary treatment and is not chlorinated
Sewage, Secondary Chlorinated	Sewage that has undergone both primary and secondary treatment and is chlorinated
Sewage, Final Effluent Unchlorinated	Sewage that has undergone all treatment present at the plant with the exception of chlorination
Sewage, Final Effluent Chlorinated	Sewage that has undergone all treatment present at the plant including chlorination

*IDS – Integrated Divisional System [Ministry's Information Management System]

Table 3. Number of spill or bypass events according to type of contaminant that was discharged. Data from the report "Spills and Bypasses in the Grand River Watershed (2002-2006)". Note: the contaminant type categories in this table represent the information that was entered into the Ministry's information management system (e.g. IDS) between 2002 and 2006.

Bypass/Spill by Contaminant Type	No. of Events (2002-2006)	Events by Category (percentage)	Level of Concern*
Sewage, Raw Unchlorinated	18	13	High
Sewage, Primary Unchlorinated	1	1	High
Sewage, Raw Chlorinated	15	11	High
Sewage, Secondary Unchlorinated	3	2	Medium
Sewage, Primary Chlorinated	34	25	Medium
Sewage, Secondary	1	1	Low
Sewage, Secondary Chlorinated	43	32	Low
Sewage, Tertiary	3	2	Low
Sewage, Tertiary Chlorinated	3	2	Low
Sewage, Final Effluent Chlorinated	15	11	Low
TOTAL	**136**	**100**	

* as discussed and agreed to by Municipal Water Managers

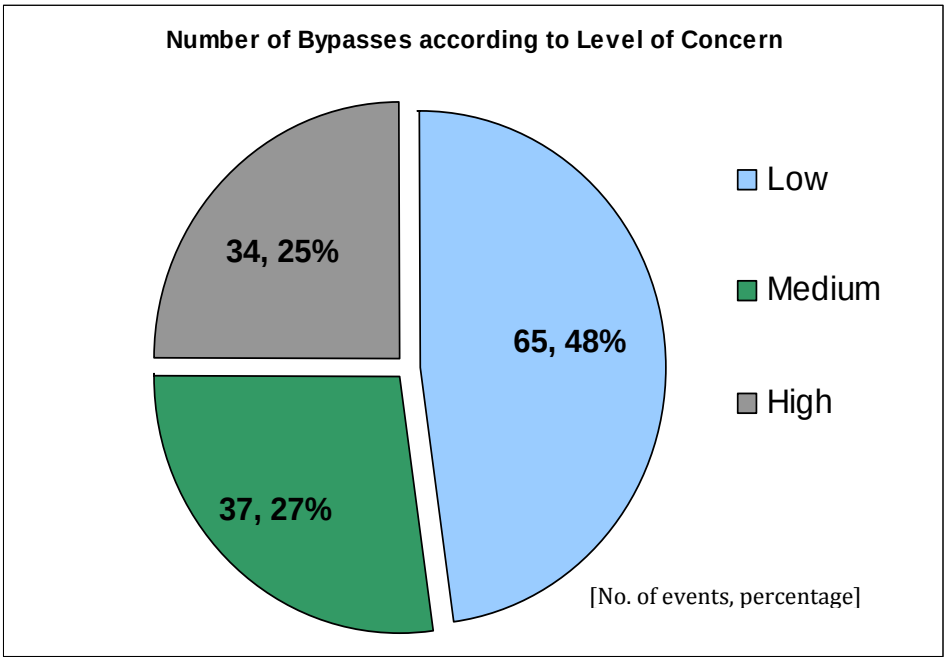

Figure 4. Number of bypasses and spills between 2002 and 2006 according to the level of concern to downstream users. Data from the Ministry of the Environment's report: *Spills and Bypasses in the Grand River Watershed (2002-2006).*

The records of the spills and bypasses considered to be of higher concern (34 events; Table 3), were categorized into their general causes (Table 4). The general causes of spills and bypasses were of higher concern was similar to the results of the ministry's report: many of the events were caused by weather. The second most frequent cause was damaged or blocked sewers discharging raw

sewage. Further inspection of the information revealed that while most (59%) of the events occurred at wastewater treatment plants, many (41%) occurred at pumping stations and sewer mains (Table 5). The prevalence of spills and bypasses at both wastewater treatment plants and in wastewater conveyance infrastructure highlight the need for best practices for all wastewater management facilities.

Table 4. Break down of the general causes of the bypasses/spills that are considered of higher concern.

Bypass / Spill by Cause	Number	Percent
Weather	12	35
Blocked Sewer	8	24
Unknown	5	15
Power Failure	5	15
Equipment Failure	3	9
Aging Infrastructure	1	3
Total	**34**	**100**

Table 5. Break down of the number of bypasses/spills from pumping stations, sewer mains or wastewater treatment plants that are of high concern.

Bypass /Spill by Facility	Number	Percent
Pumping Station	5	15
Sewer Main	9	26
WWTP	20	59
Total	**34**	**100**

This information helps to target best practices that can reduce the number of spills or bypasses of higher concern to downstream users. Most (12) were a result of weather; therefore, programs or best practices must be aggressively implemented to address infiltration and inflow.

One quarter of the events (9) were a result of power failure, equipment failure or aging infrastructure; having back up equipment and power on site would reduce the likelihood of these events.

This exercise illustrated the need for better information collection and transfer by both the operators reporting a spill or bypass and the Ministry. For example, 15% (5) of the bypasses considered high concern were as a result of unknown reasons. Improved and consistent notification procedures by both wastewater treatment plant operators and Spills Action Centre staff should eliminate this category in the future.

4. BEST PRACTICES

4.1. BEST PRACTICES FOR DATA COLLECTION AND INFORMATION MANAGEMENT

A need for improved information management was evident as a result of the analysis in the last section. Common terminology and a common understanding of this terminology is needed among all wastewater treatment plant operators, ministry and GRCA staff to ensure downstream users are notified with appropriate information for making water management decisions. Further, it was determined that there was no common procedure for reporting spills or bypasses by operators and municipal staff. Ministry staff reviewed the terminology used in their information management system (e.g. IDS) and their protocol: *Non-standard Procedure for Reporting Spills and Bypasses in the Grand River watershed.* Definitions for the IDS category 'Contaminant Type' are included in this report (see Table 2) and a **Sewage Discharge Notification Form** (see following page) was drafted for use by municipalities, the ministry and the GRCA. The following are key recommendations to improve information management and communication:

> **Recommendation 1.** All wastewater treatment plant and wastewater collection system operators should start to use the draft *Sewage Discharge Notification Form* following its introduction at an operator training workshop in the fall of 2009.
>
> **Recommendation 2.** The Ministry of the Environment should make provisions in their procedures and their Integrated Divisional System (IDS) for accommodating the additional information collected and reported by wastewater treatment plant and sewage conveyance operators using the new Sewage Discharge Notification Form**.**
>
> **Recommendation 3.** A workshop should be held for wastewater treatment plant and wastewater collection system operators, municipal staff and interested Health Unit staff to review spills and bypass reporting procedures for the Grand River Watershed including the draft *Sewage Discharge Notification Form*. An annual workshop for wastewater plant and collection operators should be considered to promote training and best practices.
>
> **Recommendation 4.** The new reporting procedures, including the Ministry's updated N*on-Standard Procedure for Reporting Spills and Bypasses in the Grand River watershed* and the *Sewage Discharge Notification Form* should be reviewed annually to evaluate its effectiveness with all watershed municipalities and agencies. The annual review can be facilitated by the Water Managers working group.

In addition to notifying downstream users of any spills and bypasses, municipalities are also required to notify the ministry and all downstream users when a particular event is over. Although closure notification is mandatory by each operator or municipality by the ministry, group members discussed the need for an alternate closure notification procedure and made the following recommendation:

> **Recommendation 5.** The current closure notification procedures for municipalities and wastewater treatment plant operators should be reviewed with the Ministry and if determined feasible, a new closure notification procedure be developed as part of the N*on-Standard Procedure for Reporting Spills and Bypasses in the Grand River* watershed.

Due diligence should be exercised by all agencies to collect and distribute relevant information regarding spill and bypass events. This includes information gathering and communication within each agency. Consequently, the following recommendation is made:

> **Recommendation 6.** Municipalities that own or operate wastewater treatment plants, drinking water treatment plants and wastewater collection systems should review internal communication procedures to ensure that there is a consistent approach for documenting and communicating relevant information on spills and bypasses.

To encourage the sharing of information and reporting on progress amongst working group members, the following recommendation is made:

> **Recommendation 7.** Progress made in implementing the best practices outlined in this report should be reported annually. The Water Managers Working Group for the Grand River Watershed can be the forum for reporting progress and sharing information on Best Practices.

Grand River Watershed Sewage Discharge Notification Form for Spills and Bypasses

Report to Spills Action Centre 1-800-268-6060	Date Time
Spills Action Centre Officer:	MOE Reference Number (IDS):
☐ Bypass ☐ Overflow	Is the discharge the result of planned maintenance?: ☐ Yes ☐ No
Event Type: ☐ Wet Weather ☐ Dry Weather	Plant rated capacity : Plant current flow:
Location/Facility:	Operator Name:
Municipality:	
Date of Discharge:	Time Discharge Started:
Discharge from Sewage Treatment Plant: ☐ Yes ☐ No If Yes identify process point in plant being bypassed: Plant process that bypass is returned to:	Discharge from Sewage Collection System: ☐ Yes ☐ No If Yes, where: ☐ Lift / Pump Station ☐ Manhole ☐ Sewer Main
Discharge Direct to Natural Environment: ☐ Yes ☐ No If Yes, provide details: Receiving Water Course:	Level of Treatment Sewage Received: ☐ Sewage, Raw ☐ Sewage, Primary ☐ Sewage, Secondary ☐ Sewage, Tertiary ☐ Sewage, Final Effluent
Chlorination: ☐ Yes ☐ No Other Disinfection: ☐ Yes ☐ No Type of Disinfection (i.e. UV):	
Describe Cause of Discharge: ☐ Weather ☐ Infiltration & Inflow ☐ Equipment failure ☐ Power failure ☐ Process Upset ☐ Exceed Capacity Design ☐ Blocked Sewer ☐ Other (describe):	
Downstream Notifications By Operator (List) :	
Initial Volume Spill or Bypass : ☐ Estimated Volume ☐ Measured Volume	
Action Taken by Operating Authority:	
Grab Samples Taken and Submitted: Date Time:	
Comments:	
Follow-up Notification	
Date Discharge Ended:	Time Discharge Ended:
Duration of Discharge:	Final Volume: ☐ Estimated ☐ Measured
Downstream Notifications by Operator: WHO / WHEN	
Updates/Corrections:	
Comments:	

Definitions	
Sewage, Raw	Sewage that has not undergone any treatment.
Sewage, Primary	Sewage that has undergone primary treatment.
Sewage, Secondary	Sewage that has undergone both primary and secondary treatment.
Sewage, Tertiary	Sewage that has undergone primary, secondary and usually advanced nutrient (e.g. nitrogen or phosphorus) removal.
Sewage, Final Effluent	Sewage that has undergone all treatment present at the plant.
Disinfection	Disinfection of wastewater substantially reduce the number of microorganisms in the water. Common methods of disinfection include ozone, chlorine and ultraviolet light.
Event	An occurrence(s) of a bypass or overflow separated by a period of more than 12 hours from another occurrence(s) (i.e. may have several occurrences within one event). Dry-weather flow is sewage flow resulting from both: • Sanitary sewage (combined input of industrial, domestic, and commercial flows); and • Infiltration and inflows from foundation drains or other drains occurring during periods with an absence of rainfall or snowmelt. Wet-weather flow is the combined sewage flow resulting from: • Sanitary sewage; • Infiltration and inflows from foundation drains or other drains resulting from rainfall or snowmelt; and • Stormwater generated by either rainfall or snowmelt that enters the combined sewer system.
Bypass	A wastewater treatment plant *bypass* means the bypassing of a process within a sewage treatment works with the associated sewage flows being returned to the sewage treatment flow and discharging to the environment through the final effluent outfall of the sewage treatment plant.
Plant Overflow	Wastewater treatment plant overflow means a discharge to the environment from a sewage treatment works at a location other than the final effluent outfall or downstream of the sampling point in the final effluent outfall.
Sanitary Sewer Overflow	A discharge to the environment from a sanitary sewer collection system.
Spill	As defined in Part X of the Environmental Protection Act: a discharge of a pollutant into the natural environment, from or out of a structure, vehicle or other container and that is abnormal in quality or quantity in light of all the circumstances of the discharge.

4.2. BEST PRACTICES FOR MUNICIPALITIES

Responsibility for managing wastewater in the watershed is in the hands of both upper tier and lower tier municipalities. This includes managing both sewage conveyance infrastructure such as pumping stations, sewer mains and wastewater treatment plants.

The ministry's guidance documents, legislation and regulations require municipalities to prepare action plans and staged implementation programs for maintenance and continued improvements [see Ministry of the Environment's Wastewater Procedure F-5-1 "*Determination of Treatment Requirements for Municipal and Private Sewage Treatment Works Discharging to Surface Waters*"]. Since each municipal wastewater system is different, it is difficult to prescribe absolute approaches to all municipalities to reduce the occurrence of high-risk bypasses. Therefore, the following describes the best responses to the various types of spills and bypasses:

1. Infiltration and Inflow / weather related events

- Routine monitoring of all wastewater flows under various climatic conditions to determine the extent of infiltration and inflow
- A documented action plan to aggressively deal with Infiltration and Inflow (I and I) over a specified time period. Action plans will include priority areas, capital and operations budgets and timelines for implementation and establishment and enforcement of municipal bylaws where applicable.
- An active infrastructure replacement program that identifies priority areas for infrastructure renewal and replacement
- Increased emergency overflow storage capacity for holding times as appropriate for timely response; Extra capacity should be provided in the sewers leading to the pumping station or in dedicated storage/equalization tanks.

Recommendation 8. Watershed municipalities should implement aggressive programs to reduce inflow and infiltration to lower the number of weather-related wastewater treatment plant bypasses**.**

Since inflow and infiltration (I and I) is the predominant cause of spills and bypasses in the watershed, the ministry has offered to work with the Water Managers working group to share information on a review of best practices for managing inflow and infiltration. Information from this review will be presented at future meetings.

2. Power related events

- Emergency backup power systems should be installed at all pump stations and wastewater treatment plants or mobile power generating capacity should be available for deployment to mitigate any spills or bypasses from these sites.
- Alarm systems should be in place at key points in the treatment process, including pump stations and at key points within the collection system. Appropriate back-up equipment should be on site.

- A documented action plan should be in place to implement back-up power at pumping stations that are in close proximity to surface waters and for critical processes at wastewater treatment plants.

Recommendation 9. Back-up power and equipment or appropriate procedures should be available at all pump stations and wastewater treatment plants.

3. Equipment failure related events

- Alarm systems should be in place at key points in the treatment process and collection system with appropriate redundancy
- A documented contingency plan to deal with infrastructure in response to equipment failure related to critical components or points in the treatment or collection system.
- There should be routine preventative maintenance programs of assets to ensure their operability

4. Damaged or blocked sewer mains

- Action and implementation plans should be created to identify aging infrastructure and those areas where the likelihood of blockage is high (i.e. grease build up, vandalism etc)
- Response plans and procedures should be in place to deal with blocked sewers.

In addition to the best practices to address the specific causes of spills and bypasses described above, the following describes management activities that are recommended to improve the overall management of wastewater in the watershed:

Practice Due Diligence

- Design and operate the wastewater system to minimize the potential for and harm resulting from bypasses

Operator Training

- Proactive and routine operator training
- Municipalities to meet all requirements for certification and training for operators and those people involved in the sewage collection system
- All operators are certified with Ministry for the appropriate level required for operating their respective wastewater treatment plants
- Documented 'Standard Operating Procedures' for each wastewater treatment plant and collection system.
- All municipal wastewater treatment plants should have adequate level of staffing with qualified and competent operators.

Monitoring

- Efficient and effective SCADA systems to accurately monitor sewage networks (e.g. sewage treatment plant; pumping stations) with functioning and redundant alarm systems
- Treatment plants and pump stations have alarms for equipment failure, power failure and bypass events
- Incorporate Audit methodologies (e.g. ISO, Environmental Management Systems) for continuous improvement in wastewater treatment management and operations

Preparation of Abatement Plans

- Preparation and implementation of bypass abatement plans or programs with annual reviews and where applicable, plans or programs should be revised and updated

Preparation of Contingency Plans

- Documented contingency plans and management approaches for managing wastewater treatment plants during bypasses to reduce the extent and impact of the bypass
- Documented contingency plan or incident response plan to respond to overflows at pumping stations to ensure a timely response
- All contingency plans should be reviewed annually and when applicable revised.

Routine Wastewater Planning

- Planning involves designing the system to convey current and projected wastewater flows based on population estimates and projected future development
- Wastewater master plans for watershed municipalities are current and updated regularly
- Annual review of current wastewater capacity and available units for growth and development
- Regular exchange of information between municipal planning and wastewater services
- Current Asset Management Plans and regular reporting (e.g. Bill 175: S Sustainable Water and Sewage Systems Act)

Routine Reporting & Documentation

- Prompt reporting/notification to the Ministry, downstream users, and other authorities as per documented protocol for all spills and bypasses
- Implement the *Sewage Discharge Notification Form* for reporting all spills and bypasses to the Spills Action Centre.
- Documented protocol or standard operating procedure for responding to sewage bypasses
- Maintenance of appropriate records relating to bypasses
- Improvements to incident response procedures
- All bypasses and spills should be investigated and documented; reasonable action should be implemented to reduce the occurrence of a similar event.

Step Feed

- Step Feed is an approach that was recommended by a watershed municipality which can be used in the wastewater treatment plant during a high flow event to limit solids loss and protect the treatment process. Step feed preserves solids within the aeration system and limits solids loss through the secondary clarifier. It allows the treatment process to be restarted immediately after a high flow event. For more information see Factsheet in Appendix G.

In addition to the above stated activities, group members recommend the following:

Recommendation 10. Watershed municipalities should give appropriate consideration to prioritizing capital infrastructure renewal projects that would benefit the Grand River and its tributaries.

4.3. Best Practices for the Ministry of the Environment

The district office is the local office of the Ministry of the Environment responsible for compliance with provincial environmental legislation including the *Environmental Protection Act* and the *Ontario Water Resources Act*. The Guelph District Office deals with most of the municipalities in the Grand River watershed; however some municipalities are serviced by the ministry's Hamilton, Owen Sound and London District Offices.

In general, the ministry district office performs a number of functions relating to wastewater treatment plants and bypasses. These functions include: responding to spill and bypass events, conducting proactive inspections of plants, requiring abatement action from owners and / or operators to address issues of non-compliance with applicable legislation, confirming compliance by reviewing the actions taken by owners and / or operators, referring incidents for investigation where appropriate and monitoring the number, location and causes of bypasses and spills to the Grand River.

As a Best Practices, district office staff will continue to respond to spills and bypasses events, depending on the severity, to assess the incident and require appropriate action to reduce, contain or stop the event. If the incident warrants an immediate field response, Ministry staff will continue to have a provincial officer available 24 hours a day to respond. Incidents that cause or have the potential to cause adverse effects will be referred for investigation to the ministry's Investigations and Enforcement Branch, as appropriate for possible charges.

The ministry will continue to conduct proactive inspections of all wastewater treatment plants to ensure that they are being operated properly in accordance with their Certificates of Approval and applicable legislation. Staff will also continue to regularly review activities at wastewater treatment plants, including bypass and spill events and inflow and infiltration concerns, and meet with owners and / or operators to ensure that actions are implemented to address issues of non-compliance. Further, the Ministry will continue to encourage, and require, municipalities to implement aggressive inflow and infiltration action plans to address weather-related events.

To continually improve the information management and communication of bypasses and spills in the watershed, the Ministry will continue to maintain and update the *Non-Standard Procedure for Reporting Spills and Bypasses in the Grand River watershed* as a Best Practice [see Recommendation 4] and incorporate the information in the Sewage Discharge Notification Form into their internal information management system (e.g. IDS or other reporting systems) [see Recommendation 2].

The Ministry is currently updating its province wide monitoring and reporting requirements for sewage works. The *Non-Standard Procedure for Reporting Spills and Bypasses in the Grand River watershed* and the Sewage Discharge Notification Form will support this province wide update by ensuring consistent information is collected and reported during sewage discharge events.

4.4. Best Practices for the Grand River Conservation Authority

The GRCA's roles in responding to spills or bypasses are to ensure that information regarding a reportable spills or bypasses is transferred to appropriate agencies and provide appropriate river and watershed information. This includes providing stream flow data and estimates of travel times (i.e. how long it will take a spill or bypass to reach a downstream drinking water intake); locations of spills or bypasses as relative to downstream users, and to ensure all downstream users are notified. The GRCA's communication role was determined by the Water Managers working group in the mid 1990's. This service is provided through the duty officer system which is available 24 hours a day, seven days a week and ensures timely response to Ministry and Municipal staff inquires pertaining to the river and watershed.

To ensure common understanding and information management, the GRCA should incorporate the new Sewage Discharge Notification form into its reporting procedures. This will ensure that common terminology is used. [see Recommendation 6]

To ensure that watershed municipalities have the opportunity to share information, discuss watershed issues and formulate solutions, the GRCA will continue to facilitate meetings of the Municipal Water Managers working group and regularly table the issues of spills and bypasses on the agenda.

Improved travel time estimates for the river is required for more timely response to spills and bypasses in the watershed. The GRCA will continue to provide these estimates. However, a new time-of-travel model for more accurately estimating travel times should be developed.

> **Recommendation 11.** The Grand River Conservation Authority develop a time-of-travel model to improve the estimated travel times under steady-state conditions for watershed municipalities to help them better plan to deal with spills and bypasses.

4.5. WASTEWATER TREATMENT PLANT PERFORMANCE EVALUATIONS

4.5.1. Background

In the early 1990s, the Ministry and Environment Canada developed and implemented a multi-year and multi-faceted wastewater treatment plant performance evaluation program in Ontario. The program developed or applied several optimization tools (e.g. manuals, approaches, procedures, etc) which helped wastewater treatment plants conduct optimization studies to improve effluent quality. In some cases, this allowed the municipality to defer or minimize capital expansion.

The benefits from this program include[3]:

- identification of plants and limiting unit processes which require upgrading and or expansion before non-compliance occurs;
- improved environmental protection by enabling plants to consistently achieve effluent limits compliance and reduce bypasses;
- effective utilization of existing facilities, often beyond nominal design capacity specified in the Certificates of Approval, thereby eliminating, deferring or minimizing the need for expansion or other capital investments;
- determination of the most economical means for upgrading or expanding plants to meet future growth or more restrictive effluent requirements; and
- maintenance of improvements made during optimization studies in the long run, through empowerment of plant operators.

This program resulted in a reduction in bypasses at the wastewater treatment plants involved in the pilot program. Auxiliary benefits included improved effluent quality, more effective use of existing facilities, fiscal responsibility and empowered and more knowledgeable operators.

Although the Sewage Treatment Plant Optimization Program was discontinued in 1995, there is renewed interest in the Ministry to reevaluate this program. This is a result of recent successful implementation of the optimization programs in some Ontario municipalities which have demonstrated an effective approach to reduce the number of bypasses[4], improved effluent quality[5] and defer substantial capital infrastructure costs[3,6].

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[3] Managers Guide to Sewage Treatment Plant Optimization. 1996 [Draft, Unpublished]. Prepared by Wastewater Technology Centre and Process Applications for the Ontario MOE and Energy.

[4] Oakville SW WWTP Optimization Technical Brief. 2004. SW WWTP Case Study re: Bypass Mitigation. Revised for Environment Canada.

[5] Upgrading Existing Secondary Clarifiers to Improve Serviceability and Process Controllability to Support Nitrification. 2005. City of Guelph

[6] Wheeler, G., and C. Walsh, pers. comm..

The Composite Correction Program (CCP) for wastewater treatment optimization is nationally recognized program in the United States that was developed by Process Applications, Inc. Its goal is to cost-effectively improve performance at existing facilities.

The CCP consists of two phases that can be conducted independently or in combination:

The first phase is the Comprehensive Performance Evaluation (CPE). The second phase is the Comprehensive Technical Assistance (CTA)[7]. Once it is recognized that a plant is in need of improved performance, a CPE is initiated to more accurately determine the nature of the problems and prioritized their causes. The evaluation focuses on four major areas: plant design; plant operation; maintenance; and administration.

The second phase is the Comprehensive Technical Assistance (CTA). This step is initiated when a treatment plant is capable of achieving compliance at its current flow. The CTA is used to systematically resolve the performance limiting factors in the plant that are preventing it from achieving compliance or producing good, economical effluent[3] The CTA is used to achieve the best possible performance and capacity from wastewater treatment plants[6].

The United States Environmental Protection Agency has implemented successful Area-Wide Optimization Programs since the 1990's that have targeted numerous treatment plants in various states/USEPA Regions. This framework allows state governments to ensure environmental compliance but it can also be used for prioritizing infrastructure renewal and investment[8].

Resource Materials:

Ministry of Environment and Energy. 1994. Assessment of the Comprehensive Performance Evaluation Technique for Ontario Sewage Treatment Plants. Queens Printer for Ontario. ISBN 0-7778-1293-2

Ministry of Environment and Energy. 1995. Assessment of the Comprehensive Technical Assistance Technique for Ontario Sewage Treatment Plants. Queens Printer for Ontario. ISBN 0-7778-3833-8

The following reference is no longer available but you can receive an electronic version from Sandra Cooke, Grand River Conservation Authority (519 621-2761)

Wastewater Technology Centre, Process Applications Inc. 1996 [Draft, Unpublished]. Managers Guide to Sewage Treatment Plant Optimization. Report prepared for the Ontario Ministry of the

[7] Process Applications, Inc. 2008. http://process.applications.googlepages.com/water&wastewaterservices

[8] . Hegg, B. EPA's Area-Wide Optimization Program (AWOP): Background and Overview. Powerpoint slides received from C. Walsh, City of Guelph.

Environment and Energy, Environment Canada, The Municipal Engineers Association and Water Environment Association of Ontario.

4.5.2. Case Study: City of Guelph

In 2005 the City of Guelph initiated a wastewater treatment plant optimization program based on the Composite Correction Program (CCP) approach developed by the U.S. EPA and adopted by the ministry in the 1990's. The CCP is a two-step approach to assess and address performance-limiting factors affecting plant performance and focused on four key areas that affect a facility's ability to achieve the desired level of performance. Performance limiting factors were identified in four key areas: Administration, Operations, Design, and Maintenance[9].

Initially, wastewater treatment plant managers invested in appropriate tools (e.g. data management tools, laboratory for conducting on-site analysis for more timely data collection and interpretation etc) that empowered staff to apply data-based decisions on a daily basis. Implementing data-based decision making created a more receptive atmosphere in which staff were empowered to ask questions and be part of the team to determine solutions. Arising from this new approach was staff engagement and ownership. This approach resulted in achieving higher quality effluent and fewer bypasses. More importantly it resulted in a new level of operator skills and confidence that formed the foundation for sustaining the improvements. These improvements are shown in Figures 5 and 6 below.

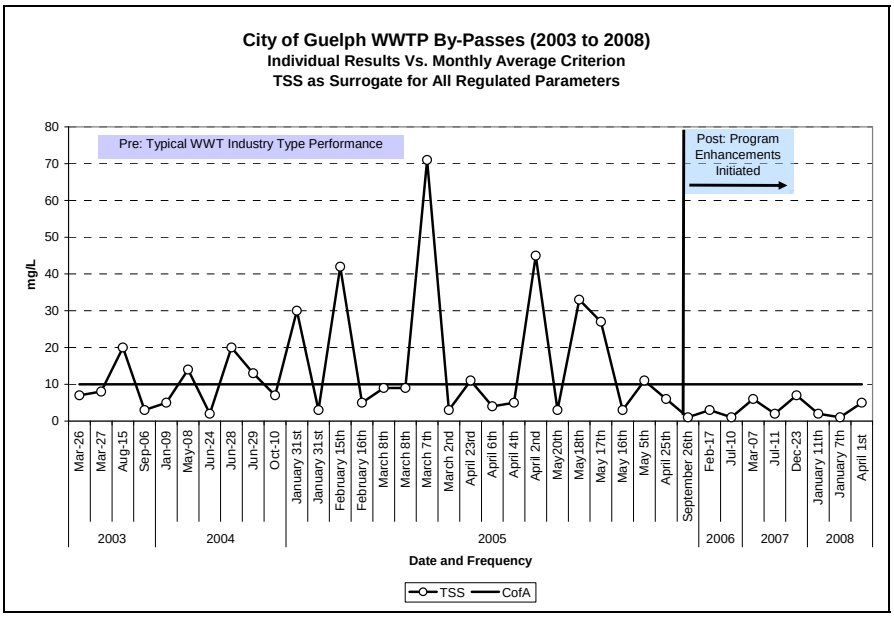

Figure 5. Total suspended solids concentration in wastewater effluent prior to and following the initiation of wastewater treatment plant optimization. [Figure from G. Wheeler, C. Walsh, City of Guelph]

[9] Walsh et al. 2004. Empowering human infrastructure to get the most out of physical infrastructure. The Regional Municipality of Halton, Oakville SW WWTP Case Study.

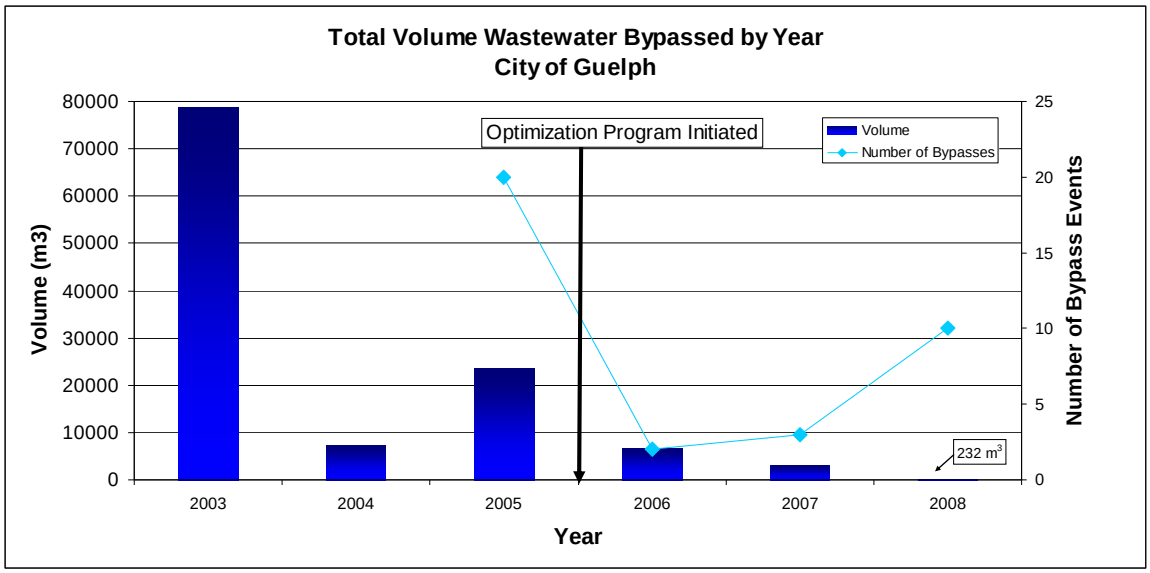

Figure 6. The total volume of wastewater effluent bypassed (bars) and the number of bypass events (diamonds) by the City of Guelph prior to and following the initiation of wastewater treatment plant optimization (September 2005). [Data from Ministry of the Environment and City of Guelph]

4.5.3. Summary

Since there are 28 wastewater treatment plants that discharge into the Grand River system, the operation and management of wastewater treatment plants is an important factor that contributes to the overall health of the river. Working group members discussed the need for improved wastewater treatment and agreed that evaluating wastewater treatment performance can help to improve effluent quality and lower the number of bypasses. The composite correction program (CCP) implemented at the Guelph wastewater treatment plant is already yielding success. The Guelph wastewater treatment plant has higher quality effluent and bypasses less wastewater than five years ago[10]. In addition to Guelph, Haldimand County has also started to implement a performance evaluation program at the Dunnville and Caledonia wastewater treatment plants. A wastewater treatment plant performance evaluation pilot for the watershed would not only benefit wastewater treatment plant operators and managers but also provide benefit to the river and downstream users. Therefore, the working group recommends the following:

> **Recommendation 12.** Watershed municipalities should conduct regular wastewater treatment plant infrastructure and performance reviews with the end goal of achieving good, economical effluent and a reduction in the frequency and severity of bypasses.

> **Recommendation 13.** The Ministry of the Environment should encourage and support a wastewater treatment plant performance evaluation pilot for the Grand River watershed.

[10] G. Wheeler, City of Guelph, *personal communication*

APPENDIX A: MUNICIPAL WATER MANAGERS WORKING GROUP MEMBERSHIP

Member (Alternate)	Title	Municipality
Nancy Kodousek	Director, Water Services	Region of Waterloo
Terry Spiers (Selvi Kongara)	Director of Environmental Services	City of Brantford
Janet Laird (Cameron Walsh)	Director of Environmental Services	City of Guelph
Dale Murray	Consultant	Centre Wellington representative
Geoff Ray (Phillip Wilson)	Manager of Environmental Services	County of Haldimand
Alex Davidson	Manager, Water Services	County of Brant
Derek Hill (Paul General)		Six Nations
Sandra Cooke (Chair)	Senior Water Quality Supervisor	Grand River Conservation Authority

All watershed Municipalities have a standing offer to participate in this working group. If you or your municipality wishes to participate, please contact the Chair of the Working group.

APPENDIX B: LIST OF PARTICIPATING MUNICIPALITIES

Initial Meeting: Monday May 5th , 2008

Representative	Watershed Municipality
Jane Wilson	East Luther Grand Valley
Samuel Graham	Southgate Township
Harvey Nicholls	Southgate Township
Janet Laird	City of Guelph
Carl Slater	Ministry of the Environment
Terry Spiers	City of Brantford
Olga Vrentzos	Region of Waterloo
Frank Moffat	Region of Waterloo
Jamie Austin	City of Cambridge
Dale Murray	Centre Wellington
Alex Davidson	Brant County

June 16, 2008 Meeting

Representative	Watershed Municipality
Nancy Kodousek	Region of Waterloo
Jane Wilson	East Luther Grand Valley
Gerry Wheeler	City of Guelph
Ken Elder	Centre Wellington
Gary Williamson	Twp Wellington North
Bill Garibaldi	City of Waterloo
Jamie Austin	City of Cambridge
Selvi Kongara	City of Brantford
Jim Ellis	Southgate Township
Cameron Walsh	City of Guelph
Carl Slater	Ministry of the Environment
George Sousa	Grand River Conservation Authority
Ed Sharp	Brant County
Alex Davidson	Brant County
Sandra Cooke	Grand River Conservation Authority

October 28th, Meeting

Representative	Watershed Municipality
Selvi Kongara	City of Brantford
Nancy Kodousek	Region of Waterloo
Cameron Walsh	City of Guelph
Ken Elder	Centre Wellington
Jim Kerr	Centre Wellington
Gary Williamson	Twp Wellington North
Bill Garibaldi	City of Waterloo
Jamie Austin	City of Cambridge
Jim Ellis	Southgate Township
Brian Dubrick	City of Kitchener
Cory Banks	City of Kitchener
Paul Mungar	Haldimand County
Dale Murray	Representative for Centre Wellington
Carl Slater	Ministry of the Environment
Mark Anderson	Grand River Conservation Authority
Sandra Cooke	Grand River Conservation Authority, chair

December 17th Meeting

Representative	Watershed Municipality
T. Spiers	City of Brantford
Nancy Kodousek	Region of Waterloo
Cameron Walsh	City of Guelph
Alex Davidson	County of Brant
Ken Elder	Centre Wellington
Jim Kerr	Centre Wellington
Gary Williamson	Twp Wellington North
Bill Garibaldi	City of Waterloo
Jamie Austin	City of Cambridge
Cory Banks	City of Kitchener
Jim Ellis	Southgate Township
Dale Murray	Representative for Centre Wellington
Carl Slater	Ministry of the Environment
Kyle Davis	Ministry of the Environment
Mark Anderson	Grand River Conservation Authority
Sandra Cooke	Grand River Conservation Authority, chair

January 2009 Meeting

Representative	Watershed Municipality
T. Spiers	City of Brantford
Khalid Mehmood	Region of Waterloo
Cameron Walsh	City of Guelph
Alex Davidson	County of Brant
Ken Elder	Centre Wellington
Jim Kerr	Centre Wellington
Gary Williamson	Twp Wellington North
Bill Garibaldi	City of Waterloo
Jamie Austin (alternate)	City of Cambridge
Jim Ellis	Southgate Township
Dale Murray	Representative for Centre Wellington
Carl Slater	Ministry of the Environment
Kyle Davis	Ministry of the Environment
Mark Anderson	Grand River Conservation Authority
Sandra Cooke	Grand River Conservation Authority, chair

June 2009 Meeting

Representative	Watershed Municipality
T. Spiers	City of Brantford
Nancy Kodousek	Region of Waterloo
Gerry Wheeler	City of Guelph
Alex Davidson	County of Brant
Ed Sharp	County of Brant
Ken Elder	Centre Wellington
Jim Kerr	Centre Wellington
Gary Williamson	Twp Wellington North
Bill Garibaldi	City of Waterloo
Jamie Austin	City of Cambridge
Jim Ellis	Southgate Township
Carl Slater	Ministry of the Environment
Kyle Davis	Ministry of the Environment
Marc Ethier	Ontario Clean Water Agency
Paul Mungar	Haldimand County
Mark Anderson	Grand River Conservation Authority
Sandra Cooke	Grand River Conservation Authority, chair

APPENDIX C: MUNICIPAL WATER MANAGERS WORKING GROUP: GUIDING PRINCIPLES

Municipal Water Managers working group members actively discuss issues that go beyond their municipal boundaries. The working group is made up of senior managers of environmental services of the major municipalities of the watershed (See Appendix B: List of Members). The working group was initially formed in the late 1970's for the development of the Grand River Basin Water Management Plan. This group has met on a regular basis since 1995 to discuss trans-municipal water management issues including wastewater assimilative capacity, nonpoint source management, water supply, spill notification and wastewater bypasses in the watershed. The working group members share information on water and wastewater management projects and identify, discuss and prioritize watershed surface and groundwater management issues.

The following principles guided the discussions and drafting of this report:

1. All municipalities in the Grand River watershed take wastewater spills and bypasses very seriously, recognizing and acknowledging that they are undesirable to downstream users and the public.
2. Every effort must be made to reduce the frequency and severity of sewage bypasses in the watershed as all users depend on the river for their quality of life.
3. Wastewater systems operate to protect public health and the environment.
4. All wastewater systems are designed to bypass in a controlled manner to protect public health (e.g. reduce the chance of sewage backing up into residential areas). Bypasses are usually directed to the outlet of the wastewater treatment plant.
5. There are no combined sanitary / storm sewers in the Grand River watershed. Those municipalities with high Inflow and Infiltration (I&I) levels, as identified by high per capita levels, should initiate comprehensive I&I programs.
6. Bypasses can be managed and the frequency can be reduced through design (based on the best knowledge and requirements at the time), standard operating procedures and contingency plans. In addition, appropriate back up equipment or procedure should be available for use at all wastewater treatment plants and pumping stations in the watershed. Appropriate back-up power (e.g. diesel generator) or protocols must also be in place to deal with power outages.
7. As water managers and watershed stewards, we strive for continuous improvement to improve and optimize wastewater management infrastructure to reduce impacts to the Grand River system.

APPENDIX D: REVIEW OF RELEVANT LEGISLATION AND DEFINITIONS

In Ontario, the general management principle of the Ministry is that water quality must be protected, preserved or restored to permit the greatest number of uses (Ministry of the Environment 1999). Wastewater discharges are managed by the ministry through two policies:

Policy I. In areas which have water quality better than the Provincial Water Quality Objectives, water quality shall be maintained at or above the Objectives.

Or

Policy II. Water quality which presently does not meet the Provincial Water Quality Objectives shall not be degraded further and all practical measures shall be taken to upgrade the water quality to the Objectives.

There are multiple statutes, regulations and Ministry guidelines applicable to the construction and operation of municipal wastewater treatment plants / collection systems and to spills and bypasses from these plants and systems. The key pieces of legislation are the Environmental Protection Act and the Ontario Water Resources Act and the applicable regulations under these Acts. The Ministry also publishes various guidance documents including the B, D and F series Guidelines to address specific requirements not detailed in the legislation including receiving water based effluent requirements, levels of treatment and disinfection, installation, combined and partially separated sewers, sampling, analysis etc.

A few of the legislation and Ministry documents are summarized below. This summary is not exhaustive but gives a general overview of the relevant legislation regarding spills and bypasses relating to municipal wastewater treatment plants / collection systems. Please refer to the documents below for more complete information.

- Environmental Protection Act. R.S.O. 1990. Search for Act at: http://www.e-laws.gov.on.ca/
- Environmental Protection Act. Ontario Regulation 675/98. Classification and Exemption of Spills and Reporting of Discharges. Search for Regulation at: http://www.e-laws.gov.on.ca/
- Ontario Water Resources Act. R.S.O. 1990. Search for Act at: http://www.e-laws.gov.on.ca/
- Ministry of the Environment. Procedure F-5-1. Determination of Treatment Requirements for Municipal and Private Sewage Treatment Works Discharging to Surface Waters.
- "Spills Reporting – A Guide to Reporting Spills and Discharges" Ministry of the Environment, May 2007. http://www.ene.gov.on.ca/en/about/penalties/SpillReportingGuide.pdf

Certificates of Approvals

Under Section 53(1) of the Ontario Water Resources Act, all sewage works are required to have a Certificate of Approval:

"*No person shall establish, alter, extend or replace new or existing sewage works except under and in accordance with an approval granted by a Director."*

Requirements in the Certificates of Approval are site specific but include monitoring, reporting, operation, maintenance and effluent quality conditions.

Spills

Discharge events to surface water include both spills and bypasses.

The definition of a spill according to the Environmental Protection Act, Part X and O. Reg. 675/98 is as follows:

> "spill", when used with reference to a pollutant, means a discharge,
>
> (a) into the natural environment,
>
> (b) from or out of a structure, vehicle or other container, and
>
> (c) that is abnormal in quality or quantity in light of all the circumstances of the discharge,

Notification

The Ministry of the Environment must be notified of a spill or bypass as required by the Environmental Protection Act, the Ontario Water Resources Act and Ontario Regulation 675/98.

Environmental Protection Act Section 15(1):

"Every person who discharges a contaminant or causes or permits the discharge of a contaminant into the natural environment shall forthwith notify the Ministry [of the Environment] if the discharge is out of the normal course of events, the discharge causes or is likely to cause an adverse effect and the person is not otherwise required to notify the Ministry under section 92. 2005, c. 12, s. 1 (6)."

Environmental Protection Act Section 92(1):

"Every person having control of a pollutant that is spilled and every person who spills or causes or permits a spill of a pollutant shall forthwith notify the following persons of the spill, of the circumstances thereof, and of the action that the person has taken or intends to take with respect thereto,

(a) the Ministry;

(b) any municipality within the boundaries of which the spill occurred or, if the spill occurred within the boundaries of a regional municipality, the regional municipality;

(c) where the person is not the owner of the pollutant and knows or is able to ascertain readily the identity of the owner of the pollutant, the owner of the pollutant; and

(d) where the person is not the person having control of the pollutant and knows or is able to ascertain readily the identity of the person having control of the pollutant, the person having control of the pollutant."

O. Reg. 675/98 Section 13(2):

"A person to whom this section applies shall give notice by telephoning the Spills Action Centre (1-800-268-6060 or 416-325-3000) and providing the information required by subsections (3) and (4) to the person who answers the telephone call."

Ontario Water Resources Act Section 30(2):

"Every person that discharges or causes or permits the discharge of any material of any kind, and such discharge is not in the normal course of events, or from whose control material of any kind escapes into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters, shall forthwith notify the Ministry of the discharge or escape, as the case may be."

Bypasses

A wastewater treatment plant ***bypass*** means the bypassing of a process within a sewage treatment works with the associated sewage flows being returned to the sewage treatment flow and discharging to the environment through the final effluent outfall of the sewage treatment plant.

Procedure F-5-1 policy directions regarding sewage treatment bypasses are such that incidents shall not be allowed except in 'emergency conditions". In the event of a bypass, Procedure F-5-1 states:

" In accordance with Section 15 of the Environmental Protection Act (RSO 1990) and with section 30(2) OWR Act (RSO 1990) bypass incidents shall be recorded and the appropriate agencies (i.e. MOEE Region and or SAC, and Medical Officer of Health) notified. In addition, the measured or estimated volume, duration and reasons for bypassing shall be documented and reported to the MOEE Regional Office"

To reduce the frequency and volume of sewage discharged from emergency bypasses to an acceptable minimum, Procedure F-5-1 states that "*measures shall be taken to provide adequate sewer and pumping station capacity, stand-by equipment, stand-by power, reserve storage capacity in sewers, and or at treatment facilities and adequate capacity in sewage treatment works*"

Furthermore, Procedure F-5-1 states "*that if there is excessive infiltration and inflow (I and I) problems which result in unacceptable frequencies or quantities of raw sewage and or primary effluent bypassing and where the above measures alone are either impractical or uneconomical to reduce the by-passing to acceptable levels,* ***staged programs should be developed*** *for the ultimate containment of these flows by a combination of the above measures and the reduction of I and I to the*

sewer system. These programs should outline the approaches to solving the problems along with the anticipated timing of when the changes to the sewage system could be made."

In summary, multiple statutes, regulations and guidelines apply to all municipalities and owners of pollutants (including sewage) that are discharged to the natural environment. Notification of spills and bypasses must be reported to Ministry through its Spills Action Centre as well as other identified parties (e.g. MOH, GRCA etc). As per Ministry guideline, bypasses are to be allowed only under emergency conditions and measures taken to provide adequate system capacity, stand-by power and development of programs to reduce excessive infiltration and inflow to the system.

APPENDIX E: DOWNSTREAM NOTIFICATION PROCEDURE SECTION FROM THE NON-STANDARD PROCEDURE FOR SEWAGE BYPASSES AND SPILLS IN THE GRAND RIVER WATERSHED

Downstream Notification List

Procedure

Notify:

1. Downstream Water Treatment Plants
2. Grand River Conservation Authority / Recreational Users
3. Local Health Units
4. Environment Canada
5. Health Canada

Refer to Notification List that follows for telephone numbers. Check the other agency binders for a map of Health Units and the Surface Water Intakes Binder for water intake locations.

Notification List

1. Mannheim WTP (located at Kitchener)

Primary: 519-571-6208 - A 24 hour contact which is routed to one of four rotating Mannheim WTP personnel.

Secondary: 519-650-8260 - 08:30 to 16:30 - Environmental Enforcement Services

After hours the Region of Waterloo laboratory have 24 hour spills response personnel.

2. Brantford WTP

Primary: 519-752-3198 - 24 hour operator

Secondary: 519-753-8106

- ext. 215 - plant control room
- ext. 204 - plant chemist Patrick Halevy
- ext. 210 - plant superintendent Chuck Boyd

3. Oshweken WTP (Six Nations downstream from of Brantford)

Primary: 519-752-4712 - Answering Service will page Steve Lickers WTP operator

Secondary: 519-445-4242 - Six Nations PUC Office: Dale Bomberry is the Director

4. Environment Canada

Duty Officer Contact Number: 416-518-3221 (NOT a public line)

5. Health Canada

See Other Agencies Binder for Business Hours and After Hours contact information.

6. Dunnville WTP (Downstream from Six Nations near Lake Erie)

Business Hours (08:00-16:00): 905-774-7111

After Hours (Nanticoke WTP): 519-587-4565

Pager (24/7) - 1-800-222-3143 Pin: 102144

Note: Dunnville intake is from Lake Erie at Port Maitland. There is an emergency intake in the Grand River that is not in use.

7. Grand River Conservation Authority

Regular Hours: 519-621-2761

After Hours: 519-621-2761 at Extend Communications and ask for the

GRCA duty officer

Grand River tubing run in Elora Gorge – GRCA should be prioritized to call when Township of Centre Wellington (Fergus or Elora) has a bypass

8. Health Units

The Wellington – Dufferin – Guelph Health Unit, the Waterloo Regional Health Unit and the Haldimand – Norfolk Health Unit have requested to only be called for those events where a spill or bypass is serious in nature and the SAC officer believes that there is a potential impact on public health. For the majority of the bypass events, these Health Units would like notification by the e-mail addresses provided below. The seriousness of the event will need to be assessed on an incident by incident basis but factors contributing to an event needing phone notification include large volume bypasses, low water levels at the time of the incident, bypasses of raw sewage or primary, non-disinfected sewage or bypasses in close proximity to downstream users.

The Brant County Health Unit wishes to continue receiving only phone notifications.

A) Wellington-Dufferin-Guelph Health Unit

E-mail: info@wdghu.org

If spill or bypass is likely to have a significant impact on the river or water supplies call:

Business Hours - 519-846-2715

After Hours - 1-877-884-8653

B) Waterloo Regional Health Unit

E-mail: qdoug@region.waterloo.on.ca
c.c to ghenry@region.waterloo.on.ca

If spill or bypass is likely to have a significant impact on the river or water supplies call:

Business Hours: 1-519-883-2008

After Hours: 1-519-650-8200

C) Brant County Health Unit

Business Hours: 519-753-4937 (ZERO out & ask for public health inspector)

Business Hours: 519-753-4937 (If it's a big issue & a public health inspector is NOT available, xt. 238 Jeff Kowal, Environmental Services)

After Hours: 519-753-4937 - answering service

D) Haldimand-Norfolk Health Unit

E-mail: hnmoh@hnhu.org

If spill or bypass is likely to have a significant impact on the river or water supplies call:

Business Hours: 1-519-426-6170

After Hours: 1-877-298-5888

Notes: A map of watercourses which are tributaries of the Grand River are located in the NSP binder, and an electronic version available in the electronic NSP Database (Link 2 of this NSP).

Please contact the GRCA (Grand River Conservation Authority) 24/7 if you are unsure if the watercourse is apart of the Grand River Watershed. GRCA Website Shows Rivers/Creeks in the Grand River Watershed

APPENDIX F: LIST OF WASTEWATER TREATMENT PLANTS AND CORRESPONDING DOWNSTREAM USERS

MUNCIPALITY	PLANT NAME	OPERATOR	Water Course	Downstream User	Level of Treatment
Municipal Facilities					
Wellington North	Arthur WPCA	Private operator	Conestogo River	GRCA Reservoir/Conestogo Lake	Tertiary
Brantford	Brantford WPCP	Private operator	Grand River	Ohsweken DWTP; Dunnville DWTP	Secondary
Centre Wellington	Elora WPCP	Municipal	Grand River	GRCA Elora Gorge (recreational use); Mannheim DWTP; Brantford DWTP: Ohsweken DWTP; Dunnville DWTP	Secondary
Centre Wellington	Fergus WPCP	Municipal	Grand River	GRCA Elora Gorge (recreational use); Mannheim DWTP; Brantford DWTP: Ohsweken DWTP; Dunnville DWTP	Tertiary
County of Brant	Paris WPCP	Private operator	Grand River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Secondary
County of Brant	St. George WPCP	Private operator	Fairchild Creek	Ohsweken DWTP; Dunnville DWTP	Tertiary
County of Brant	Cainsville Lagoon	Private operator	Fairchild Creek	Ohsweken DWTP; Dunnville DWTP	Lagoon
County of Oxford	Drumbo WPCP	Municipal	Nith River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Tertiary
County of Oxford	Plattsville Lagoon	Municipal	Nith River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Lagoon
Southgate	Dundalk Lagoon	Municipal	Foley Drain to Grand River	GRCA Reservoir/Belwood Lake	Lagoon with Continuous Discharge and Filtration
East Luther Grand Valley	Grand Valley WPCP	Private operator	Grand River	GRCA Reservoir/Belwood Lake	Secondary
Guelph	Guelph WPCP	Municipal	Speed River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Tertiary

MUNCIPALITY	PLANT NAME	OPERATOR	Water Course	Downstream User	Level of Treatment
Haldimand	Cayuga WPCP	Private operator	Grand River	Dunnville DWTP	Secondary
Haldimand	Dunnville WPCP	Private operator	Grand River	Dunnville DWTP	Secondary
Haldimand	Caledonia WPCP	Private operator	Grand River	Dunnville DWTP	Tertiary
Mapleton	Drayton Lagoon	Private operator	Conestogo River	GRCA Reservoir/Conestogo Lake	Lagoon
Region of Waterloo	Elmira WPCP	Private operator	Canagagigue Creek	Mannheim DWTP; Brantford DWTP: Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Galt WPCP	Private operator	Grand River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Kitchener WPCP	Private operator	Grand River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Secondary
Region of Waterloo	Baden/New Hamburg WPCP	Private operator	Nith River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Preston WPCP	Private operator	Grand River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Waterloo WPCP	Private operator	Grand River	Mannheim DWTP; Brantford DWTP: Ohsweken DWTP; Dunnville DWTP	Secondary
Region of Waterloo	Hespeler WPCP	Private operator	Speed River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Secondary
Region of Waterloo	St. Jacobs WPCP	Private operator	Conestogo River	Mannheim DWTP; Brantford DWTP: Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Wellesley WPCP	Private operator	Nith River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Ayr WPCP	Private operator	Nith River	Brantford DWTP; Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Alt Heidelberg Estates	Private operator	Heildelberg Creek	Mannheim DWTP; Brantford DWTP: Ohsweken DWTP; Dunnville DWTP	Tertiary
Region of Waterloo	Conestogo Golf Course Estates	Private operator	Grand River	Mannheim DWTP; Brantford DWTP: Ohsweken DWTP; Dunnville DWTP	Tertiary

APPENDIX G: STEP FEED

The following describes the Standard Operating Procedure for the Oakville SW Wastewater Treatment Plant. The information below is from Cameron Walsh, City of Guelph and Rob Pade, Halton.

Step Feed Initiation

1.0 PURPOSE/SCOPE

To outline the procedure for 'step feed initiation' during high flows.

2.0 SPECIFIC RESPONSIBILITIES

Supervisor

1. To ensure that operators have read and understand this policy, and that a copy is available in the Oakville South West WWTP O & M manual.
2. Must ensure that an Operator In Charge (OIC) is in control of the process changes, and that all necessary reporting is adhered to.
3. To ensure that operators are properly trained in the use and principles of step feed

Sub-Foreperson

1. To ensure monitoring of incliment weather advisorys. www.theweathernetwork.com
2. To ensure the scheduling and implementation of 'Step Feed' prior to wet weather events.

Plant Operator(s)

1. Maintain good process control prior to 'Step Feed Initiation'.
2. To ensure monitoring of incliment weather advisorys.(WWW.the weathernetwork.com)
3. To ensure the implementation of 'Step Feed' prior to wet weather.
4. Document any problems and make appropriate notifications in the log book including time, flow, operators involved

3.0 INSTRUCTIONS AND FORMS

In the event that the wet weather event is too severe a bypass event report must be filled out and fax to the M.O.E. at (905) 319-3847

The health department must also be notified at ext.7815# Area manager. Environment health

If event is after hours the spills action centre must be notified at 1800-268-6060.

4.0 PROCEDURE

Rough criteria for when step feed should be initiated are as follows

- Dry conditions with rainfall of 20mm or better.
- Wet conditions with rainfall of 10mm or better.
- Snow melt periods.

Note: An experienced operators judgment will be the best measure of when to initiate step feed and bypassing if any.

- ✓ Close all aeration inlet gates 1 per plant for a total of 4 for the whole plant see picture marked aeration inlet gate at the top of this S.O.P.
- ✓ Pull all step feed inlet gates in each pass of all the aeration system. See picture marked step feed gate at the top of this S.O.P.
- ✓ Maintain the RAS pumps at 30% of that day's dry weather flow. DO NOT INCREASE RAS RATE.
- ✓ Operator should montior the whole plant during events of flow greater then 80,000 M3 and use best judgement as to when and if any bypass is nessary (100,000 + M3).
- ✓ Bypassing should best be judged on uniwaste number and your daily S.V.I. and hopefully good settling sludge with an S.V.I of less than 100 will allow you to push more hydrallically through the plant.

4.1 lesson learned

- ✓ The step feed process is operated in a contact –stabilization mode in wet weather.
- ✓ The inlet feed is to the 3rd pass so high wet weather flows can bypass the first two passes and preserve the MLSS in the stabiliazation zone. Thus reducing the soilds loading to the secondary clarifier
- ✓ Contact stabilization uses the last two passes for treatment of the reducded wastewater due to wet weather.
- ✓ The contact zone has a realatively short contact time and the mlss concentration is lower than the stabilized zone.
- ✓ Rapid removal of soluble B.O.D. occurs in the contact zone and particulate organics are captured in the activated sludge floc for degradation in the first 2 passes.
- ✓ Do not increase the RAS as you will increase the soilds loading to the Secondary clarfier and reduce hydraulic retention time.
- ✓ Over all the plant needs to be in the best shape possible before wet weather eg. Primary mass down as low as possible This prevents the blow through of solids out of the primary clarifier.
- ✓ Wasting during wet weather is much more difficult. Due to the much shortened surface over flow rate and blow backof settled soilds from the primaries

- ✓ It appears as though wet weather will increase influent mass due to a scowering of the collection system which will cause an overall increase in plant mass.

5.0 REFERENCE DOCUMENTS

Please see the attached Special study conducted in the spring of 2003