



# **Report of the Auditor General of the Ville de Montréal** to the City Council and to the Urban Agglomeration Council

For the Year Ended December 31, 2014

# 4.13

## **MAINTENANCE OF FIRE HYDRANTS**



## Table of Contents

1. Introduction .....	497
2. Purpose and Scope of the Audit.....	499
3. Summary of Findings .....	499
4. Detailed Findings and Recommendations .....	501
4.1. Establishment of Fire Hydrant Maintenance Standards .....	503
4.2. Implementation of Fire Hydrant Maintenance Work .....	509
4.3. Profile of the Condition of Fire Hydrants Available to the Service de l'eau .....	525
4.4. Profile of the Condition of Fire Hydrants Available to the Service de sécurité incendie de Montréal.....	528
4.5. Accountability Reporting.....	545
5. General Conclusion.....	550

## List of Acronyms

AWWA	American Water Works Association	RAO	répartition assistée par ordinateur
CCSI	Centre de communications du Service de sécurité incendie de Montréal	RDP–PAT	Rivière-des-Prairies–Pointe-aux-Trembles
CNPI	Code national de prévention des incendies	SE	Service de l'eau
DGSRE	Direction de la gestion stratégique des réseaux d'eau	SIM	Service de sécurité incendie de Montréal
GEA	gestion de l'entretien des actifs	UIRP	Unité d'intervention rapide et prioritaire
		VSMPE	Villeray–Saint-Michel–Parc-Extension

## 4.13. Maintenance of Fire Hydrants

### 1. Introduction

The Service de sécurité incendie de Montréal (SIM) exercises urban agglomeration powers in the areas of fire safety and the development and implementation of the fire safety cover plan. These responsibilities include firefighting, rescues during these operations, evaluation of fire, accident or disaster risks and prevention of these events.

Effective fire risk management requires that the resources needed for different types of fire responses (equipment, staff, fire hydrants, etc.) be properly planned for, on a timely basis, in order to limit the consequences of a fire breaking out.

Within the framework of its authority, the SIM had its first *fire safety cover plan* (hereinafter referred to as the “plan”) adopted by the urban agglomeration council on December 18, 2008. This plan, which covers the years 2009 to 2013, describes fire safety on the territory and provides for an action plan and an implementation plan outlined in three components: prevention, emergency response and water supply.

More particularly, the guidelines issued by the Public Safety Minister concerning the development of this plan stressed the importance of the water supply component in responding to fires: [TRANSLATION] “*The availability of water and the reliability of the water supply have a direct impact on the effectiveness of responses.*”<sup>1</sup> These guidelines therefore require the SIM to have a thorough knowledge of the condition of fire hydrants and the water supply system and its capacity in the different parts of the City’s territory.

To provide fire protection on the territory of the agglomeration of the Ville de Montréal (the City), the SIM relies on some 31,000 fire hydrants. Most are on public land, with some 22,600 (73%) located on the City’s territory and about 7,350 (24%) in related municipalities. The remaining 1,050 (3%) are private property fire hydrants, generally located on land belonging to companies or institutions.

It is therefore vitally important that fire hydrants be accessible and in good operating condition in order to carry out effective emergency responses. For the territory of the agglomeration covered by the SIM, the Service de l’eau (SE), related municipalities or private owners are responsible for fire hydrant management, depending on the areas of jurisdiction established. In the first case, for fire hydrants located on the City’s territory, the SIM must rely on the SE,

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<sup>1</sup> *Orientations du ministre de la Sécurité publique en matière de sécurité incendie*, May 2001.

which in turn relies on the 19 boroughs to perform maintenance work on them in accordance with current standards. In the second case, the SIM must rely on related municipalities for fire hydrants located on their territories. And lastly, for private property fire hydrants, it is the owners who are responsible for maintenance work. The SIM can be assured that they are in good working order only during preventive inspections.

In its fire safety cover plan, the SIM provided for a series of measures aimed at improving the water supply. Responsibility for implementing these measures was shared between the SIM and the SE,<sup>2</sup> depending on the task. With respect to the serviceability of fire hydrants, this sharing of responsibilities is described as follows:

The SIM was to:

- complete the inventory of locations of existing fire hydrants integrated in the répartition assistée par ordinateur (RAO) application;
- make available information on the condition of fire hydrants and the flow available from them using computers in vehicles;
- improve reporting and monitoring of the condition of defective fire hydrants;
- establish and maintain liaisons with the Service de l'eau and related municipalities, who are responsible for providing an adequate water supply for firefighting.

The SE was to:

- complete the overall flow rate and pressure profile for the City's entire waterworks system;
- improve the inspection, maintenance and condition of fire hydrants.

Moreover, knowledge of the condition of water assets, including fire hydrants, is important not just for fire safety purposes, but also for the purpose of complying with the City's equipment and infrastructure policy.<sup>3</sup> Through this policy, the City set the goal of determining the planning activities necessary to keep its equipment and infrastructures in good working order, by means of a structured preventive maintenance program. The policy stresses that in order to ensure that information relevant to decision-making is provided on a timely basis, it is important that managers have a complete, permanent inventory of assets and their condition.

At the end of the implementation period for the fire safety cover plan, from 2009 to 2013, we think it is appropriate to assess the extent to which the SE and the SIM implemented the proposed measures concerning fire hydrants in order to validate certain aspects of the

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<sup>2</sup> Known as the Direction de l'eau when the fire safety cover plan was adopted.

<sup>3</sup> This policy is part of the budget documents approved every year by City council and the urban agglomeration council. It was approved for the first time when the 2004 budget was adopted.

equipment and infrastructure policy. Our findings and recommendations can then be taken into account when the fire safety cover plan provided for in the *Fire Safety Act*<sup>4</sup> is revised.

## 2. Purpose and Scope of the Audit

From the standpoint of fire protection, the objectives of the audit were to ensure that:

- the SE has an accurate overall picture of fire hydrant maintenance so that it can show that boroughs are complying with both current standards and those established by the City;
- the SIM has reliable information on the condition of fire hydrants and their available flow.

While a discussion about fire protection must consider numerous factors, such as prevention, operations and the water supply, our audit focused more specifically on the water supply component since it includes both hydrant maintenance management and the SIM's knowledge of the hydrants' condition.

Our audit focused mainly on fire hydrant maintenance activities carried out in 2013, but also takes into account information that was submitted to us up to March 2014. For some elements, data prior to 2013 were also taken into account.

It should be noted that the term "maintenance," as used in this audit report, encompasses inspections, repairs and preventive maintenance carried out on fire hydrants.

Our audit focused on the SE's Direction de la gestion stratégique des réseaux d'eau (DGSRE) and the SIM's Direction de la prévention et de la planification. It was also conducted within the Direction des travaux publics of the following four boroughs: LaSalle, Rivière-des-Prairies–Pointe-aux-Trembles (RDP–PAT), Ville-Marie and Villeray–Saint-Michel–Parc-Extension (VSMPE).

## 3. Summary of Findings

Our audit revealed sectors where improvements need to be made. The following sections of this audit report reveal deficiencies in the areas of:

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<sup>4</sup> CQLR, chapter S-3.4.

- Establishment of fire hydrant maintenance standards (section 4.1):
  - The DGSRE has not explicitly established a framework governing fire hydrant maintenance;
  - Standards expressed in the form of objectives have not been circulated to boroughs for all maintenance activities;
  - The mechanism for prioritizing fire hydrant repair operations established by the DGSRE has not been clearly defined.
  
- Implementation of fire hydrant maintenance procedures (Section 4.2):
  - Planned fire hydrant inspections (Section 4.2.1):
    - Fire hydrant maintenance objectives appearing in target tables do not always comply with DGSRE standards,
    - Inspection activities carried out by boroughs are not always in compliance with the standards expected by the DGSRE;
  - Corrective maintenance of fire hydrants (Section 4.2.2):
    - The GEA application<sup>5</sup> does not provide access to real-time data and cannot be used to produce management reports to help plan and monitor corrective maintenance activities for fire hydrants,
    - The tools placed at the boroughs' disposal by the DGSRE are not used effectively to permit optimal management of their fire hydrant maintenance activities,
    - No objectives have been set concerning deadlines for maintenance work performed to correct deficiencies detected on fire hydrants;
  - Compliance with staff qualification requirements (Section 4.2.3):
    - There is a lack of compliance with provisions governing the qualifications of staff assigned to fire hydrant maintenance operations, set out in the *Regulation respecting the quality of drinking water*.<sup>6</sup>
  
- Profile of the condition of fire hydrants available to the SE (Section 4.3):
  - The SE does not have a comprehensive, up-to-date profile of the condition of fire hydrants on the City's territory.
  
- Profile of the condition of fire hydrants available to the SIM (Section 4.4):
  - The SIM does not have a comprehensive, up-to-date profile of public fire hydrants that are out of service or have flow rates below the minimum threshold set by the Ministère de la Sécurité publique;
  - The SIM is not assured of having a comprehensive, up-to-date profile of the condition of fire hydrants located on the territories of related municipalities;

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<sup>5</sup> gestion de l'entretien des actifs.

<sup>6</sup> *Gazette officielle du Québec [GO]. Part 2*, vol. 133, no. 24, June 13, 2001, p. 3561–73.

- The SIM has neither a complete inventory of private fire hydrants located on the agglomeration’s territory nor a profile of their condition;
  - The SIM is still unable to identify all problematic sectors, in terms of flow rates and pressures, that impact on fire protection on the agglomeration’s territory.
- Accountability reporting (Section 4.5):
    - The SIM activity report does not give an account of the implementation of the measures pertaining to the profile of the condition of fire hydrants and the flow rate profile for the entire system, as provided for by the SE in the fire safety cover plan;
    - Accountability mechanisms for management of fire hydrants involving the SIM, the SE and the boroughs have not been established;
    - The revision of the fire safety cover plan was not completed during the sixth year, as provided for in the *Fire Safety Act*, and the Ministère de la Sécurité publique was not formally notified of a new deadline.

## 4. Detailed Findings and Recommendations

Various references for standards and regulations governing fire hydrant maintenance specify the obligations enforceable by municipal administrations as well as good practices, including:

- Code national de prévention des incendies (CNPI);<sup>7</sup>
- American Water Works Association<sup>8</sup> (AWWA) standards;
- Directive 001<sup>9</sup> of the Ministère de l’Environnement;<sup>10</sup>
- The *Regulation respecting the quality of drinking water*;
- The technical training guide for waterworks system attendants.<sup>11</sup>

With respect to Canadian standards, the CNPI uses American standards for inspection, testing and maintenance of water-based fire protection systems. Furthermore, the AWWA recommends:

- fire hydrant inspections at least once every two years and after each use;
- inspections twice a year in freezing weather;
- flow tests on water distribution systems to determine the flow available at various sites.

<sup>7</sup> Code national de prévention des incendies – Canada 2010 – NRCC 53303.

<sup>8</sup> The AWWA is the largest scientific and educational association dedicated to managing and treating water. It provides solutions to improve public health and protect the environment.

<sup>9</sup> Directive 001 – “Captage et distribution de l’eau,” which came into force on February 20, 1984, and was revised in August 2002.

<sup>10</sup> Now known by the name Ministère du Développement durable, de l’Environnement et de la Lutte contre les changements climatiques.

<sup>11</sup> “Formation technique des compagnons – Profil P6B,” Cégep de Saint-Laurent.



At the provincial level, Directive 001 of the Ministère de l'Environnement provides that water asset operators must carry out two inspections a year: [TRANSLATION] “*a special inspection of water mains and all fire hydrants and valves at the end of the spring (after the thaw) and every year in the fall before the first snowfall.*”

Furthermore, it should be stressed that the *Regulation respecting the quality of drinking water* requires that the work of operating and monitoring facilities, including fire hydrants, must be performed by a person certified as qualified. In addition, persons in charge of a distribution system must, as of March 8, 2012, have proof that their employees are competent and hold a certificate of qualification to work as a waterworks system attendant issued by Emploi-Québec.

The training leading to this qualification covers the components of fire hydrant maintenance:

- Complete inspections at least once a year;
- Spot inspections: before (if hydrants are used for purposes other than putting out a fire [e.g., a contractor]) and after each use;
- Winter inspections to ensure that fire hydrants are not frozen;
- Repair of defects following observations noted during inspections.

What the reference documents have in common is that they all state that fire hydrants must be inspected twice a year to ensure that they are in proper working order, that spot inspections must be conducted on them following their use and that any malfunctions detected in them must be repaired.

Compliance with requirements and good practices regarding fire hydrants helps ensure the efficiency of operations during a fire. In this regard, the SIM mentioned, in its fire safety cover plan, the importance of:

- The location of fire hydrants;
- Rapid identification of out of service fire hydrants;
- Diligent repair and inspection of fire hydrants;
- Regular preventive maintenance of fire hydrants;
- A minimum flow rate of 1,500 L/min for fire hydrants.

While these are important, the SIM is concerned only with the following aspects: knowledge of fire hydrants: where they are located, which ones are not in serviceable condition and which ones have flow rates below 1,500 L/min, if any. Accordingly, the SIM assumes that the other fire hydrants are functional. It therefore relies on maintenance work carried out by the 19 boroughs and 14 related municipalities (not counting the institutions and businesses with private fire hydrants). The SE, as the unit responsible for the boroughs' assets, plays an

important role, ensuring that the boroughs comply with standards and good practices and helping them achieve their fire hydrant maintenance objectives. In the case of fire hydrants located in related municipalities, each related municipality is responsible for ensuring compliance with standards and good practices as are the owners in the case of fire hydrants located on private land.

This is the context in which fire hydrants are managed as assets to be used for fire protection purposes. In this audit report, we first discuss the establishment of maintenance standards for fire hydrants located on the agglomeration's territory. Second, we discuss the implementation of maintenance procedures for them, including inspections and repairs. For this purpose, we examined more specifically fire hydrants located on the City's territory, since our audit did not concern related municipalities. Third, we discuss the profile of the condition of fire hydrants available to the SE, as the unit responsible for this type of asset. Fourth, we report on the profile of the condition of fire hydrants available to the SIM, including both public fire hydrants managed by the SE and related municipalities and private fire hydrants. Finally, we address the issue of accountability mechanisms established to inform decision-makers about fire protection and asset management for fire hydrants managed by the SE.

### 4.1. Establishment of Fire Hydrant Maintenance Standards

The standards communicated to officers in charge of fire hydrant maintenance must be based on current standards and good practices in the field. In a complex organizational structure, common standards must be agreed upon to promote a uniform understanding on the part of the various stakeholders.

During our audit, we therefore examined whether common standards had been established throughout the agglomeration's territory. Next, more specifically with regard to the City, we assessed the extent to which fire hydrant maintenance standards that were in compliance with current regulations and good practices in the field had been established and circulated by the SE.

#### 4.1.1. Establishing Common Standards for the Agglomeration

##### 4.1.1.A. Background and Findings

When the fire safety cover plan was developed, a fire hydrant maintenance profile was produced for all boroughs and related municipalities. In particular, this profile brought to light

differences in the ways inspections were conducted, the type of maintenance carried out and criteria used to classify fire hydrants as out of service. In order to meet an adequate level of fire hydrant inspection and standardize fire hydrant maintenance on the agglomeration's territory, the fire safety cover plan stipulated that the Direction de l'eau,<sup>12</sup> boroughs and related municipalities had to agree on common standards no later than 2008.

According to the information obtained, since the adoption of the fire safety cover plan in December 2008, the SIM has held meetings with the SE and related municipalities in which the issue of fire hydrant maintenance has been addressed. However, common standards have not been agreed upon.

Considering that six years have elapsed since the adoption of the fire safety cover plan, we think it would be appropriate for the SIM to update the fire hydrant maintenance profile in order to determine whether boroughs and related municipalities still had different practices resulting from different interpretations of the information that was sent to them. We discuss this matter in Section 4.4 of this audit report, which concerns the profile of the condition of fire hydrants available to the SIM.

## 4.1.2. Setting and Disseminating Standards for Ville de Montréal

### 4.1.2.A. Background and Findings

Within the SE, it is specifically the DGSRE, in partnership with the boroughs, that is responsible for setting up a management structure for secondary water system assets, mainly in the areas of infrastructure maintenance and renewal.

Besides setting hydrant maintenance standards, we examined the extent to which these standards were defined and circulated to the boroughs and whether management tools had been made available for follow-up purposes.

First, with respect to setting standards, within the framework of the development of the *Plan d'intervention pour les réseaux d'aqueduc et d'égout*, the SE produced the *City of Montreal State of the Infrastructure Report for Water Distribution and Wastewater Collection Systems* in 2009,<sup>13</sup> which established the type and frequency of operations considered necessary for

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<sup>12</sup> Name of the SE when the fire safety cover plan was developed.

<sup>13</sup> This report presents a comprehensive qualitative picture of the condition of secondary water systems and their related assets for each borough, as well as an assessment of the operations and investments required for maintenance purposes.

the maintenance of the different secondary system assets, based on good practices. Table 1 shows fire hydrant maintenance operation details.

**Table 1 – Operations Required for Fire Hydrant Maintenance  
According to the 2009 State of the Infrastructure Report**

Fire hydrant maintenance activity	Frequency of operation
Complete inspection, including pressure and flow rate measurement	Once/year
Partial inspection (visual, winterization, etc.)	Once/year
Minor repair (painting, etc.)	Once/4 years
Internal mechanism repair (major repair)	Once/25 years
Fire hydrant replacement	Once/75 years

Second, these standards are disseminated through partnership agreements that are concluded every year between the DGSRE and each borough. These agreements formalize both the boroughs' commitment to perform maintenance work on assets on their territories and the support provided by the DGSRE. The agreements also stress the need to use corporate tools to supply the databases.

For each borough, the partnership agreement refers to a target table in which objectives are set for certain water asset maintenance activities. In these tables, the standards governing complete and partial inspections of fire hydrants are expressed in the form of objectives for their entire inventory. Every month, boroughs must compile their achievements in these tables. For fire hydrant repair and replacement, the DGSRE did not express standards in the form of objectives set for boroughs. Nevertheless, in the comprehensive 10-year vision of the Montreal Water Strategy<sup>14</sup> and its strategic objectives (adopted by the urban agglomeration council in June 2012), the SE outlined specific objectives for fire hydrants that were to be achieved on an ongoing basis (2011–2020):

- Repair 4% of fire hydrants every year;
- Replace 1.33% of fire hydrants every year.

The boroughs are to enter in the target table on a monthly basis the number of repairs (minor, major) and replacements carried out, without any objectives established.

With respect to the other types of inspections prescribed as good practices, spot inspections and winter inspections, the DGSRE has not issued clear guidelines. According to the information obtained, boroughs are responsible for implementing them. However, our audit

<sup>14</sup> *Rapport du Comité de suivi du projet d'optimisation du réseau d'eau potable – Version intégrale*, September 2011.

revealed no evidence that any such inspections were conducted. We think that clear guidelines should be issued to boroughs for deciding on how to conduct such inspections so that they are in compliance with good practices.

Third, with respect to the definition of standards and the management tools made available to boroughs, we first noted that there are two standardized inspection sheets produced by the DGSRE: a complete inspection sheet and a partial inspection sheet. Each lists a set of potential deficiencies that might be detected during inspections. Table 2 shows the operations that must be carried out during inspections.

**Table 2 – Operations Carried Out During Fire Hydrant Inspections**

Operation	Complete inspection	Partial inspection
Checking of parts and accessories	√	√
Leak detection (flow tests)	√	
Handling of isolation valve	√	
Static and dynamic pressure measurements	√	

However, during our audit, we did not find any management frameworks or formal guidelines that would make the use of such sheets mandatory and define the types of deficiencies appearing on them (e.g., an out of service fire hydrant) so that operations could be standardized and differences in interpretation avoided.

We did, however, track down a memo that was circulated to boroughs, in which the DGSRE marked each deficiency appearing on inspection sheets as major or minor. Even though the DGSRE requests the number of major and minor repairs, we think that boroughs cannot use such data later to assess whether an objective related to fire hydrant repair was achieved.

The DGSRE also developed a model for prioritizing operations (repairs) performed on fire hydrants. In addition to all the deficiencies that can be identified on fire hydrants, inspection sheets include the following six categories of “restoration priorities”:

- Immediate restoration required;
- Urgent restoration required;
- Urgent restoration required before the winter;
- To be restored in the medium term;
- Possibly needs to be restored;
- No deficiencies.

The restoration priority established by the DGSRE is an optional tool that was originally introduced to assist boroughs with management. We noted that no guidelines were issued to

define restoration priorities. Indeed, our work revealed discrepancies among boroughs in their interpretation of both deficiencies (e.g., deficiencies in the out of service category) and restoration priorities (e.g., “urgent restoration required” as opposed to “immediate restoration required”).

For example, the stakeholders we met agreed that an out of service hydrant was an immediate restoration priority. One deficiency for which a fire hydrant can be considered out of service is inaccessibility. Some stakeholders we met followed this rule, but others did not, because they considered the hydrant operational. The ambiguity lies in the fact that hydrants are inspected with different objectives in mind: either to ensure fire protection or to manage this type of asset. This situation affects the classification of the fire hydrant when a level of restoration prioritization needs to be set. In fact, some consider that an inaccessible fire hydrant calls for an immediate restoration priority while others consider this to be “no deficiencies.”

The lack of guidelines paves the way for a lack of consistency in determining the operating condition of fire hydrants, which is likely to affect both the overview of all fire hydrants available to the SE and the reporting of out of service hydrants to the SIM. We think that the DGSRE should define those priorities so that inventory profiles can be compared between boroughs.

Finally, to help manage the maintenance of water assets that pertain to fire hydrants, the DGSRE, in collaboration with the Service des technologies de l’information and boroughs, saw to the development of the corporate “asset maintenance management” application (GEA). Entering data on fire hydrant maintenance activities should facilitate the boroughs’ planning and monitoring of operations for the purpose of showing that standards are met and objectives are achieved. This application could be said to be an effort on the part of the DGSRE to brief boroughs on the importance of compiling data on water asset maintenance, as stipulated in partnership agreements. In Section 4.2 we discuss the use of the GEA application.

In closing, we think that all fire hydrant maintenance activities overseen by the DGSRE must be an integral part of uniform maintenance standards, so that boroughs have a uniform understanding of them. While the responsibility for maintaining these assets was delegated to boroughs, the fact remains that the SE is responsible for managing them and is therefore entitled to define its expectations. Furthermore, the City, in its equipment and infrastructure policy, stresses the importance of having a structured preventive maintenance program and keeping a comprehensive perpetual inventory of its assets and their condition to ensure that it has complete information relevant to decision-making and sound management of public

funds. For this purpose, the DGSRE must issue clear guidelines on the manner in which prioritization categories are to be used by boroughs. Not only will this assist them in planning and provide them with a reliable profile of the condition of their inventories, it will also eventually help them reach the point where they can keep fire hydrants in good working order, thereby facilitating the SIM's responses. It is a given that an adequate management framework implies appropriate support (e.g., training) and follow-up for the boroughs provided by the DGSRE.

#### 4.1.2.B. Recommendation

**We recommend that the Direction de la gestion stratégique des réseaux d'eau establish a management framework based on current standards and good practices in order to better define fire hydrant maintenance with respect to:**

- **all inspection and repair activities that need to be carried out, as well as their frequency;**
  - **the interpretation of any deficiencies that may be observed during inspections;**
- so that boroughs have standardized practices with a view to sound asset management and fire protection.**

#### **Business unit's response:**

*[TRANSLATION] One way in which practices will be standardized is by delegating maintenance work to boroughs through the adoption of a by-law respecting the delegation of separate powers. This by-law will reference a guide for boroughs on the secondary water and sewer system maintenance activities carried out by boroughs. (Planned completion: December 2015)*

*Another way in which practices will be standardized is by establishing a training program for employees assigned to maintenance work. (Planned completion: June 2016)*

#### 4.1.2.C. Recommendation

**We recommend that the Direction de la gestion stratégique des réseaux d'eau express all standards for the inspection, repair and replacement of fire hydrants in terms of objectives and include these in the target tables provided for in partnership agreements so that all boroughs can help achieve the results expected by the Service de l'eau and the Service de sécurité incendie de Montréal.**

#### **Business unit's response:**

*[TRANSLATION] Based on results of fire hydrant inspections, objectives for repairing and replacing them will be set for boroughs based on restoration priorities for current*

and future years. Inspection objectives, on the other hand, will be included in the target table. **(Planned completion: April 2015)**

#### 4.1.2.D. Recommendation

**We recommend that the Direction de la gestion stratégique des réseaux d'eau define the manner in which all the restoration priorities appearing on fire hydrant inspection sheets are to be interpreted so that practices can be aligned and profiles of the condition of fire hydrants can be compared between boroughs.**

#### Business unit's response:

*[TRANSLATION] The DGSRE will review restoration priorities based on deficiencies and they will be defined in the guide on the maintenance work delegated to boroughs, which will help standardize all operations for all boroughs. **(Planned completion: December 2015)***

## 4.2. Implementation of Fire Hydrant Maintenance Work

Boroughs must plan their maintenance activities in such a way that they meet the standards established by the DGSRE in order to comply with good practices. In carrying out activities, they must use common management tools, not only to ensure consistency in practices, but also to supply databases that can be used to make management information accessible.

In our audit, we examined the extent to which boroughs carried out maintenance activities in accordance with established standards. Even though planned inspection activities and corrective maintenance activities are closely related, we discuss them separately. We also examined the extent to which maintenance activities were carried out by qualified resources.

### 4.2.1. Planned Fire Hydrant Inspections

#### 4.2.1.A. Background and Findings

First it should be pointed out that a fire hydrant inspection can be conducted internally (by the boroughs' blue-collar workers) or contracted out to an external firm, in accordance with standards determined in the target table. In both cases, complete inspections are generally carried out in the spring, while partial inspections take place in the fall. In the following paragraphs, we will briefly outline the inspection process.



For boroughs that conduct inspections internally, inspections must be documented by the inspector on the DGSRE's standardized inspection sheets. Once inspections are completed, a restoration priority should be assigned to each fire hydrant so that repairs can be planned on the basis of their degree of urgency.

On an ongoing basis, an office clerk or technical officer enters data from each inspection sheet in the GEA application. Accordingly, data on the condition of fire hydrants (concerning deficiencies) are updated.

For boroughs that contract out fire hydrant inspection to external firms, the DGSRE has standardized, in tender documents, a deficiency chart that appears on inspection sheets. In 2013, 11 of the City's 19 boroughs hired external firms to conduct complete inspections.

The results of inspections are compiled in an electronic file initially provided by the borough. When all of the inspections are completed by the external firm, this file is loaded directly in the GEA application to update data that can be used to describe the condition of fire hydrants (concerning deficiencies). According to the specifications, the hired firms submit a report on inspection results that includes the prioritization of maintenance operations to be carried out on fire hydrants based on the deficiencies detected. This prioritization is set according to the firm's judgment.

During their inspections, inspectors both from the boroughs and from external firms must report any deficiency identified that prevents or compromises fire protection (e.g., out of service fire hydrants<sup>15</sup>) as soon as it is detected. Boroughs should be able to refer to these reports to notify the SIM of them and promptly perform the corrective maintenance work necessary to restore defective fire hydrants to working order.

To assess the effectiveness of steps taken by the DGSRE to oversee fire hydrant management, we first examined whether inspection standards expressed in terms of objectives had been circulated to boroughs. We also evaluated whether the objectives set were achieved.

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<sup>15</sup> Examples of reasons for categorizing a fire hydrant as out of service: inaccessibility of the hydrant, obstruction to the handling of the hydrant, total or partial obstruction of the internal mechanism of the hydrant, no water supply, frozen hydrant.

## Application of Inspection Standards of the Direction de la gestion stratégique des réseaux d'eau

To do this, we compared the objectives appearing in the target table that was provided for in partnership agreements with the expected inspection standards (complete and partial inspections for the entire inventory) for the four boroughs selected. Two of the boroughs selected, LaSalle and RDP-PAT, contract out their inspections to external firms while Ville-Marie and VSMPE boroughs conduct their inspections internally. The results of this comparison are presented in Table 3.

**Table 3 – Fire Hydrant Inspection Objectives Appearing in  
Target Tables Provided for in Partnership Agreements – 2013**

Planned fire hydrant inspection activity	Boroughs			
	LaSalle	RDP-PAT	Ville-Marie	VSMPE
Fire hydrant inventory <sup>[a]</sup>	1,533	2,210	1,330	1,223
Complete inspection	100%	100%	100%	100%
Partial inspection	100%	0%	100%	100%

<sup>[a]</sup> Based on the 2009 inventory.

The DGSRE established fire hydrant inspection standards; however, we noticed right at the outset that one of the objectives in the target tables provided for in partnership agreements does not meet these standards. RDP-PAT borough had only an objective of carrying out complete inspections. We think that a target that meets the established standards should have been set to ensure consistency in methods.

Inspection activities planned by LaSalle and VSMPE boroughs are in compliance with the standards defined by the DGSRE, which is also reflected in the objectives appearing in the target tables that were provided for in partnership agreements.

In Ville-Marie borough, the objectives shown in the target table correspond to the standards established by the DGSRE, but in the following paragraphs, we will show that the achievement of these objectives is another matter altogether.

### Carrying out Planned Inspection Activities

Second, we attempted to assess the extent to which boroughs achieved the targets set by the DGSRE. To do this, we compared data from inspections conducted with their

corresponding objectives shown in the target tables provided for in partnership agreements in 2013. The results are shown in Table 4.

**Table 4 – Planned Inspections Conducted According to Target Tables Provided for in Partnership Agreements – 2013**

	Boroughs							
	LaSalle		RDP-PAT		Ville-Marie		VSMPE	
Inspection	Complete	Partial	Complete	Partial	Complete	Partial	Complete	Partial
Objective <sup>[a]</sup>	1,533	1,533	2,210	0	1,330	1,330	1,223	1,223
Achievement <sup>[b]</sup>	1,538	1,534	2,307	0	60	546	1,221	1,002
Percentage	100%	100%	104% <sup>[b]</sup>	N/A	5%	41%	100%	82%

<sup>[a]</sup> Based on the 2009 fire hydrant inventory.

<sup>[b]</sup> Inspections were carried out on fire hydrants that had not been inventoried in 2009.

Although the DGSRE has made certain means (e.g., additional resources) available to boroughs to assist them in the maintenance activities that were delegated to them, we note that two boroughs did not reach the objectives set.

This is the case for Ville-Marie borough, for example. Its target table shows that out of an inventory of 1,330 fire hydrants, 60 complete inspections, or 5%, were conducted. Even with this low percentage, we are unsure of its validity because stakeholders told us that they have not conducted complete inspections since 2011. As a result of our audit, we discovered that in reality, this rate represents inspections conducted on defective fire hydrants to confirm deficiencies that were already known to exist before they were repaired. Diagnosis of the condition of a fire hydrant is a step in the repair procedure rather than a complete inspection. As a result, we have no evidence that complete inspections, in accordance with the DGSRE's standards, were actually conducted by the borough. As for partial inspections, we found that 41% (546 out of 1,330) of them were conducted by Ville-Marie borough. According to the borough's stakeholders, this result can be explained by operational weaknesses. Some of the factors cited are non-optimal work organization, the complexity inherent in conducting operations in a core sector such as downtown, the obsolescence of assets, and the limited resources in the face of the extensive needs associated with their delegated responsibilities.

This is also the case with VSMPE borough, which achieved 82% (1,002 out of 1,223) of the partial inspection objective. According to the information obtained, this borough introduced and began conducting complete inspections for the first time in 2013, in addition to conducting the partial inspections that were already part of the borough's practices. The stakeholders we met explained that this situation arose because the introduction of the new complete inspection activity required an additional effort to review the organization of the work and resources as well as to become familiar with the various tools and systems.

When boroughs fail to carry out an activity related to a complete inspection, and when their partial inspection objectives are not achieved, they do not meet the maintenance standards requirements defined by the DGSRE. The result is that deficiencies are not detected on fire hydrants, and appropriate corrective action cannot be taken diligently. This also prevents boroughs and the SE from having an accurate profile of the operating condition of fire hydrants.

During our audit, we discussed these results with DGSRE stakeholders. It appears that because of the condition of their assets, some boroughs have too many repairs to carry out. They struggle to conduct the necessary repair work to correct malfunctions already known to exist and improve the condition of their assets. In these circumstances, these boroughs consider it less appropriate to invest resources in inspection activities. This is the case for Ville-Marie borough, for example, which has introduced only partial inspections, and for RDP–PAT borough, which conducts only complete inspections. This will be discussed in Section 4.3.

In conclusion, on the subject of planned inspections, we noted that fire hydrant standards were not applied consistently in the boroughs selected. We think that uniform targets should be set for all boroughs in order to comply with good practices. As well, boroughs should take the necessary steps to meet the targets set for inspections that need to be conducted.

#### 4.2.1.B. Recommendation

**We recommend that the Direction de la gestion stratégique des réseaux d'eau set uniform targets for all boroughs in order to comply with the standards established in accordance with good practices so that they can ensure sound management of their assets and meet fire protection requirements.**

#### Business unit's response:

*[TRANSLATION] The DGSRE will set uniform targets for all boroughs in order to comply with the standards established in accordance with good practices. The targets will be defined in the guide on standardized maintenance work that will be part of the by-law respecting the delegation of separate powers to boroughs in the area of secondary water and sewer system maintenance activities. (Planned completion: December 2015)*

#### 4.2.1.C. Recommendation

We recommend that Rivière-des-Prairies–Pointe-aux-Trembles, Ville-Marie and Villeray–Saint-Michel–Parc-Extension boroughs take the necessary steps to ensure that fire hydrant inspection activities are carried out in accordance with the standards established by the Direction de la gestion stratégique des réseaux d'eau so that they meet requirements in the areas of sound management of assets and fire protection.

#### Business units' responses:

##### **RIVIÈRE-DES-PRAIRIES–POINTE-AUX-TREMBLES BOROUGH**

*[TRANSLATION] The section manager will be mandated to establish the following:*

- *Up-to-date inventory of the number of fire hydrants:*
  - *Public domain;*
  - *Private domain. (Planned completion: February 2015)*
- *Evaluation of the resources needed to conduct partial inspections on an annual basis:*
  - *Human resources (positions and deadlines);*
  - *Material resources. (Planned completion: March 2015)*

*A meeting will be scheduled with the DGSRE division manager in order to take advantage of the following under the 2015 partnership agreement:*

- *Renewal of the contract for the complete inspection of fire hydrants on an annual basis through the involvement of the DGSRE;*
- *Development and availability of a budget dedicated to the borough to pay for resources for partial inspection of all fire hydrants on an annual basis. (Planned completion: March 2015)*

*Every year the section manager will submit a report to the division manager that will be useful in the analysis of objectives pertaining to progress associated with partial inspections of fire hydrants. (Planned completion: June 2015)*

*Resources assigned to partial inspections will be adjusted as needed in order to achieve the objective established on an annual basis. (Planned completion: June 2015)*

##### **VILLE-MARIE BOROUGH**

*[TRANSLATION] In 2015, the borough intends to:*

- *ensure that complete inspections will start up at the end of April, with a 60-day window to complete them; (Planned completion: May 2015)*
- *award a contract in May for partial inspections in the fall. (Planned completion: December 2015)*

**VILLERAY–SAINT-MICHEL–PARC-EXTENSION BOROUGH**

*[TRANSLATION] As per our request, the DGSRE will outsource complete inspection of fire hydrants to an external firm. (Planned completion: June 2015)*

*Partial inspection of fire hydrants will be conducted by our team internally. (Planned completion: October 2015)*

## 4.2.2. Corrective Maintenance of Fire Hydrants

### 4.2.2.A. Background and Findings

From the standpoint of sound asset management and fire protection, it is expected that boroughs carry out corrective maintenance work diligently when deficiencies are detected. In order to manage these operations effectively, prioritization mechanisms should be established to help assign resources in an optimal manner to ensure that assets are in serviceable condition.

To assess the extent to which repairs were carried out by boroughs, we wanted to evaluate the repair rates of fire hydrants based on the prioritization categories in which they were classified, as well as repair times. Since none of the boroughs was able to provide this information, we attempted to understand how they carried out their repair work.

Since the prioritization set out on inspection sheets has yet to be defined by the DGSRE, we first examined the prioritization methodology used by each of the boroughs selected. As previously stated, fire hydrant inspection sheets include six categories of “restoration priorities,” but the DGSRE did not determine either the deficiencies or the factors used to characterize any of these categories.

Our examination revealed the following facts:

- In the two boroughs where inspections are conducted by an external firm (LaSalle and RDP–PAT), fire hydrants are classified according to the six categories established by the DGSRE, based on the judgment of the external firm’s inspectors. Despite this classification, it is the stakeholders within the boroughs that ultimately decide on the order of priorities for all repairs to be carried out.
- For Ville-Marie borough, the stakeholders we met told us that the restoration priority should be determined as part of partial inspections, based on the categories established by the DGSRE. However, our audit revealed that 21% of the partial inspection sheets compiled<sup>16</sup> did not specify the restoration priority.

<sup>16</sup> 460 partial inspection sheets were compiled out of a total of 546 appearing in the target table.

- In the case of VSMPE borough, the six prioritization categories developed by the DGSRE are not used. Instead, according to the information obtained, three categories serve to determine restoration priority according to the judgment of an employee in charge of coordinating repairs.

The stakeholders we met are of the view that, in order to establish the proper order of priorities for restoration, in addition to the deficiencies noted, the reality of each borough and how it affects operating conditions should also be considered. Considerations like these involve more than just placing deficiencies in order of rank. For example, a fire hydrant located in a core sector such as a hospital would be a factor to take into account in establishing a priority. Other factors (e.g., presence of construction sites, traffic density, parking constraints) can play a key role in evaluation of the order of operations.

Although prioritization methodologies are applied differently from one borough to the next, all the stakeholders we met with agree on the importance of taking immediate action in the case of deficient fire hydrants in the out of service category, since they directly compromise the effectiveness of fire protection.

Since this is a common concern shared by boroughs, we examined specifically the repair rate of deficient fire hydrants in the out of service category. To do this, we compiled evidence of repair work that was carried out on such fire hydrants from the inspection date in 2013 to the end of 2013. For these repairs, we also examined the extent to which repairs had been recorded in the GEA application. Lastly, we noted the time frames in which repairs had been carried out. The result of this analysis is shown in Table 5.

**Table 5 – Repair Work Performed on Out of Service Fire Hydrants in 2013**

Borough	Out of service fire hydrants – 2013 inspection <sup>[a]</sup>	Evidence of repair as of December 20, 2013			
		Number <sup>[b]</sup>	Percentage	Average repair time (days)	Entry in the GEA application (number)
LaSalle	14	13	93%	72	9
RDP-PAT	34	14	41%	72	14
Ville-Marie	19	2	11%	60	0
VSMPE	16	4	25%	26	0
<b>Total</b>	<b>83</b>	<b>33</b>	<b>40%</b>		<b>23</b>

<sup>[a]</sup> Source of data: results of inspections conducted in 2013.

<sup>[b]</sup> Sources of data: GEA application, repair sheets or auxiliary files kept by boroughs.

First, the analysis shows, on the one hand, that only 40% of out of service fire hydrants for the boroughs selected were repaired in 2013. Since fire hydrants with this type of deficiency



are considered a priority by stakeholders, we expected a much higher repair rate, especially considering the impact on fire protection. On the other hand, 70% (23/33) of these repairs were recorded in the GEA application. The stakeholders we met gave various reasons for these results:

- In LaSalle borough, the problem is not with the repair rate for out of service hydrants, since 93% of them were repaired, but rather the repair entry rate in the GEA application. According to stakeholders, there is a considerable time lag between fire hydrant inspections and the loading of deficiencies identified into the GEA application. In many cases, the repair work had already been carried out prior to the data transfer. This situation contributes to the accumulation of repair sheets and increases the risk that data will not be recorded.
- In RDP–PAT borough, the problem concerns the repair rate for out of service fire hydrants (41%). According to the information obtained, corrective maintenance of fire hydrants is one of many activities for which employees assigned to work on water mains and sewers are responsible, and it is carried out only when resources are available. Moreover, all repairs were recorded in the GEA application.
- In Ville-Marie borough, the low repair rate for out of service fire hydrants (11%) can likewise be explained by the fact that repairs are carried out only when resources are available. Moreover, there is a major problem concerning the use of the GEA application to manage fire hydrant repairs.
- For VSMPE borough, while we obtained evidence that 4 out of 16 (25%) out of service fire hydrants were restored to working order, people in charge stated that they repaired 13 of them (81%). The reason given for this discrepancy is that repairs are not systematically documented by work orders, and when they are, repair sheets are not always posted in the GEA application, mainly because they are not completed.

To improve the rate at which repairs are carried out and recorded in the GEA application, we believe that several steps should be taken. First, the application should provide access to the real-time data needed for adequate management of maintenance activities. The problem with time lags between the start of inspections and the transfer of inspection data to the GEA application affects all boroughs for which inspections are conducted by external firms. Since this time lag can last up to three months, it is impossible for boroughs to record repair data during this interval, because the corresponding deficiencies do not appear in the application. Consequently, with this mode of operation, it is not possible to have real-time data. The second step is to encourage boroughs to enter all repair data promptly in the GEA application.

Finally, the third step is to make the application capable of producing management reports so that corrective maintenance work performed on fire hydrants can be planned and monitored. At present, the GEA application cannot be used to produce management reports,



for example for the purpose of measuring repair times. This situation leads us to question how diligently repairs are carried out by boroughs.

During our audit, we calculated that the average repair times for out of service fire hydrants ranged from 26 to 72 days, depending on the borough (see Table 5). Other than the comparison of the different boroughs, what we found significant was the level of emergency response assigned to out of service fire hydrants. We find it difficult to conceive that these fire hydrants were not repaired for several months after they were found to be “out of service,” especially since the people we met with stressed the urgency of taking action to remedy the deficiencies. The situation is even more troubling if we consider that, as of December 20, 2013, 60% of out of service fire hydrants had not yet been repaired (in Ville-Marie borough, for instance, there are fire hydrants that have been out of service since 2012).

According to the information obtained, the DGSRE and the boroughs have to date not agreed on standard repair times. In our opinion, it would be appropriate for the DGSRE to decide on a maximum response time for the repair of fire hydrants with such deficiencies.

#### 4.2.2.B. Recommendation

**We recommend that the Direction de la gestion stratégique des réseaux d’eau make a corporate application available to boroughs that:**

- **provides access to real-time data;**
- **can be used to generate management reports;**

**in order to be able to achieve optimal management of fire hydrant maintenance activities.**

#### **Business unit’s response:**

*[TRANSLATION] Development of a mobile application is under way to allow inspection data to be entered in the field in real time. Rollout will begin in 2015, with complete implementation scheduled for 2018. The DGSRE will introduce standardized management reports based on data from the GEA application beginning on December 31, 2015. (Planned completion: December 2018)*

#### 4.2.2.C. Recommendation

We recommend that LaSalle, Rivière-des-Prairies–Pointe-aux-Trembles, Ville-Marie and Villeray–Saint-Michel–Parc-Extension boroughs take the necessary steps to ensure that the tools placed at their disposal by the Direction de la gestion stratégique des réseaux d'eau (inspection sheets, gestion de l'entretien des actifs (GEA) application) are used systematically to support optimal management of fire hydrant maintenance activities and thereby promote the achievement of objectives.

#### Business units' responses:

##### LASALLE BOROUGH

*[TRANSLATION] Continue to use the tools placed at our disposal by the DGSRE to help achieve the objectives set. Confirm that staff certified as qualified to perform this task understand the work, and train staff as needed. (Planned completion: February 2015)*

*Create a working group that includes all partners who use data to evaluate tools, and suggest modifications that would make the tools more accurate and user-friendly. (Planned completion: May 2015)*

*Create a working group mandated to develop adequate training on how to enter data in the management system. (Planned completion: January 2016)*

##### RIVIÈRE-DES-PRAIRIES–POINTE-AUX-TREMBLES BOROUGH

*[TRANSLATION] The section manager will be mandated to assess the following:*

- *The inventory of unrepaired fire hydrants associated with previous inspections;*
  - *Evaluation of the availability of information on fire hydrant inspections for the current year;*
  - *Establishment of the borough's internal priorities;*
  - *Establishment of repair timeframes based on the type of priority;*
  - *Evaluation of available resources assigned to repairs (human and material).*
- (Planned completion: March 2015)***

*A meeting will be scheduled with the DGSRE division manager to obtain the budget to pay for both the human resources assigned by the borough to perform corrective maintenance work on fire hydrants and the leasing of equipment and purchase of materials, under the 2015 partnership agreement. (Planned completion: March 2015)*

*Every month the section manager will submit to the division manager a report specifying the inventory of fire hydrants to be repaired at the start of the season, including references to priority levels, desired response times and actual response times. (Planned completion: June 2015)*

Resources assigned to repair work will be adjusted as needed to take into account desired repair times for fire hydrants classified as out of service. **(Planned completion: June 2015)**

**VILLE-MARIE BOROUGH**

[TRANSLATION] Since early 2014, the borough has been using the GEA application systematically to produce and compile all fire hydrant inspection and repair activities. The borough works together with the DGSRE to ensure that data in target tables match data in the GEA application. **(Completed)**

**VILLERAY–SAINT-MICHEL–PARC-EXTENSION BOROUGH**

[TRANSLATION] Since complete inspections are carried out by the private contractor, the SE will enter data from the sheets in the GEA application. We will use only repair sheets. **(Planned completion: June 2015)**

For partial inspections (conducted internally), inspection sheets are printed from the GEA application by the office clerk and are submitted to inspectors. Following inspections, data from the sheets are entered again in the application for follow-up purposes and to generate the deficiencies report. This report is submitted to forepersons in charge of the activity so that the fire hydrants can be repaired. Following the repairs, the sheets are returned to the office clerk, who completes and closes the file. **(Planned completion: October 2015)**

**4.2.2.D. Recommendation**

**We recommend that the Direction de la gestion stratégique des réseaux d'eau set objectives for boroughs concerning repair times for performing corrective maintenance work on fire hydrants, in order to minimize the number of non-operational hydrants and improve the condition of all the other hydrants, thereby promoting the effectiveness of the operations of the Service de sécurité incendie de Montréal.**

**Business unit's response:**

[TRANSLATION] The DGSRE will set objectives for boroughs in terms of deadlines for corrective maintenance operations performed on fire hydrants. The targets will be defined in the guide on standardized maintenance work that will appear in the by-law respecting the delegation of separate powers to boroughs in the area of secondary water and sewer system maintenance activities. **(Planned completion: December 2015)**

## 4.2.3. Compliance with Staff Qualification Requirements

### 4.2.3.A. Background and Findings

Provisions governing the qualifications of people who carry out maintenance or repair work on equipment connected to a drinking water main (e.g., fire hydrants, valves) or who supervise the performance of these duties are set out in the *Regulation respecting the quality of drinking water* of the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques, in force since June 2001. It provides that tasks related to the operation and monitoring of drinking water production and distribution facilities, including fire hydrants, must be performed by people certified as competent. People who have taken recognized training programs are certified as competent. New requirements amending the Regulation provide that:

- persons in charge of a distribution system must, as of March 8, 2012, have proof of the competency of their employees, and they must provide this proof to the Ministère upon request;
- all the people affected by the Regulation must, as of March 8, 2013, obtain from Emploi-Québec a certificate of qualification, which they must carry at all times while performing duties, and they must show it upon request. This certificate of qualification must also be renewed at a frequency established by Emploi-Québec.

During this audit, we assessed the extent to which the selected boroughs ensured that they had proof of the competency of people involved in fire hydrant maintenance operations, including employees of both the external firms hired and boroughs. It should be noted that contracts awarded to external firms concern only fire hydrant inspections.

The results of our analysis revealed that in general, boroughs had no evidence that resources assigned to fire hydrant maintenance had the competencies required under the *Regulation respecting the quality of drinking water* (see Table 6).

**Table 6 – Proof of Employee Certification Kept by Boroughs – 2013**

Boroughs	Origin of staff assigned	Number of people assigned to fire hydrant operations <sup>[a]</sup>	Number of people for whom proof of certification was obtained	Compliance with the regulation
LaSalle	Borough	6	5	Yes
	External firm	9	1	No
RDP-PAT	Borough	5	0	No
	External firm <sup>[b]</sup>	5	3	No
Ville-Marie	Borough	6	1	No
VSMPE	Borough	6	4	No
<b>Total</b>		<b>37</b>	<b>14 (38%)</b>	

<sup>[a]</sup> For inspection and repair activities.

<sup>[b]</sup> The DGSRE is the contractor for the fire hydrant inspection contract for RDP-PAT borough.

In fact, for employees of external firms, we found that neither the DGSRE nor the boroughs follow a formal procedure to confirm that their employees are qualified. And yet, tender documents include a clause specifying that staff assigned to handling accessories of a drinking water distribution system must hold a P6b certificate issued by Emploi-Québec.

For staff employed by boroughs, only LaSalle borough had in its possession proof that all its staff were qualified, with the exception of one employee. While we have no evidence that this took place, the borough claims to have performed a check with Emploi-Québec confirming that this employee was qualified. For the other boroughs, the persons in charge were unable to prove to us that they performed the necessary checks to ensure that the resources concerned had the required qualifications. According to the information obtained, when a person assigned to fire hydrant maintenance work does not have the recognized qualifications, that person must be under the immediate supervision of a person certified as qualified. However, the stakeholders we met told us that partial inspections could be conducted “solo.” In the event that the people conducting them are not properly qualified, this situation would not comply with the regulation. In short, our audit did not enable us to obtain evidence that the boroughs selected complied with the staff qualification requirements provided for in the *Regulation respecting the quality of drinking water*.

This situation poses risks associated with the handling of fire hydrants by unqualified staff, including erroneous diagnoses, contamination of the water system and breaks caused by improper handling of fire hydrants. Furthermore, under the *Regulation respecting the quality of drinking water*, both the City and staff assigned to emergency responses face penalties ranging from \$250 to \$250,000 relating to the proof of competency required by this regulation. We therefore think that boroughs or the DGSRE, as the case may be, should ensure that they have proof that resources covered by the Regulation, including employees of both the

external firms mandated and boroughs, are qualified. In addition, only people who are qualified within the meaning of the *Regulation respecting the quality of drinking water*, or people who are under the immediate supervision of a person certified as qualified, should be assigned to fire hydrant maintenance. Finally, people in charge at the boroughs should also brief the people affected by the Regulation on the importance of carrying their certificates of qualification at all times while performing their duties.

#### 4.2.3.B. Recommendation

**We recommend that LaSalle, Rivière-des-Prairies–Pointe-aux-Trembles, Ville-Marie and Villeray–Saint-Michel–Parc-Extension boroughs and the Direction de la gestion stratégique des réseaux d’eau:**

- **make sure they have proof that resources assigned to fire hydrant maintenance are qualified, including both staff of the external firms hired and borough employees;**
- **take the necessary steps to ensure that only employees who carry on their person certificates of qualification issued by Emploi-Québec, or those who are under the immediate supervision of a qualified person, are assigned to carry out operations on drinking water distribution and production equipment, including fire hydrants;**
- **take the necessary steps to make employees covered by the *Regulation respecting the quality of drinking water* aware that, while performing their duties, they are required to carry on their person their certificates of qualification issued by Emploi-Québec attesting to their competency;**

**in order to comply with the requirements of the *Regulation respecting the quality of drinking water*.**

#### Business units’ responses:

##### **LASALLE BOROUGH**

*[TRANSLATION] Review the process currently in place to ensure that resources assigned to fire hydrant maintenance, both internal and external, are qualified. (Planned completion: March 2015)*

*Suggest a method for following up on the confirmation of this qualification for both internal and external resources. (Planned completion: March 2015)*

*Establish a follow-up process that will include various partners involved in carrying out fire hydrant maintenance work, such as forepersons, division managers, human resource managers, as well as those responsible for different job sites that might be affected by the requirements of the Regulation respecting the quality of drinking water. (Planned completion: April 2015)*

**RIVIÈRE-DES-PRAIRIES–POINTE-AUX-TREMBLES BOROUGH**

[TRANSLATION] The section manager will be mandated to establish the following:

- Register of staff certified by Emploi-Québec (updated with changes in the work schedule), including the following information:
  - Employee's name;
  - Date of certification;
  - Date of renewal of the qualification certificate at a frequency established by Emploi-Québec;
  - Copy of the qualification certificate. **(Planned completion: February 2015)**

Needs assessment on resources assigned to inspection, maintenance and repair of the water system. **(Planned completion: February 2015)**

Needs assessment on training accredited by Emploi-Québec. **(Planned completion: March 2015)**

Training planning and coordination. **(Planned completion: March 2015)**

**VILLE-MARIE BOROUGH**

[TRANSLATION] During the start-up meeting, the contractor responsible for the complete inspection submitted its employees' certificates to DGSRE project managers. The borough hired two technical officers to conduct random checks in 2014 to verify whether the contractor had in its possession the certificates as submitted at start-up meetings. **(Completed)**

For maintenance work carried out internally, the borough registered 17 employees in Emploi-Québec certification programs. The process leading to certification, which involves a "buddy system," ended in early 2015, and five employees are currently waiting to be summoned by Emploi-Québec to take the exam and have their certification validated. **(Planned completion: June 2015)**

Guideline issued reminding employees to keep the Emploi-Québec certificate on their person at all times. **(Completed)**

**VILLERAY–SAINT-MICHEL–PARC-EXTENSION BOROUGH**

[TRANSLATION] The external firm that will conduct the complete inspection of fire hydrants in our borough will be checked during the start-up meeting with the DGSRE to provide us with the assurance that its employees have the qualifications required under the Regulation respecting the quality of drinking water. **(Planned completion: May 2015)**

For the partial inspection of fire hydrants, conducted internally, employees who entered their names on the list of willing teams will be registered for the appropriate training at Cégep de St-Laurent. **(Planned completion: June 2015)**



**DIRECTION DE LA GESTION STRATÉGIQUE DES RÉSEAUX D'EAU**

*[TRANSLATION] The DGSRE will ensure that it keeps on hand certifications of employees of external firms assigned to fire hydrant inspections. (Planned completion: May 2015)*

### 4.3. Profile of the Condition of Fire Hydrants Available to the Service de l'eau

#### 4.3.A. Background and Findings

As a result of both the City's equipment and infrastructure policy and the SE objectives set forth in the fire safety cover plan, the DGSRE must have an accurate profile of the condition of fire hydrants in order to ensure sound management of these assets. This information is used to compare data year over year in order to assess improvement or deterioration in the condition of fire hydrants and to make decisions concerning budget allocations for maintenance or investments.

During our audit, we assessed the extent to which the SE had an accurate profile of the condition of fire hydrants.

As mentioned above, boroughs provide two sources of information: data recorded in target tables, as prescribed by partnership agreements, and data entered in the corporate GEA application. The target table provides the number of complete and partial inspections carried out, the number of major and minor repairs performed and the number of replaced fire hydrants. This means that inspection and repair data must be recorded on a regular basis by each of the units responsible. On this subject, we noted in Section 4.2.2, concerning the implementation of corrective maintenance procedures by boroughs, that boroughs did not have management reports providing them with a profile of the condition of their fire hydrant inventories. As a result, the DGSRE does not have a comprehensive picture of the condition of fire hydrants for all boroughs.

Nevertheless, during our audit, we wanted to show the extent to which the DGSRE had comprehensive data on fire hydrants. To this end, we compared the number of inspections and repairs recorded in 2013 in target tables by the four boroughs selected with data these boroughs entered in the GEA application. The results of this analysis are shown in Table 7.



**Table 7 – Comparison Between Inspection and Repair Data Entered in Target Tables and Inspection and Repair Data Entered in the GEA Application – 2013**

Total (6,435 fire hydrants)				
Activity	Target table <sup>[a]</sup>	GEA <sup>[b]</sup>	Discrepancy	Variation
Complete inspections	5,135	5,065	70	1%
Partial inspections	3,157	3,018	139	4%
Major repairs <sup>[c]</sup>	354	288	66	19%
Minor repairs <sup>[d]</sup>	859	248	611	71%

<sup>[a]</sup> Number of operations that the selected boroughs carried out and compiled in the target tables provided for in partnership agreements.

<sup>[b]</sup> Number of operations entered in the GEA application by the four boroughs selected.

<sup>[c]</sup> Mainly internal mechanism repairs.

<sup>[d]</sup> Repairs that do not require much time, such as painting, replacing a bolt, applying lubricant, installing a hydrant marker.

This comparison confirms a problem that we raised in Section 4.2.2 concerning the total number of repairs entered in the GEA application. Indeed, 19% of data on major repairs and 71% of data on minor repairs were not entered in it, even though the partnership agreements stress the importance of updating digital networks and other corporate databases. This prevents the DGSRE from having reliable information on fire hydrants and from determining the extent to which their condition has improved. It should be noted that the discrepancies could be greater if boroughs do not record all the information in target tables.

Since it is the out of service fire hydrants that are of concern to the SIM, we extended our analysis further and attempted to assess the extent to which data missing from the GEA application are reflected in the profile of out of service fire hydrants available to the SE.

We therefore compared the list of fire hydrants that were out of service as of December 20, 2013, which was accessible to the SE through the GEA application, with the profile that was provided to us by the boroughs concerned. It should be pointed out that the profile available to the boroughs is drawn from auxiliary data, i.e., maintenance activities compiled in spreadsheets and used as a reference to fill out the target table. The results of this comparison are presented in Figure 1.

**Figure 1 – Comparison Between the Number of Out of Service Fire Hydrants Known to Boroughs and the Number Known to the SE – December 20, 2013**



**Discrepancy in the numbers of fire hydrants: 65**

As shown above, a comparison of the two lists reveals that as of December 20, 2013, the four audited boroughs indicated that they had 56 out of service hydrants on their territories, whereas the SE was aware of 57 out of service hydrants. A data analysis reveals that 24 out of service fire hydrants were known to both sides. Since boroughs have an accurate profile of out of service fire hydrants, this means that in reality, 32 hydrants are out of service but not identified in the GEA application. Also, information available to the SE reveals that 33 fire hydrants described as “out of service” in the GEA application were in fact supposedly operational.

The discrepancies appear to have occurred either because out of service fire hydrants with deficiencies had not been entered by boroughs in the GEA application at the time of a complete inspection, partial inspection or reports made in the course of the year, or because data on repairs carried out had not been entered in the GEA application.

All the explanations obtained show, in our opinion, that not all the stakeholders concerned within the boroughs are made aware of the importance of documenting operations and entering data in the GEA application. On this subject, we think that all stakeholders should be briefed on the importance of their contribution to the process of managing fire hydrants.

In conclusion, the SE does not have access to reliable information on out of service fire hydrants. Data missing from the GEA application prevent the SE from having an accurate profile of all fire hydrants, and more specifically, out of service hydrants that require priority responses. It is therefore not possible to assess improvement or deterioration in the situation.

#### 4.3.B. Recommendation

**We recommend that the Direction de la gestion stratégique des réseaux d'eau take the necessary steps to ensure that the corporate application provides an accurate profile of the condition of fire hydrants so that it can ensure sound management of its assets.**

#### Business unit's response:

*[TRANSLATION] The DGSRE will brief all stakeholders on the importance of documenting responses and entering data in the GEA application by various means:*

- *Training; (Planned completion: December 2016)*
- *The guideline; (Planned completion: May 2015)*
- *The maintenance guide. (Planned completion: December 2015)*

### 4.4. Profile of the Condition of Fire Hydrants Available to the Service de sécurité incendie de Montréal

#### 4.4.A. Background and Findings

To ensure effective operations, SIM stakeholders stress the importance of having reliable, timely information on the location of:

- all hydrants on the Montreal agglomeration territory;
- out of service fire hydrants;
- fire hydrants with flow rates below the minimum acceptable threshold of 1,500 L/min, in accordance with the Ministère de la Sécurité publique guidelines.<sup>17</sup>

In 2008, the SIM compiled inventory data on approximately 31,000 fire hydrants on the waterworks system throughout the Montreal agglomeration. This inventory is integrated into a database<sup>18</sup> that can be fed into the RAO application. This application, which is operated by the SIM, can forward emergency calls to fire stations, dispatch vehicles to the scene of a fire and manage information, including the location and condition of fire hydrants, that is necessary for an emergency response.

When an emergency call is received, the RAO application automatically locates three available fire hydrants close to the scene of the fire. Information is sent directly to the fire stations concerned and to computers in fire trucks that are dispatched to the scene of a fire. With respect to data on the condition of the inventory, when fire hydrants are out of service, this information is entered directly in the RAO application from reports received from

<sup>17</sup> The Ministère de la Sécurité publique guidelines provide for a basic flow rate of 1,500 L/min for 30 minutes. However, this standard is for a minimum response, i.e., an initial attack, and not the prevention of a major fire.

<sup>18</sup> The SIM database: BD PROD-CARTO-SIM.

boroughs and related municipalities. However, information on fire hydrants with flow rates below the minimum threshold is not recorded in the RAO application as soon as a diagnosis is made during fire hydrant inspections.

Since it is important for the SIM to have accurate, up-to-date profiles of the condition of fire hydrants on the City's territory, we attempted to assess their reliability. Reports originating in boroughs will therefore be discussed separately from those originating in related municipalities.

#### 4.4.1. Profile of the Condition of Fire Hydrants in Boroughs

##### 4.4.1.1. Out of Service Fire Hydrants

###### 4.4.1.1.A. Background and Findings

A formal reporting process should be established so that the SIM is assured of receiving the information it needs to describe the condition of fire hydrants. This process should formalize the type of information, the frequency with which it is updated and the responsibilities of each stakeholder concerned.

Our work revealed the existence of informal reporting processes designed to disseminate the coordinates of out of service fire hydrants, including following complete and partial inspections or when emergency situations arise (e.g., accidents, breaks caused by handling). These informal processes also cover the restoration to working order of fire hydrants following repairs.

We will briefly describe the routing of reports of out of service fire hydrants, depending on whether they come from boroughs or from the SIM. In twelve boroughs,<sup>19</sup> the application for managing citizen enquiries (GDC, or Gestion des demandes des citoyens) is used to report fire hydrants described as "out of service" or rehabilitated hydrants to the Unité d'intervention rapide et prioritaire (UIRP), which comes under the purview of the Service de la concertation des arrondissements. The UIRP, in turn, faxes the information to the Centre de communications du Service de sécurité incendie de Montréal (CCSI). For the other seven boroughs,<sup>20</sup> reports are forwarded directly to the SIM (CCSI) during regular business hours, and pass through the UIRP at other times.<sup>21</sup>

<sup>19</sup> RDP-PAT, Ville-Marie and VSMPE boroughs are among these.

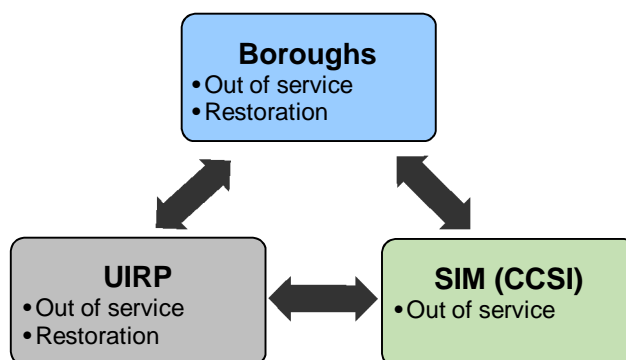
<sup>20</sup> LaSalle borough is part of this group.

<sup>21</sup> Evenings and weekends.

Reports of out of service fire hydrants received by the CCSI are recorded directly in the RAO application. The fire hydrant number, the date of decommissioning and a theoretical restoration date are entered. Two statuses are then possible for fire hydrants: “available” and “unavailable.” It should also be pointed out that SIM staff may also have to report fire hydrants that were decommissioned following firefighting operations. For this type of reporting, the SIM issued a guideline in August 2010 to all its employees, which stated that information must be communicated to both the CCSI, for integration in the RAO application, and to the borough concerned, so that it can enter the restoration in its corporate application (GEA).

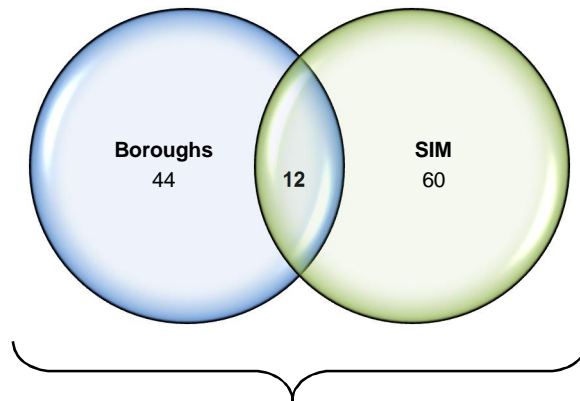
The reporting mechanisms established are illustrated in Figure 2.

**Figure 2 – Process for Reporting the Condition of Fire Hydrants**



In our audit, we assessed the extent to which the SIM had up-to-date information on the condition of fire hydrants. To do this, we compared the list of out of service fire hydrants available to the SIM with those of the four boroughs audited. The results of the comparison, as of December 20, 2013, are shown in Figure 3.

**Figure 3 – Comparison Between the Number of Out of Service Fire Hydrants Known to Boroughs and the Number of Out of Service Fire Hydrants Known to the SIM – December 20, 2013**



**Discrepancy in the numbers of fire hydrants: 104**

Our very first finding was that there is a discrepancy between the number of out of service fire hydrants known to the SIM (72) and the number of out of service fire hydrants known to boroughs (56). Following a detailed analysis of the fire hydrants appearing on each of these lists, we found that these discrepancies are much greater, since only 12 out of service fire hydrants are known to both the SIM and the boroughs.

We can already ascertain that the SIM does not have a comprehensive, up-to-date overview of out of service fire hydrants located in boroughs. This situation raises doubts about the effectiveness of this reporting process.

In view of the discrepancies noted, we attempted to determine at what stage in the process the reporting failed. While it is mainly boroughs that do the reporting, reports can also originate from the SIM. It should be pointed out that our analysis dealt solely with reports on decommissioning or restoration work carried out on fire hydrants in 2013. Regarding the discrepancy of 104 fire hydrants noted (see Figure 3), 64 hydrants had been reported in 2013. Analysis of failures to report yields the following results:

- In 56% of cases, we had no evidence that reports had been forwarded to the SIM, either by boroughs or by the UIRP.
- In 25% of cases, while we had evidence that reports had been forwarded to the SIM, we did not find any records of them in the RAO application.
- In 2% of cases, we had evidence that a report originated from the SIM but that the UIRP had not relayed the information to the boroughs.
- In 17% of cases, we found no evidence indicating where the reporting failed.

In light of these results, we found that failures to report occur throughout the process. On the one hand, since boroughs and the SIM (RAO) use independent sources of information, stakeholders involved in reporting out of service fire hydrants must enter the information twice, which increases the risk of errors.

On the other hand, according to the information obtained, the SIM apparently did not regularly check to determine whether or not the out of service fire hydrants entered in the RAO application had been repaired. The RAO application seems to be programmed such that the status of a fire hydrant that had been reported as out of service will automatically be returned to “available” as soon as the theoretical restoration date entered by the CCSI at the time of the report is reached. This poses the risk that some unrepaired fire hydrants may no longer be identifiable by the SIM in the RAO application. We feel that steps must be taken to ensure that the status of these fire hydrants is not automatically returned to “available” without someone first checking with the boroughs and related municipalities concerned to ascertain their condition.

Furthermore, in addition to the deficiencies in the reporting process, we must take into account the finding pointed out in Section 4.1.2, which is that out of service fire hydrants are not considered as such by the boroughs audited because they have different ways of interpreting deficiencies. This situation has a direct consequence on the reporting of a fire hydrant to the SIM.

Accordingly, we think that all the shortcomings in the reporting process make it impossible for the SIM to have access to reliable information on the condition of fire hydrants, which it needs in order to plan responses. As a result, the SIM probably needs to change its response plan during an emergency according to the actual condition of fire hydrants, which can be established only at the scene of an emergency response. This situation would cause a delayed reaction time, thereby compromising the effectiveness of responses.

We think that formal reporting mechanisms should be established and that all the stakeholders concerned should comply with them, so that the SIM can have a comprehensive, up-to-date overview. This could take the form of an administrative framework that defines the concept of “out of service” for fire hydrants to be reported, the reporting deadline and the responsibilities of each of the stakeholders concerned (the SIM, boroughs and the UIRP) in this process.

Moreover, once the SE’s GEA application makes it possible to have reliable, real-time data, we think that it would be appropriate to assess the possibility of taking steps to develop computer links enabling the two computer applications (GEA and RAO) to relay information

on out of service fire hydrants to each other. This practice would allow the SIM to have access to real-time data, thereby limiting the risk of errors associated with data on the condition of fire hydrants. In the meantime, we think it is essential that the SIM's and the boroughs' inventories of out of service fire hydrants be checked and aligned regularly to ensure the integrity of the data used in planning SIM operations.

#### 4.4.1.1.B. Recommendation

We recommend that the **Service de sécurité incendie de Montréal**, in collaboration with the **Service de l'eau**, produce an administrative framework designed to formalize the process for reporting out of service fire hydrants in order to have a comprehensive, up-to-date overview of out of service fire hydrants on the entire territory. In particular, this management framework should:

- define the concept of “out of service” for fire hydrants to be reported;
- establish the deadline for sending these reports;
- specify the responsibilities of each of the stakeholders concerned (**Service de sécurité incendie de Montréal**, boroughs and **Priority Rapid Response Unit**) in this process.

#### Business units' responses:

##### **SERVICE DE SÉCURITÉ INCENDIE DE MONTRÉAL**

*[TRANSLATION] Identify each partner's resource persons in order to initiate analysis of the process to be established and start up the workshops. (Planned completion: April 2015)*

*Establish the administrative framework, define the roles and responsibilities of each stakeholder, the process and the way in which reporting of the City's out of service fire hydrants (under the boroughs' responsibility) is kept up to date. (Planned completion: December 2015)*

##### **SERVICE DE L'EAU**

*[TRANSLATION] The SE undertakes to collaborate in the implementation of the SIM's action plan. (Planned completion: according to the SIM's action plan)*

#### 4.4.1.1.C. Recommendation

We recommend that the **Service de sécurité incendie de Montréal** and the **Service de l'eau** take steps to develop computer links enabling them to relay to each other information on out of service fire hydrants, so that they each have reliable, real-time information that can help ensure the effectiveness of fire protection response operations.



**Business units' responses:**

**SERVICE DE SÉCURITÉ INCENDIE DE MONTRÉAL**

*[TRANSLATION] In collaboration with the SE, the SIM will conduct an in-depth analysis, taking into account the capacity of IT services, for the purpose of developing computer links in order to relay information on the condition of the City's fire hydrants (under the boroughs' responsibility). (Planned completion: December 2015)*

**SERVICE DE L'EAU**

*[TRANSLATION] The SE undertakes to collaborate in the implementation of the SIM's action plan. (Planned completion: December 2015)*

**4.4.1.1.D. Recommendation**

**We recommend that, pending the establishment of computer links between the gestion de l'entretien des actifs and répartition assistée par ordinateur applications, LaSalle, Rivière-des-Prairies–Pointe-aux-Trembles, Ville-Marie and Villeray–Saint-Michel–Parc-Extension boroughs promptly report to the Service de sécurité incendie de Montréal information on fire hydrants that are out of service and fire hydrants that have been recommissioned so that it has comprehensive, up-to-date information.**

**Business units' responses:**

**LASALLE BOROUGH**

*[TRANSLATION] Review the process currently used to communicate information effectively to the different stakeholders and start up workshops. (Planned completion: February 2015)*

*Establish the administrative framework, define the roles and responsibilities of each stakeholder as well as the process and the way in which reporting of the City's out of service fire hydrants is kept up to date. (Planned completion: June 2015)*

**RIVIÈRE-DES-PRAIRIES–POINTE-AUX-TREMBLES BOROUGH**

*[TRANSLATION] Establish an administrative framework and a procedure so that the SIM and the borough can have a reliable register of out of service fire hydrants. (Planned completion: June 2015)*

**VILLE-MARIE BOROUGH**

*[TRANSLATION] On February 1, 2015, the borough's senior technical officer directly relayed to the officer in charge of the RAO application all information on decommissioned and recommissioned fire hydrants. (Completed)*

**VILLERAY–SAINT-MICHEL–PARC-EXTENSION BOROUGH**

*[TRANSLATION] We will get in touch with the SIM by the end of February 2015 in order to collaborate in the implementation of the required administrative framework and process. For the time being, information on out of service fire hydrants is sent to the UIRP. (Planned completion: September 2015)*

**4.4.1.1.E. Recommendation**

We recommend that the Service de sécurité incendie de Montréal, pending the establishment of computer links between the gestion de l'entretien des actifs and répartition assistée par ordinateur applications, regularly check the accuracy of data on out of service fire hydrants that boroughs have entered in the répartition assistée par ordinateur application so that it has access to reliable information to help ensure the effectiveness of its operations.

**Business unit's response:**

*[TRANSLATION] The SIM will establish a procedure for checking the accuracy of data; the procedure will specify the frequency with which data are checked and the condition of the City's fire hydrants (under the boroughs' responsibility). (Planned completion: May 2015)*

**4.4.1.1.F. Recommendation**

We recommend that the Service de sécurité incendie de Montréal take the necessary steps to ensure that the répartition assistée par ordinateur application no longer allows the automatic restoration of an out of service fire hydrant at the end of an initially scheduled theoretical repair date so that it is assured of having comprehensive information on this fire hydrant category in its inventory.

**Business unit's response:**

*[TRANSLATION] The SIM will send a request to the officer in charge of the RAO application to change the program so that fire hydrants are no longer automatically restored to working order. (Planned completion: May 2015)*

**4.4.1.2. Fire Hydrants with Insufficient Flow****4.4.1.2.A. Background and Findings**

It is important to have a thorough knowledge of the water supply system and its capacity in the different sectors of the City's territory. It therefore becomes crucially important to know which fire hydrants have available flows below an acceptable threshold for firefighting in order

to ensure the effectiveness of the SIM's emergency responses. The water flow rate needed to extinguish a fire varies according to the building affected.

In 2007, guidelines issued by the Ministère de la Sécurité publique for developing fire safety cover plans stressed that it was important for a fire department to have a thorough knowledge of the water supply system and its capacity in different parts of its territory. This means that firefighters must be able to rely on a water supply capable of producing a basic flow rate of 1,500 L/min for at least 30 minutes. This standard applies when a building is in the “low risk” category, is located in an urban area, and involves a minimum response, i.e., an initial attack but not preventing a major fire. This basic flow rate therefore does not provide an adequate water supply to put out fires in higher-risk buildings.

In 2008, in its fire safety cover plan, the SIM discussed one feature of the water supply component that needed to be improved: a comprehensive flow and pressure profile for the system as a whole was needed in order to locate problematic sectors. This information had to be compiled when boroughs and related municipalities performed maintenance work on fire hydrants.

Flow rate is calculated mainly from pressure measurements, taken during flow tests that are part of complete fire hydrant inspections. The available flow is used to determine whether the acceptable threshold is met for the purpose of providing fire protection for a given sector.

During our audit, the SIM had embarked on a large-scale project that consisted in establishing the water flow rates required on its territory (required fire flow) using firefighting calculation methods. According to the information obtained, this exercise should be completed by the end of 2016. However, to locate problematic fire protection sectors, these data on the required water flow rates must be compared with the data on available flow in the system, calculated by the SE. At the time of our audit, it was anticipated that this flow rate comparison would be carried out as part of the water sectorization and pressure regulation project undertaken by the SE. This project, aimed at measuring flow rate and pressure regulation on the waterworks system, is only in its early stages, and its completion is scheduled for 2023. In the meantime, the SIM is not in a position to identify all the problematic sectors on the agglomeration's territory that have an impact on fire protection and will not have a comprehensive profile of them before 2023 (a wait of at least seven years).

Once these problematic water supply sectors are identified, the SIM will be able to plan the establishment of special operating methods<sup>22</sup> and identify fire hydrants of crucial importance,

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<sup>22</sup> Operating methods that call for additional fire engines to be mobilized and supplied with water from operational fire hydrants in the sector in the event of insufficient water.

those that must be kept operational at all times to guarantee adequate fire protection. In the opinion of SIM management, the fact that problematic sectors have not yet been identified for the entire system is not alarming, because when firefighters arriving at the scene of a fire realize that there are water supply problems, fallback solutions are quickly adopted. However, we believe that such a practice could compromise the effectiveness of operations.

An overview of problematic sectors is not yet available for all of the agglomeration's territory; however, the SIM is working on determining the profile of fire hydrants that do not meet the minimum requirement set by the Ministère de la Sécurité publique: a flow rate of at least 1,500 L/min. Since these hydrants do not meet the minimum requirement, they do not provide an adequate water supply and should therefore be considered "out of service."

During our audit, we examined the way in which the SIM received data on fire hydrants with flow rates lower than 1,500 L/min. We also wanted to assess whether the information the SIM had was comprehensive.

First, we noted that no formal reporting process had been put in place to inform the SIM as soon as a diagnosis was made. Instead, data on flow rates lower than 1,500 L/min are submitted by the SE upon request (on a yearly basis) by the SIM's Centre de services – Expertise et développement de la prévention. At the time of our audit, even though data had been compiled by boroughs during complete inspections, generally conducted in the spring, the SIM was given the data only in November 2013. It should be noted that the previous list that the SIM had received was dated April 2012 and corresponded to information available to the SE as of that date. In an email, the SE stressed that the completeness of the data provided depends on the diligence with which boroughs update the database following complete inspections. It should be noted that at the time of this audit report (January 2015), no other list had been sent by the SE concerning these fire hydrants with flow rates lower than 1,500 L/min.

Second, based on inspection results posted by boroughs in the GEA application, we attempted to verify whether the SIM had the complete list of fire hydrants with flow rates lower than the acceptable threshold for firefighting (1,500 L/min). The results of this comparison are shown in Table 8.

**Table 8 – Fire Hydrants with Flow Rates Lower than 1,500 L/min – Comparison of Information Kept by the SIM and by Boroughs 2013**

Borough	Inventory <sup>[a]</sup>	Fire hydrants whose flow rates were measured		Fire hydrants with flow rates below 1,500 L/min	
		Number	%	SIM <sup>[b]</sup>	Following borough inspections
LaSalle	1,544	1,474	95%	0	1
RDP-PAT	2,310	2,202	95%	0	2
Ville-Marie	1,352	0	0%	N/A	N/A
VSMPE	1,229	1,144	93%	6	6
<b>Total</b>	<b>6,435</b>	<b>4,820</b>	<b>75%</b>	<b>6</b>	<b>9</b>

<sup>[a]</sup> According to the 2013 inventory taken from the spatial geographic information system (SGIS).

<sup>[b]</sup> According to a list obtained from the SE, as of November 24, 2013.

First, as shown in Table 8, Ville-Marie borough had not taken any pressure measurements to calculate the flow rates of fire hydrants on its territory. According to the information obtained, this has been the situation since 2011. Consequently, information relayed to the SIM about this borough is incomplete. Considering that Ville-Marie borough is a hub of activity (traffic, population density, high concentration of institutions, etc.), a sector where risk tolerance should be among the lowest, we think it should be noted that under such circumstances, the SIM is unable to contain all the risks associated with insufficient flow rates for fire hydrants located in this vital sector.

Moreover, insofar as pressure readings are taken at the time of complete inspections to calculate the flow rates of fire hydrants, our audit revealed the presence of discrepancies for LaSalle and RDP-PAT boroughs. Even though the discrepancies involving fire hydrants in two of the four boroughs selected account for a small proportion of their respective inventories, the very existence of these discrepancies is troubling. The list submitted to the SIM in November 2013 contained 49 fire hydrants with flow rates below 1,500 L/min for five boroughs, including six in VSMPE borough. We believe that the SE should check with boroughs to validate the data it sends to the SIM so that it can have reliable information at its disposal.

We also examined whether hydrants with flow rates below 1,500 L/min were recorded in the RAO application. Of the boroughs audited, only VSMPE borough appeared on the list received from the SE. We noted that as of December 20, 2013, not one of the six hydrants appearing on this list had been posted in the RAO application. However, as of February 20, 2014, five of them appeared on the list. Our work revealed that after the SIM receives the list from the SE, it must ask boroughs to confirm which fire hydrants have flow rates below 1,500 L/min and report them as out of service if the situation has remained unchanged. In short, not only does the SIM not receive the list of fire hydrants with insufficient flows from

the SE in a timely manner, i.e., in November, even though inspections are generally carried out in the spring, but there are then further delays before these fire hydrants are entered in the RAO application.

Since the SIM does not have comprehensive, up-to-date data on fire hydrants with flow rates below the threshold of 1,500 L/min, it has no guarantee that hydrants assigned to operations by the RAO application have the minimum capacity required during an emergency. As a result, the inaccuracy of data on the condition of fire hydrants could compromise the effectiveness of the SIM's response procedure during a fire.

In closing, concerning the compilation of flow rate data, Ville-Marie borough should take the necessary steps to conduct complete inspections, including taking pressure measurements to calculate flow rates of fire hydrants, as specified in recommendation 4.2.1.C, so that its results are reported to the SIM. We also think that, throughout the year, the SE should report fire hydrants with calculated flow rates below 1,500 L/min to the SIM. In this regard, the SE should make sure that it provides the SIM with validated data, so that it has reliable information. In order to formalize the reporting process for this type of fire hydrant, we believe that an administrative framework should be developed.

Finally, we understand that the guidelines of the Ministère de la Sécurité publique specify that a flow rate of at least 1,500 L/min for 30 minutes is required. However, this is a basic flow rate, and other sectors requiring higher flow rates can also be problematic because of an insufficient water supply. As mentioned above, the SIM will have an overall picture of these problematic sectors only after the SE's water sectorization and pressure regulation project is completed in 2023. We believe that it would be appropriate to assess the risk of knowing which sectors are problematic only at the end of this timeline and limit the consequences of such a situation.

#### 4.4.1.2.B. Recommendation

**We recommend that the Service de l'eau check with boroughs to validate the accuracy of data entered in the gestion de l'entretien des actifs application on fire hydrants with flow rates below the acceptable threshold of 1,500 L/min so that they can provide the Service de sécurité incendie de Montréal with reliable information, thereby ensuring the effectiveness of its operations.**

#### Business unit's response:

*[TRANSLATION] The SE will establish a procedure for checking with boroughs the accuracy of data entered in the GEA application on fire hydrants with flow rates below*

*the acceptable threshold of 1,500 L/min so that they can provide the SIM with reliable information, thereby ensuring the effectiveness of its operations. (Planned completion: December 2015)*

#### 4.4.1.2.C. Recommendation

We recommend that the Service de sécurité incendie de Montréal, in collaboration with the Service de l'eau, produce an administrative framework aimed at formalizing the reporting process for fire hydrants with flow rates below the minimum acceptable threshold of 1,500 L/min to ensure such situations are reported as soon as boroughs detect the deficiency during inspections so that the Service de sécurité incendie de Montréal has comprehensive, up-to-date information that enables it to provide fire protection.

#### Business units' responses:

##### SERVICE DE SÉCURITÉ INCENDIE DE MONTRÉAL

*[TRANSLATION] Resource persons within the boroughs and the DGSRE will be contacted to identify and establish the process that must be put in place in order to start up the workshops (work meeting schedule). (Planned completion: December 2015)*

*Establish the administrative framework, define the roles and responsibilities of each stakeholder, the process and the way in which reporting of the City's fire hydrants (under the boroughs' responsibility) that cannot provide a minimum flow rate of 1,500 L/min is kept up to date. (Planned completion: December 2015)*

##### SERVICE DE L'EAU

*[TRANSLATION] The SE undertakes to collaborate in the implementation of the SIM's action plan. (Planned completion: according to the SIM's action plan)*

#### 4.4.1.2.D. Recommendation

We recommend that the Direction générale assess the risk of knowing the profile of problematic sectors in the agglomeration, with respect to flow rates and pressures, only upon completion of the water sectorization and pressure regulation project of the Service de l'eau (scheduled for 2023), and take any steps necessary to limit the consequences of such a situation so that the Service de sécurité incendie de Montréal is able to provide adequate fire protection.



**Business unit's response:**

*[TRANSLATION] Produce a report assessing the risks associated with a lack of knowledge of the waterworks system (flow rates and pressures) and the SIM's work methods during responses. (Planned completion: December 2015)*

*If necessary, establish a temporary procedure to help limit the consequences of a lack of knowledge, to be maintained until completion of the SE's water sectorization and pressure regulation project (slated for 2023). (Planned completion: December 2015)*

## 4.4.2. Profile of the Condition of Fire Hydrants in Related Municipalities

### 4.4.2.A. Background and Findings

It should first be mentioned that, in order to make its operations more effective, the SIM needs to have as much information on the fire hydrants located in the 14 related municipalities as it does on the hydrants found on the City's territory. The SIM is concerned with knowing the locations of both out of service fire hydrants and those with flow rates lower than the minimum threshold of 1,500 L/min.

As is the case for establishing a profile of the condition of fire hydrants located on the City's territory, a formal reporting process should also be established so that the SIM can be assured of receiving the information it needs to describe the condition of fire hydrants located in related municipalities.

Even though no formal reporting process was adopted by the parties, we were informed that the SIM nevertheless received information allowing it to describe the condition of fire hydrants. This information was obtained from related municipalities either at annual meetings, or when they informed the SIM directly by fax or email (during regular work hours) or through the UIRP (outside of business hours). At the time of our audit, according to the information available to the SIM, out of an inventory of about 7,350 fire hydrants, 68, or close to 1%, were out of service and 12 had flow rates lower than 1,500 L/min.

We would have liked to assess the extent to which the SIM had reliable, up-to-date information on the condition of fire hydrants in related municipalities just as we did with boroughs. Since we do not have access to the data used and processes established by related municipalities for fire hydrant maintenance, we were unable to validate all the data that the SIM had in the RAO application on fire hydrants that were out of service or had flow rates below 1,500 L/min. However, one of the principal stakeholders told us that he was not



certain that the information received was accurate. This could compromise the effectiveness of firefighting operations in related municipalities.

In our opinion, it is essential that the SIM promptly take the necessary steps to ensure that it has comprehensive, reliable data on the condition of fire hydrants located in related municipalities. To achieve this, a reporting process should be put in place for related municipalities to formalize the type of information required, the frequency with which it is to be updated and the responsibilities of each stakeholder concerned. Data on the condition of fire hydrants integrated in the RAO application should also be validated regularly with each related municipality.

#### 4.4.2.B. Recommendation

**We recommend that the Service de sécurité incendie de Montréal:**

- **put in place a formal reporting process for related municipalities so that it knows the locations of fire hydrants that are out of service or have flow rates lower than 1,500 L/min;**
- **check with related municipalities on a regular basis to validate the data it has on fire hydrants that are out of service or have flow rates below 1,500 L/min;**

**so that it has comprehensive, reliable information on the condition of fire hydrants and is able to ensure the effectiveness of its operations.**

#### Business unit's response:

*[TRANSLATION] Resource persons within related municipalities will be contacted to determine and establish the process that must be put in place in order to start up the workshops (work meeting schedule). (Planned completion: December 2015)*

*Establish the administrative framework, define the roles and responsibilities of each stakeholder, the process and the way in which reporting of the City's fire hydrants (under the related municipalities' responsibility) that are out of service or unable to provide a minimum flow rate of 1,500 L/min is kept up to date. (Planned completion: December 2015)*

### 4.4.3. Profile of the Condition of Private Fire Hydrants

#### 4.4.3.A. Background and Findings

Of the roughly 31,000 fire hydrants available to the SIM for fire protection, roughly 1,050 (3%) are privately owned, located on land belonging to companies or institutions. Such hydrants are mainly required for private properties, under the National Building Code or by insurers.

The location and maintenance of private fire hydrants are the responsibility of the owners themselves. Private fire hydrant maintenance is governed by the provisions of the CNPI 2010, which requires that fire hydrants be inspected, tested and maintained in accordance with NFPA Standard 25.<sup>23</sup>

The SIM is responsible for ensuring that these provisions are enforced in accordance with current fire prevention by-laws. It should be noted that there are 15 such by-laws on the territory of the agglomeration (one for each related municipality, including Ville de Montréal).<sup>24</sup> For this purpose, each related municipality must make sure of the availability and locations of fire hydrants on its territory. The SIM informs owners via its website that routine maintenance of fire hydrants must be carried out by a specialized contractor. For this purpose, an inspection report containing a list of defective or non-compliant items, if any, must be kept. It is imperative that the necessary work be carried out to make equipment operational and effective. Under these by-laws, fines may be imposed in the event of non-compliance.

Moreover, in January 2012, the urban agglomeration council adopted the *By-law concerning the Service de sécurité incendie de Montréal*,<sup>25</sup> conferring powers on the SIM that enabled it to assume its responsibilities fully. Provisions governing essential standards stipulate that:

- “fire hydrants must, at all times, be visible and accessible [...] for clear access by firefighters and their equipment”;
- “a copy of the records of trials, inspections or operations related to the maintenance [...] must be kept on the premises.”

The SIM can issue notices of violation to penalize institutions that violate the *By-law concerning the Service de sécurité incendie de Montréal*.

Despite the existence of these provisions, SIM stakeholders informed us that their inventory of private fire hydrants is incomplete and that their condition is unknown. Since private fire hydrants are located near important buildings (e.g., hospitals, universities), there is reason to be concerned about the inevitable consequences that malfunctioning hydrants would have for the effectiveness of the SIM's response to a fire. Furthermore, even though this by-law was adopted by City council on January 23, 2012, the stakeholders we met told us that the SIM had not yet adopted measures to ensure compliance with the provisions governing private fire hydrants.

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<sup>23</sup> NFPA Standard 25 refers to inspections of fire hydrants on private land. It provides for inspections on an annual basis as well as after each use. It provides for their accessibility as well as preventive and corrective maintenance work on them.

<sup>24</sup> By-law 12-005, *By-law concerning fire safety*, adopted by City council on January 23, 2012.

<sup>25</sup> By-law RCG 12-003, adopted on January 26, 2012.

We think that it is necessary to establish programs, as soon as possible, to identify private fire hydrants located on the territory of the agglomeration in order to validate the SIM's inventory. These measures should provide for the updating of the private fire hydrant inventory and its integration in SIM databases.

We also feel that having a profile of the operating condition of private fire hydrants is necessary because it forces owners to take the necessary steps to establish fallback procedures during emergency responses. It would therefore be appropriate to consider setting up a private fire hydrant inspection program to regularly ensure that their owners are in fact carrying out maintenance work and that penalties are imposed if they fail to do so, as provided by the *By-law concerning the Service de sécurité incendie de Montréal*.

#### 4.4.3.B. Recommendation

**We recommend that the Service de sécurité incendie de Montréal take the necessary steps to complete the inventory of locations of fire hydrants on private land and ensure that they are integrated into its inventory so that it has comprehensive, reliable information when responses are required.**

#### Business unit's response:

*[TRANSLATION] Resource persons within the boroughs, related municipalities and the DGSRE will be contacted, as well as other possible partners who are directly involved (owners and private firms), to obtain comprehensive information on the locations of private fire hydrants. (Planned completion: December 2016)*

#### 4.4.3.C. Recommendation

**We recommend that the Service de sécurité incendie de Montréal establish an inspection program for fire hydrants located on private land in order to have a profile of their condition and to be able to enforce the provisions of the *By-law concerning the Service de sécurité incendie de Montréal*.**

#### Business unit's response:

*[TRANSLATION] A program will be introduced to make private fire hydrant owners aware of their responsibilities vis-à-vis testing, maintenance and inspection of fire hydrants that belong to them (private fire hydrants). (Planned completion: December 2016)*

## 4.5. Accountability Reporting

### 4.5.A. Background and Findings

It is important that structured accountability mechanisms be established so that management of a department or borough and the municipal administration can keep informed on the management of an activity as well as on the achievement of the objectives set. Management reports must therefore be produced regularly to keep them up to date on achievements and provide reasons for discrepancies, if any. This accountability reporting must foster informed decision-making that guides planning and the allocation of resources needed to achieve the objectives.

As part of our audit, our work consisted in investigating the mechanisms established to account for fire hydrant management.

The fire hydrant management process involves many business units. Accountability mechanisms must be provided because each unit contributes to the achievement of the objectives set, whether in the areas of assets management or fire safety.

Boroughs are responsible for the inspection and repair of fire hydrants. They report on a monthly basis to the DGSRE on activities carried out, using the target table provided for in partnership agreements, specifying the number of fire hydrants inspected, repaired and replaced. Apart from the number of inspections, we found that no mechanisms have been established to enable boroughs to account for their real objectives. Nevertheless, the SE, in its Montreal Water Strategy and its strategic objectives (adopted by the urban agglomeration council in June 2012), set the objective of repairing 4% and replacing 1.33% of fire hydrants every year.

Since the DGSRE is in charge of establishing the management of secondary water system assets, it must account for the execution of these activities and the achievement of objectives for all boroughs. In 2014, for the first time, the DGSRE prepared a *Bilan des activités sur les réseaux secondaires d'eau potable et d'égouts* (activity report on secondary drinking water and sewage systems) for SE management and the Direction générale. In this document, the DGSRE accounts for its achievements by comparing the number of fire hydrants inspected with the number of inspections that should have been conducted according to standards. The DGSRE also presents the number of repaired and replaced fire hydrants, but we found that it did not provide information on the extent to which the objectives set out in the Montreal Water Strategy and its strategic objectives were achieved.

Moreover, we found that the DGSRE, as the unit in charge of secondary system assets, did not account for the condition of the fire hydrant inventory. It should be noted that under the equipment and infrastructure policy, approved by City council and the urban agglomeration council in 2009, managers are required to have a knowledge of the complete inventory and the quality of real estate assets, including wear, that fall under their responsibility. However, the results of our audit showed that the GEA application currently does not allow either boroughs or the DGSRE to have a reliable profile of the condition of fire hydrants that would make it possible to provide accountability reports on them. We believe that this situation should have been disclosed in the report produced by the DGSRE to inform SE management of the measures it intends to implement, along with the planned completion dates, in order to comply with this policy. However, the fact remains that a significant issue such as this should be subject to accountability, for the purpose of showing improvements in or deterioration of the condition of the inventory from year to year, among other things, and to be able to review the objectives that were set.

Finally, when the SIM developed the 2009–2013 fire safety cover plan, measures were introduced in the water supply component, including those dealing with fire hydrant management and the flow rate and pressure profile of the entire water system. These measures concerned either the SIM or the SE. It is worth noting that the City obtained a certificate of compliance for the fire safety cover plan on the basis of all the proposed measures and timelines, including the water supply component.<sup>26</sup> Since the development of the fire safety cover plan, the SIM has produced, in compliance with the *Fire Safety Act*, five annual reports for authorities and the Ministère de la Sécurité publique to account for developments in the implementation of the prescribed measures. However, in the case of the water supply component, activity reports overlook the implementation of the measures prescribed for the SE. It was only in December 2013 that the SIM officially appointed an officer responsible for achieving the water-related objectives appearing in the 2009–2013 fire safety cover plan. The role of this person is to establish and maintain liaisons with the Direction de l'eau potable and other municipal stakeholders responsible for providing an adequate water supply for firefighting.

We believe that accountability reporting would have focused attention on the problems encountered and the consequences of not meeting deadlines. This would have facilitated decision-making, resulting in deadlines being met or a review of the allocation of resources.

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<sup>26</sup> Under section 21 of the *Fire Safety Act*, the Public Safety Minister issues a certificate of compliance to the regional authority or proposes any amendments the Minister deems necessary to remedy any deficiency identified within the time indicated by the Minister.

Since the *Fire Safety Act* requires that the next fire safety cover plan be revised, it would be appropriate for the SIM to obtain from the SE a report on the implementation of the measures set out in it. With such accountability reporting, a new action plan can be developed for all water-related activities, including those involving fire hydrants, that are necessary for fire protection. We think that formal mechanisms should then be established to ensure accountability between the SE and the SIM in order to provide the municipal administration with comprehensive information when the implementation of measures set out in the fire safety cover plan needs to be evaluated.

With regard to this revision of the fire safety cover plan in particular, section 29 of the *Fire Safety Act* provides as follows: “*The fire safety cover plan must, in addition, be revised during the sixth year following the date of its coming into force or of its last certificate of compliance.*”

Considering that its fire safety cover plan was certified as compliant on October 17, 2008, by the Ministère de la Sécurité publique, that it came into force on January 1, 2009, and that it covered a five-year period, that is, until 2013, the SIM should have revised it in 2014 to comply with the provisions of this section. According to information obtained in December 2014, the SIM planned to revise its fire safety cover plan in 2015 and no formal request for an extension of the deadline prescribed for this revision had been sent to the Ministère de la Sécurité publique.

Since the fire safety cover plan, once it is approved by the Public Safety Minister, allows the City, under an urban agglomeration power, to benefit from an exemption from liability (immunity) under section 47 of the *Fire Safety Act*, we think that the SIM must take every necessary step to comply with the provisions governing its revision in particular. The approval of a fire safety cover plan revised by the Ministère de la Sécurité publique and municipal authorities would maintain the City’s immunity beyond any reasonable doubt if a major fire should break out on its territory, for example.

Accordingly, we think that even though the deadline has passed, the SIM should take the necessary steps to revise its fire safety cover plan as promptly as possible in accordance with the provisions set out in the *Fire Safety Act*. In the meantime, the SIM should formally notify the Ministère de la Sécurité publique of the date on which it intends to submit the revision of its fire safety cover plan.

#### 4.5.B. Recommendation

We recommend that the Direction de la gestion stratégique des réseaux d'eau establish accountability mechanisms providing for the participation of boroughs in fire hydrant management so that it can inform the management of both the Service de l'eau and the Direction générale about:

- the execution of activities;
- assessment of the results obtained in comparison with the objectives set and, in the event of any discrepancies, the corrective action to be taken;
- the condition of the inventory.

#### Business unit's response:

*[TRANSLATION] The DGSRE will establish accountability mechanisms that provide for the participation of boroughs in fire hydrant management.*

*These mechanisms will be defined in the by-law respecting the delegation of separate powers to boroughs in the area of secondary water and sewer system maintenance activities. (Planned completion: December 2015)*

#### 4.5.C. Recommendation

We recommend that the Service de sécurité incendie de Montréal ensure that it obtains from the Service de l'eau a report on the implementation of measures dealing with the water supply component that were provided for in the 2009–2013 fire safety cover plan so that it can prepare a new fire protection action plan and take it into account when the fire safety cover plan is revised.

#### Business unit's response:

*[TRANSLATION] A direct link has been established between the SIM and the SE. A request was sent to the SE to find out the costs of implementing the actions identified in the fire safety cover plan. Cooperation is in place to obtain the various details that can be used to produce a report.*

*A report, combined with a list of the various items in place, can help better determine the needs for the next fire safety cover plan and its implementation. (Planned completion: December 2015)*



**4.5.D. Recommendation**

We recommend that the Service de sécurité incendie de Montréal establish formal accountability mechanisms that integrate the results of the Service de l'eau concerning the implementation of measures provided for in future fire safety cover plans so that it can inform the authorities about all the measures provided for in them.

**Business unit's response:**

*[TRANSLATION] A committee consisting of several people who participated in the development of the initial fire safety cover plan has been set up. This committee will also include departments on which implementation of the fire safety cover plan will have an impact.*

*A project management approach, with studies, analyses, follow-up, progress reports and accountability reporting will be introduced.*

*A rolling action plan for implementation will be created and used by the SIM over the next few years. (Planned completion: December 2015)*

**4.5.E. Recommendation**

We recommend that the Service de sécurité incendie de Montréal take the necessary steps to produce the revision of the fire safety cover plan as promptly as possible in order to comply with the provisions set out in the *Fire Safety Act*, notwithstanding the fact that the deadline is past.

**Business unit's response:**

*[TRANSLATION] The SIM will set up a committee consisting of several people who participated in the development of the first fire safety cover plan. This committee will also include municipal departments on which implementation of the fire safety cover plan will have an impact.*

*A rolling action plan for implementation of the revision of the fire safety cover plan will be created and used by the SIM over the next few years. (Planned completion: December 2015)*

**4.5.F. Recommendation**

We recommend that the Service de sécurité incendie de Montréal, pending completion of the revision of the fire safety cover plan, formally notify the Ministère de la Sécurité publique of the new delivery date on which it plans to submit this revision so that the City can maintain beyond any reasonable doubt the exemption from liability from which it has benefited since the certification of the first fire safety cover plan.



**Business unit's response:**

*[TRANSLATION] A resolution must be approved by the agglomeration so that authorities can be assured that the City will continue to benefit from its exemption from liability. (Planned completion: June 2015)*

## 5. General Conclusion

Fire hydrant maintenance management is one of the essential aspects of fire protection. In the event that deficiencies related to the functioning of fire hydrants or the water supply should materialize during a fire, the City would be liable for any negative consequences. Such consequences could be reflected in a longer emergency response time, compromised citizen safety, greater material damages, etc.

Fire hydrant management is complex because it involves interdependence among the various municipal responsibilities exercised by the Service de sécurité incendie de Montréal (SIM), the Service de l'eau (SE), the 19 boroughs on the City's territory and the related municipalities.

Among the most important factors that enable the SIM to ensure that its operations are effective are the locations of fire hydrants and the rapid identification of fire hydrants that are out of service or have flow rates below 1,500 L/min. To limit the number of out of service fire hydrants while ensuring that the others are in proper working order, the SIM expects all related municipalities and Ville de Montréal to ensure that they are inspected and that diligent repair work and regular preventive maintenance work are carried out on them. Nonetheless, our audit revealed the presence of deficiencies related to a lack of knowledge of the condition of fire hydrants.

First, many of the people we met with in boroughs were not aware of the importance of their participation in the fire hydrant management process, which is aimed primarily at providing the SIM with assurance that hydrants are in good working order.

With respect to the City, the fact that the SIM uses a separate database (répartition assistée par ordinateur (RAO)) from the SE and the boroughs (which use gestion de l'entretien des actifs (GEA)), means that harmonization measures must be adopted in order to allow the flow of information among them. When several stakeholders are involved, there is a greater risk of errors, as our audit has in fact shown. This problem is compounded by the lack of uniform standards for boroughs, the lack of true maintenance objectives, a corporate application (GEA) that does not provide real-time data and that cannot be used to generate management

reports to facilitate the planning and monitoring of maintenance, deficiencies related to repair times and employee qualification. It is therefore easy to understand why accountability reporting is only partial.

It subsequently becomes difficult for the SE and the boroughs to demonstrate that maintenance work is carried out diligently and that the SIM has all the data it needs. There is no denying that a coherent fire hydrant inspection and maintenance program, which was supposed to be established in 2010 under the fire safety cover plan, has still not been set up as of 2014. Moreover, the overall flow rate and pressure profile for the system as a whole still does not allow the identification of all problematic sectors, as provided for in the 2009–2013 fire safety cover plan.

All the problems observed demand that corrective action be taken by each of the business units responsible (SIM, SE and boroughs) so that they have knowledge of the condition of fire hydrants enabling them to respond effectively to a fire.