5.1

Management of the Emerald Ash Borer and the Canopy

Summary of the Audit

Purpose

Evaluate the measures with which the city deployed a strategy governing management of the problem related to the emerald ash borer in the territory of the Montréal agglomeration.

Results

In addition to these results, we have formulated various recommendations for the business units.

The details of these recommendations and our conclusion are outlined in our audit report, presented in the following pages.

Note that the business units have had the opportunity to formulate their comments, which appear after the audit report recommendations.

Considerable efforts have been deployed by the city to fight this plague and tend to enhance the canopy. However, in our opinion, several improvements should be made to the measures already taken by the city to fight this plague taking into account the main findings hereunder.

- Since the adoption by the executive committee in 2012 of the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015*, no other formal action plan has been drawn up and approved to circumscribe the directions.
- In the context of deployment of the strategy against the emerald ash borer:
  - the ash trees initially treated with a biopesticide did not systematically receive another treatment every two years as recommended by the supplier;
  - the results and the underlying analyses of the operations proposed are not all documented.
- The Service des grands parcs, du verdissement et du Mont-Royal (SGPVMR) has not instituted *post facto* controls allowing it to validate that tree felling prescribed in the boroughs was actually performed.
- The business unit responsible for assuming the city-wide leadership to look for and analyze solutions for reclamation of wood from felled ash trees has not been designated.
- By-law 15-040 to stop the spread of the emerald ash borer in the private domain has not received any monitoring of its application in the field.
- The financial setup that should allow anticipation of the budget needs of future years, in order to manage the impacts of the fight against the emerald ash borer, has never been updated since it was drafted in 2014.
- Budget appropriations are transferred from the SGPVMR to the boroughs without instituting control and monitoring measures to assess their contribution to the achievement of the fixed objectives.
- Management reports allowing tracking of the progress of operations and the degree of advancement of the actions taken in relation to the fixed targets, as well as assessments allowing evaluation of the strategy deployed against the emerald ash borer and for canopy enhancement, are not produced periodically.

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List of Acronyms

ASM	Ash Subsidy Management
BAM	Bureaux Accès Montréal
CFIA	Canadian Food Inspection Agency
CHD	chest height diameter
CMM	Communauté métropolitaine de Montréal
CQEEE	Conseil québécois des espèces exotiques envahissantes
NPO	non-profit organization
SGPVMR	Service des grands parcs, du verdissement et du Mont-Royal
SLAM	*Slow Ash Mortality*
SPO	Service de la performance organisationnelle
STI	Service des technologies de l'information
TCEP	Triennial Capital Expenditures Program

5.1. Management of the Emerald Ash Borer and the Canopy

1. Background

The emerald ash borer is a metallic emerald green-coloured insect originating from Asia (see Appendix 6.1, Figure A). This exotic invasive species attacks all types of ash trees, causing the death of the tree within a few years. No effective means of eradicating this insect has been perfected to date.

The insect was discovered for the first time in 2002 in Southern Ontario and in 2008 in Québec. Its presence in Montréal was recognized for the first time in July 2011 in the territory of Mercer–Hochelaga-Maisonneuve borough, near the Port of Montréal. The use of ash pallets for transport of merchandise in trade from Asia to North America allegedly allowed the introduction of the insect. Since then, the emerald ash borer has continued to spread and now is present throughout the territory of the Island of Montréal.

According to the documentation traced on the subject, the insect has the ability to fly short distances, but the main sources favouring its dispersion are human handling associated with transport of ash firewood, branches or logs infested with the insect. We should specify that the insect can live in the wood of a felled and cut ash tree, which accentuates the risks of spreading.

In 2012, the city estimated at 1.2 million the number of trees of all species planted in the public domain.[1] Of this number, the ash population was estimated at nearly 20%, a little over 200,000 trees threatened with destruction by the insect.

Knowledge of the emerald ash borer reveals the fact that, without intervention, the infested tree is doomed to gradual die-out over a period of two to three years and sometimes within a single year if the tree is severely infested. Thus, although it poses no human health hazard, the spread of the insect and the massive and rapid loss of ash trees present many environmental issues, as well as economic and social issues for municipalities and citizens, particularly:

- a loss of quality of life;
- an impairment of the esthetics of neighbourhoods and private property values;

[1] These trees in the public domain occupy space on the public thoroughfare along streets, in parks (off-street) or in the natural environment (woodlands). In opposition, trees in the private domain are planted on land belonging to individuals, industries, businesses or institutions (e.g., universities, hospitals).

- a reduction of the canopy[2] and a de facto increase in urban heat islands;[3]
- a decrease in air quality;
- a decrease in rainwater retention capacity (increased risk of sewer overflows during heavy rains);
- an increase in the annual costs mainly associated with felling of dead ash trees for public safety reasons (branches or parts of the tree can fall), replacement of these trees (replanting) and disposal of the infested wood.

In this context, the city has adopted an approach seeking to slow the progression of emerald ash borer in its territory and gain time to reduce its impacts. Thus, the *Plan d'action montréalais de lutte à l'agrile du frêne 2012-2015,* deployed by the city since 2012, is articulated around the *"Slow Ash Mortality (SLAM)"* strategy. This consists of slowing the insect's progression by detecting and treating outbreaks as soon as possible with a biopesticide. This strategy offers the advantage, in particular, of spreading the costs of tree felling and replacement over time instead of clear-cutting all ash trees.

The Service des grands parcs, du verdissement et du Mont-Royal (SGPVMR) is the business unit designated to implement this action plan in the city's territory.[4] However, we should mention that some boroughs have also adopted local action plans and have invested additional efforts, in collaboration with the SGPVMR, to protect the public ash trees in their respective territories.

Finally, we should mention that the city's Sustainable Development Plan *Montréal durable 2016-2020*, and the previous plan entitled *Plan de développement durable de la collectivité montréalaise 2010-2015*, both identify the target of improving green infrastructure in Montréal by increasing the canopy area index from 20% to 25% by 2025 as one of the main collective targets to be achieved. In view of achieving this objective, the SGPVMR produced a study in 2011 on the Montréal canopy and, subsequently, the *Plan d'action canopée 2012-2021* covering the urban agglomeration. The *Plan d'action canopée 2012-2021* is the result of a joint effort by the city and a non-profit organization (NPO). For the implementation of this plan, it was agreed that the city would coordinate planting in the municipal public domain and the sites under its responsibility, while the NPO would see to coordinating tree planting in the private and institutional domain with the assistance of another NPO, which represents an umbrella group of about 40 organizations. The plan proposes, over a 10-year horizon, the additional planting of 300,000 trees on the Island of Montréal, in

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2 The **canopy** is the extent of the vegetation cover formed by the trees in a territory. The canopy area index calculates the shade on the ground provided by the tree crowns relative to the territory.

3 **Urban heat islands** are localized temperature elevations, particularly the maximum diurnal and nocturnal temperatures, recorded in the urban environment relative to the neighbouring rural or forest areas or relative to the regional average temperatures.

4 In 2012, this activity was the responsibility of the Division de la production et de l'expertise arboricole, Direction des grands parcs et verdissement, of the Service du développement et des opérations. For the purposes of the report, the name Service des grands parcs, du verdissement et du Mont-Royal (SGPVMR) will be retained.

both the public and private domains. For the city, this represents 75,000 additional trees to plant in the public domain, in addition to the 23,000 trees the boroughs plant on the average under their regular planting program, while for the NPOs involved, this represents planting 142,000 trees. For the related cities, this involves planting 60,000 additional trees.

In this perspective it must be recognized that the infestation related to the spread of the emerald ash borer could compromise the achievement of this objective of the sustainable development plan, *Montréal durable 2016-2020*.

2. Purpose and Scope of the Audit

The purpose of the audit conducted was to evaluate the measures with which the city deployed a strategy governing management of the problem related to the emerald ash borer in the territory of the Montréal agglomeration.

Our audit covered the years 2012 to 2016. It began on May 30, 2016, and then intensified over the period from September 6 to December 16, 2016.

This work was performed primarily with the following business units:

- The SGPVMR (Division stratégies, programmes et politiques, Section biodiversité et écologie urbaine);
- The Côte-des-Neiges–Notre-Dame-de-Grâce borough (Direction des travaux publics, Division de la voirie et des parcs);
- The Rivière-des-Prairies–Pointe-aux-Trembles borough (Direction des travaux publics, Division de l'horticulture et des parcs, Direction du développement du territoire et études techniques, Division de l'ingénierie, Section conception de parcs);
- The Sud-Ouest borough (Direction des travaux publics, Division des parcs et horticulture).

The work consisted of conducting interviews with personnel, examining various documents and conducting the surveys we considered appropriate with a view to obtaining probative information. This audit is based on the examination of the evaluation criteria presented in Appendix 6.4.

3. Main Findings

The audit performed found that improvements had to be made because, in particular:

- Since the adoption by the executive committee in 2012 of the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015*, no other formal action plan has been drawn up and approved to circumscribe the directions;
- Under the strategy deployed by the SGPVMR against the emerald ash borer, the ash trees initially treated with a biopesticide did not systematically receive another treatment every two years as recommended by the supplier;
- The results and the underlying analyses of the operations proposed in the context of deployment of the strategy against the emerald ash borer are not all documented;
- The SGPVMR has not instituted *post facto* controls allowing it to validate that tree felling prescribed in the boroughs was actually performed;
- The business unit responsible for assuming the city-wide leadership to look for and analyze solutions for reclamation of wood from felled ash trees has not been designated;
- Since its adoption in May 2015, By-law 15-040 to stop the spread of the emerald ash borer in the private domain, has not received any monitoring of its application in the field;
- The financial setup that should allow anticipation of the budget needs of future years, in order to manage the impacts of the fight against the emerald ash borer, has never been updated since it was drafted in 2014;
- Budget appropriations are transferred from the SGPVMR to the boroughs without instituting control and monitoring measures to assess their contribution to the achievement of the fixed objectives (e.g., tree felling and replacement);
- Management reports allowing tracking of the progress of operations and the degree of advancement of the actions taken in relation to the fixed targets, as well as assessments allowing evaluation of the strategy deployed against the emerald ash borer and for canopy enhancement, are not produced periodically.

4. Audit Results

Regarding roles and responsibilities, we should specify that the SGPVMR, which acts in conjunction with the other departments (e.g., the Service des finances, the Service de l'environnement) and the city's boroughs, as well as the community partners, has the following mission:

- Improve the quality of life of Montrealers and visitors by the protection, development, planning and management of parks, green spaces, natural settings, public places or urban routes;
- Implement the *Plan de protection et de mise en valeur du Mont-Royal*;
- Green the public domain and encourage greening of the private domain;
- Work for the improvement of the urban environment as a whole.

The SGPVMR handles several aspects, including preserving and maintaining the accessibility of green spaces in the territory, designing and carrying out planning projects to improve the network of large parks and public places, ensuring the protection of natural settings and, more broadly, promoting urban biodiversity. It also ensures operations related to growing trees in the municipal nursery, scientific research, prevention of insect pests and analysis of the canopy.

The responsibility for greening is shared. On the one hand, the SGPVMR contributes, by means of contractual agreements, to tree planting with the aim of strengthening the canopy. On the other hand, the boroughs, under their regular programming, are also responsible for operations related to tree planting in their respective territories, their maintenance and operations related to felling and stump pulling. This includes green spaces (local parks) located in their territory, excluding large parks (e.g., La Fontaine Park, Mount Royal Park), which are under the SGPVMR's responsibility.

We find the actions to stop the spread of the emerald ash borer and to expand of the Montréal canopy involve shared powers between the SGPVMR and the boroughs. Nonetheless, it is with the objective of deploying overall intervention strategy affecting environmental aspects common to all the city's business units that the SGPVMR intervenes in the boroughs' territory in the context of implementation, on the one hand, of the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015* and, on the other hand, of the *Plan d'action canopée 2012-2021*. These plans will be discussed subsequently in section 4.1 of this report.

Finally, as information, let us mention that the Canadian Food Inspection Agency (CFIA) is responsible, in particular, for administering the *Plant Protection Act* and its regulations. In this regard, it is responsible for preventing the introduction or the spread in Canada of quarantine plant pests.[5] For management of the emerald ash borer, the CFIA has identified geographic quarantine areas within which transport of firewood is prohibited.

These clarifications having been made, the following sections of this report will discuss, in turn, all the aspects concerning the implementation and monitoring of actions with the aim of stopping the spread of this plague and concurrently enhancing the canopy.

[5] Any species, strain or biotype or plant, animal or pathogenic agent injurious to plants or plant products.

4.1. Action Plans for Management of the Emerald Ash Borer and the Canopy

4.1.A. Background and Findings

The development of a documented action plan is the management tool of choice to identify the operational phases to be implemented, in view of the objectives sought. Ultimately, this action plan must serve as a basis of evaluation of the progress of operations, identification of the problems encountered and review of the recommended strategy, as applicable. Also, considering the importance of planning the human and budgetary resources necessary for its implementation, it is important that an action plan be submitted for the purposes of formal approval by the authority concerned, prior to its implementation.

This having been said, in light of the information identified, we find that, starting in 2008, the SGPVMR took steps to prepare for the eventual arrival of the emerald ash borer in Montréal. In particular, communications were transmitted with the aim of raising the boroughs' awareness of the impacts of the plague and the preventive actions to be taken. A Committee to monitor the emerald ash borer, composed of boroughs' representatives and the CFIA, among others, was constituted and is still active to date. Training concerning techniques for detection of the insect was delivered to the personnel concerned.

Following detection of the insect in the city's territory in July 2011, a first action plan, entitled *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015*, was drawn up. As already mentioned the chosen strategy seeks to slow the emerald ash borer infestation and gain time to reduce its impacts. This action plan was formally approved by the city's executive committee at a meeting held on April 18, 2012.[6]

The *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015* spins off into four main lines of strategic intervention:

1. continuous screening to know the outbreaks as soon as possible and track the progress of the infestation to then adopt the most appropriate interventions;
2. selective felling of ash trees heavily infested by the emerald ash borer in order to contain the outbreaks and slow the insect's dispersion;
3. treatment with a biopesticide of ash trees located around infested ash trees, with the aim of containing the outbreaks by eliminating the next generation of insects;
4. control of transport of ash wood within the territory to reduce the risks of dispersion during the critical period when the insect's adult stage is active (April to September).

[6] Resolution CE12 0555.

Let us specify this intervention strategy only concerns ash trees under municipal responsibility, namely ash trees in the public domain. Also, a series of other actions that had to be performed in parallel supported the plan's strategy, including:

- introduction of concerted action mechanisms for stakeholders who have a role to play against the emerald ash borer;
- update of the ash tree inventory;
- adoption of municipal by-laws to facilitate detection of infested ash trees in the private domain, with the aim of harmonizing the interventions applied with those for public ash trees and thus reducing the risks of the insect's dispersion;
- deployment of a communications action plan to raise public awareness for protection of their private ash trees.

The examination of this action plan reveals that the city initially envisioned a concerted and harmonized intervention on the scale of the Montréal agglomeration, with the aim of forming a common front to counter the insect invasion. To this effect, we recognize that:

- The plan envisioned the establishment of a centralized expert office on the emerald ash borer, effective in 2012, to deploy strategies against that insect in the agglomeration's territory. It was projected that this centralized expert office would be created within the SGPVMR and that it would have the mandate to develop the best strategies and deploy them with the boroughs and the related municipalities, in order to ensure coordination of actions and follow-up of the proposed measures;
- In April 2014, the executive committee had even adopted a resolution[7] to put a notice of motion on the urban agglomeration council agenda, for an urban agglomeration council by-law amending the schedule to the order in council concerning the Montréal agglomeration,[8] by which the following action would be added to the list of activities of collective interest: "*Adoption of a strategy against the spread of the emerald ash borer on the scale of the urban agglomeration, implementation of this strategy and adoption of by-laws against the spread of the emerald ash borer*."

This increase in powers sought to allow the adoption on the scale of the urban agglomeration of an overall strategy against the emerald ash borer. At the same time, it was also resolved to mandate the SGPVMR to establish the actions against the emerald ash borer throughout the agglomeration's territory in collaboration with the related cities.

We find this aspect of the action plan, seeking an intervention strategy on the scale of the agglomeration and the establishment of a centralized expert office, as projected, did not materialize and the action plan in question was put forward only in the city's territory. Indeed, in light of the information obtained, it appears this desired amendment

[7] Resolution CE14 0671, April 23, 2014.

[8] Order in council 1229-2005, December 8, 2005; *Act respecting the exercise of certain municipal powers in certain urban agglomerations* (CQLR, chapter E-20.001).

to the order in council concerning the urban agglomeration of Montréal did not receive the unanimous support of the related municipalities and the boroughs. Thus, this project was abandoned and the stakeholders instead relied on everyone's co-operation by creating an agglomeration committee to ensure harmonization of the interventions of each related city. Moreover, in accordance with the directions of the 2014-2024 Metropolitan Strategy Against the Emerald Ash Borer of the Communauté métropolitaine de Montréal (CMM), we find, in studying the 2014-2015 assessment prepared by the CMM, that during this period, the vast majority of the related municipalities constituting the Montréal agglomeration had adopted an action plan against the emerald ash borer adapted to their own reality. Moreover, 80% of them had adopted municipal by-law imposing measures against the emerald ash borer on private land. For the city, this is the *By-law to stop the spread of the emerald ash borer on the territory of Montréal* (By-law 15-040) and the *By-law concerning the subsidy for the treatment of ash trees located on private property in high-risk areas* (By-law 15-063). These by-laws will be discussed subsequently in section 4.2.8 of this report.

To date, it has been confirmed to us that a committee of a more technical nature, called the Comité régional Agrile has succeeded the initial Agglomeration Committee. This committee, constituted of the SGPVMR team of experts in the matter, and representatives of the boroughs and the related municipalities, allows information sharing and tracking of the efforts against the emerald ash borer in the urban agglomeration's territory.

Following the adoption of the first *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015* on April 18, 2012, we find the executive committee resolved, at a meeting held on June 19, 2013[9], to mandate the SGPVMR to produce the financial setup of the *Plan d'action montréalais de lutte contre l'agrile du frêne 2015-2025*. Upon reading the decision-making summary accompanying this resolution, we understand the emerald ash borer has gained ground, because new outbreaks have been discovered and additional budget appropriations will be required to continue the fight against the emerald ash borer. The decision-making summary indicates the following:

> *[TRANSLATION] To determine the most profitable interventions for Montréal in the longer term and avoid inflation of unpredictable costs in the years ahead, <u>an action plan</u> for the next 10 years will be proposed in 2015. […] <u>The plan proposed</u> by the Direction des grands parcs et du verdissement (DGPV) <u>will be associated with a financial setup</u>, which will allow anticipation of the budget needs to manage the impacts of the efforts to stop the spread of the emerald ash borer between 2015 and 2025.*[10]

Thus, although the executive committee was informed by the decision-making summary that, effective from 2015, a new action plan associated with a financial setup

[9] See GDD 1136218007 (Resolution CE13 0939, June 19, 2013).
[10] Our underlining.

would be drawn up, it must be recognized that only the financial setup was produced by the SGPVMR in collaboration with a budget advisor from the Service des finances.

This financial setup, which the SGPVMR's managers entitled *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)* or *Plan de gestion intégré de la forêt urbaine 2015-2025 (PGIFU),* concurrently combines the required investments (all funding sources) to stop the spread of the emerald ash borer and those required to achieve the canopy enhancement target (20% to 25%) by 2025. We have not traced any evidence that it was formally approved by the SGPVMR's management, nor by the executive committee, even though it had ordered its production.[11] Moreover, major loan by-laws ($7 million and $14 million in 2015 and $22 million in 2016), seeking in part to fund these interventions concerning the fight against the emerald ash borer and canopy enhancement, were adopted by city council, without integrating the *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)* or the financial setup in question into the attachments of the decision summaries. For example, the decision files underlying the adoption of the $14 million and $22 million loan by-laws indicate the borrowing is required for the fulfillment of the *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)* which, in fact, turns out to be a financial setup extending to 2028, according to what we could observe. These aspects associated with the financial setup will be discussed more fully in section 4.3 of this report.

Questioned to this effect, the managers interviewed within the SGPVMR affirm that management of fight against the emerald ash borer was the subject of various presentations over the years. The division head responsible affirms that quarterly meetings were held with the city manager to discuss the progress of the situation regarding the efforts against the emerald ash borer and the achievement of the canopy enhancement target. According to the information obtained, the financial setup called *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)* received oral approvals.

Over the years, the only two documents we traced and which briefly state the direction of the interventions to continue the fight against the emerald ash borer and enhance the canopy are as follows:

- *Plan d'action montréalais contre l'Agrile du frêne 2012-2015 – Bilan 2012 et programme 2013*. The document is undated;
- *Forêt urbaine – Bilan 2015 – Plan d'action 2016*. This is a PowerPoint presentation dated March 24, 2016.

The document entitled *Bilan 2012 et programme 2013* presents the main objective and the actions proposed for 2013, while the second document *Forêt urbaine – Bilan 2015 – Plan d'action 2016* identifies three action priorities for 2016. We have not traced any documentation discussing all the intervention priorities for the years 2014 and 2015. Moreover, we were unable to identify clearly to whom these documents had been presented, but according to the information obtained from the persons

[11] Resolution CE13 0939, June 19, 2013.

interviewed at the SGPVMR, they were transmitted to the management of the department.

In short, since the adoption by the executive committee in 2012 of the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015*, no other formal action plan has been drawn up and approved with the aim of circumscribing the directions.

Moreover, specifically concerning the *Plan d'action canopée 2012-2021,* which we discussed previously, we find it was the subject of a public consultation held on October 3, 2012 by the Commission permanente du conseil d'agglomération sur l'eau, l'environnement, le développement durable et les grands parcs.[12] The report of the standing committee, which mentions unanimous support for the *Plan d'action canopée 2012-2021* project, was tabled at city council and then at the urban agglomeration council in January 2013. In response to the standing committee's report, we find the decision-making summary indicates that the city's executive committee, in particular, resolved[13] on September 18, 2013, to mandate the SGPVMR to finalize the *Plan d'action canopée 2012-2021*.

However, to date, although actions have been undertaken to implement the *Plan d'action canopée 2012-2021* and major loan by-laws have been adopted to fund its fulfillment concurrently with the interventions against the emerald ash borer, we find the *Plan d'action canopée 2012-2021* is still identified[14] as a working document. We did not trace any evidence of its formal approval by the authorities concerned. This finding was confirmed to us by the division head responsible for the SGPVMR.

To date, in view of the scope of the emerald ash borer's ravages in Montréal's territory and the issue this crisis represents for the objective of enhancing the canopy from 20% to 25% by 2025, it is legitimate to establish joint management of the action plan to continue the fight against the emerald ash borer and the action plan to enhance the canopy. In this sense, it would have been opportune for the SGPVMR to adopt an updated, documented and formally approved action plan with a view to renewing or redefining the strategy to apply and presenting the actions to be implemented in order to circumscribe all the problems identified, given the targets to be achieved and the available budgets.

[12] Resolution CG12 0230.
[13] Resolution CE13 1511.
[14] The cover page of the *Plan d'action canopée 2012-2021* indicates it is a working document.

RECOMMENDATION	
4.1.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal take the necessary actions to adopt an updated action plan, formally approved by the authority concerned, regarding the strategy pursued and the targets sought in fighting the emerald ash borer and enhancing the canopy, in order to benefit from an appropriate intervention framework and a decision help tool to track the achievement of the expected results.
BUSINESS UNIT'S RESPONSE	
4.1.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The Service des grands parcs, du verdissement et du Mont-Royal has already produced an annual status report on urban forest issues, making it possible to account for the results achieved in relation to the administration's objectives and present the priorities for the coming year. A succinct report is produced and a press conference is organized. A more complete substantive document could be presented every three years. This will allow popularization of the issue as a whole and statement of the priorities for the next three years.* ***(Planned completion: April 2018)*** **Auditor General's comments** **We reiterate the importance for the SGPVMR to adopt, in the very short term, an updated and approved action plan regarding the strategy pursued to fight the emerald ash borer and simultaneously increase the Montréal canopy index. Considering the scope of the plague and the size of the budgets that will still have to be allocated to it, such a plan undoubtedly constitutes the cornerstone for ensuring the conduct of priority actions and the coordination of interventions by all the business units involved. In light of the response submitted by the SGPVMR, we do not perceive that all the necessary actions will be taken to adopt such a management tool, whereas the SGPVMR mentions that a more complete substantive document <u>could</u> be (and not will be) presented every three years.** **This is especially relevant, considering that several aspects of the financial framework will have to be updated to anticipate the future budget needs properly and that the Canopy Action Plan 2012-2021 was established without accounting for the devastating effects of the emerald ash borer's presence in the**

	territory. The objective of increasing the canopy index by 5% by 2025 is at risk of being compromised.

4.2. Intervention Strategy

Concurrent to the strategy against the emerald ash borer put forward by the SGPVMR, let us mention that the Sud-Ouest borough, which is the subject of this audit, is one of the city's boroughs to have adopted its own *Plan d'action de lutte à l'agrile du frêne (2014-2024).*[15] This action plan is presented as one of the components of the borough's urban forest sustainable development plan. The borough's interventions against the emerald ash borer are complementary to those carried out by the SGPVMR, regarding the detection and treatment of ash trees in the public domain present in its territory.

4.2.1. Ash Tree Inventory

4.2.1.A. Background and Findings

To rapidly counter the inherent impacts of the ravages caused by emerald ash borer, it is essential to rely on an up-to-date inventory and thus have an exhaustive knowledge of the quantity of ash trees existing both in the public domain and in the private domain, which both constitute categories of trees in the urban environment. In the absence of a precise inventory of ash trees existing in the territory, it will be more difficult to deploy an intervention strategy that will be perfectly well coordinated and harmonized, without counting that it could also be more difficult to establish precisely the necessary budgets to fight this plague.

Concerning trees in the public domain, a distinction is made between streetside ash trees, off-street ash trees (local parks) and woodland ash trees (large parks). On the other hand, ash trees in the private domain belong to individuals, merchants, industries or institutions. These trees are entirely and legally under the owners' responsibility.

The municipalities have an interest in knowing the location and quantity of public trees exhaustively, because they are liable for any damage or harm they might cause. As for trees located on private land, it is also necessary to know their inventory to be able to apply a comprehensive strategy of efficient management throughout the city's territory in the presence of a pest like the emerald ash borer.

[15] The borough council authorized a budget allocation of $1.4 million for the first four years of this plan.

In 2012, shortly after the insect was detected in the city's territory, the SGPVMR estimated the public ash tree population was a little over 200,000 trees, including:

- 50,000 streetside ash trees;
- 50,000 off-street ash trees located in local parks;
- 100,000 woodland ash trees (forests of large parks, e.g., Mount Royal Park).

To date, our audit reveals that the SGPVMR has not yet completed the entire inventory of ash trees in the public domain, particularly for those presented in woodlands of large parks. However, concerning the first two categories (streetside ash trees and off-street ash trees), which were estimated at 100,000 ash trees in 2012, the inventory data obtained from the SGPVMR as of November 18, 2016, reveals that no more than a total of 70,867 streetside and off-street ash trees remain, namely:

- 46,978 streetside ash trees;
- 23,889 off-street ash trees.

According to the information obtained, the recognized difference of 29,133 ash trees relative to the initial estimate (100,000 - 70,867) is particularly explained by annual felling by the boroughs.

To be reliable, the power of an inventory depends primarily on its data, making its update essential. Yet we have found the city-wide tree inventory is not recorded on a uniform computer platform that could be used by all the business units concerned. Indeed, currently different computerized platforms exist, supporting the city's tree inventory. In particular, there is the vegetation management system, which is used by the SGPVMR and by 13 of the city's 19 boroughs, including the 3 boroughs covered by this audit. The other six[16] boroughs use different applications specific to them. It appears these different databases do not communicate with each other. Moreover, in some regards, inventory data (e.g., geopositioning of the trees) in some boroughs is not up to date.

The first version of the city-owned vegetation management system property, restricted to the tree inventory, was adopted in 1991. Since that data, several developments have been dedicated to the system and several modules have been added to it. It now supports the streetside, off-street and woodland tree inventory, as well as the inventory of trees in the private domain, allows georeferencing of their locations, management of procurement at the municipal tree nursery, pesticide management and project-based management of planting, pruning and other tree maintenance projects. According to the information we obtained from the interviewees, and in view of the documentation consulted, this tool is becoming increasingly obsolete, however, due to its age and the capacity to maintain it up to date. Indeed, over the years, although the vegetation management system has undergone modifications and additions, user training has not necessarily followed, due to a lack of budget. Moreover, it turns out

[16] These are the following boroughs: Anjou, Lachine, LaSalle, L'Île-Bizard–Sainte-Geneviève, Montréal-Nord and Outremont.

the application is not used to its full potential due to a lack of knowledge of all its functionalities by the users. This situation thus generates a risk that the users use the system incorrectly due to a lack of knowledge and training. In this regard, it was mentioned to us that the city's Service des technologies de l'information (STI), in collaboration with the Service de la performance organisationnelle (SPO) had been mandated in 2016 to conduct an overall study of asset management at the city, including the vegetation management system, in view of identifying a computer platform that eventually could be used uniformly by all stakeholders.

In the interim, with the goal of being able to collect the data concerning the tree inventory for all the city's business units, the SGPVMR has used an application called ArcGIS®.[17] Thus, by means of Excel files, the data saved in the different inventory databases used by the boroughs (the vegetation management system and the applications of the six boroughs) is extracted to export the information to the ArcGIS® application, which will allow the SGPVMR to obtain the entire inventory.

Moreover, more specifically concerning the vegetation management system, the information obtained reveals that the frequency of data updates relating to the tree inventory can vary from one borough to another. Moreover, we find the boroughs must proceed manually to capture interventions performed in the field by means of paper work orders. Thus, it is possible that the inventory database is not exactly up to date, considering the delays that can be caused by this handling of paper and the risks that work orders have been lost. In addition, contrary to the boroughs, the SGPVMR's personnel have electronic tools (tablets) allowing real-time capture of inventory data directly in the field when they are patrolling the territory. The inventory data captured in this manner by the SGPVMR may not have been communicated systematically to the boroughs, thus causing deviations between the two inventory databases kept by the boroughs and those constituted by the SGPVMR.

Thus, to date, the city does not yet have an exhaustive picture of all the ash trees located in its territory. On the one hand, the picture of the situation in the public domain is incomplete, but also the inventory data on ash trees in the private domains is still provisional.

Indeed, on February 23, 2016, the city council resolved[18] to award a contract for professional services in an amount of $290,671 to an NPO for the production of an ash tree inventory in the private domain within the city's territory. According to the information obtained, the census of these ash trees in the private domain, within a certain number of risk areas, had initially begun in fall 2015, under a first agreement made with the same organization, for $24,693. At the time of the audit, it appears the

[17] ArcGIS® is geographic information software developed to provide tools allowing cartographic and geospatial analysis of data, in particular. This system is composed of different platforms, whether office automation, Web or mobile, which allows users of geographic information systems (GIS) to collaborate and share geographic information.

[18] Resolution CM16 0227.

organization had completed the work requested with this second contract. However, because the NPO's employees are not municipal employees, they were not authorized to access the private yards of individuals. In the circumstances, they had to try to reference the ash trees visible from the street. This could have caused many inaccuracies. This is why, with the aim of eventually being able to have a complete and up-to-date inventory, the SGPVMR must now proceed with field validations to obtain the certainty that the trees identified are really ash trees and that all of them have been inventoried. As of December 1, 2016, the provisional data communicated to us by the SGPVMR reveals that a total of approximately 47,253 ash trees existed in the private domain.

From the city's 19 boroughs, we were informed that some of them[19] also undertake to conduct an inventory of the ash trees in the private domain in their respective territories. Of the three audited boroughs, the Rivière-des-Prairies–Pointe-aux-Trembles and Sud-Ouest boroughs have taken actions in this sense, whereas in 2014 and 2015 (for Le Sud-Ouest) and in 2016 (for Rivière-des-Prairies–Pointe-aux-Trembles), the organization responsible for carrying out the Éco-quartier program within the borough had the mandate to conduct this survey in its territory. According to the information obtained from the technical agent within the Sud-Ouest borough, the data collected was validated by sampling.

Finally, without seeking to downplay all the efforts deployed to date to counter the emerald ash borer invasion, it remains that this lack of knowledge of the exact number and the geographic location of the ash trees present in the city's territory will certainly have hindered the campaign and weakened the intervention strategy. On the one hand, portions of the territory might have escaped the SGPVMR's vigilance in view of slowing the insect's spread (e.g., the inventory of ash trees present in the woodlands of large parks is still incomplete). On the other hand, as we will see in section 4.2.8 of this report regarding ash trees in the private domain, an incomplete picture very certainly will have added to the complexity of the application by By-law 15-040,[20] as well as the SGPVMR's validation of applications for subsidies under By-law 15-063.[21]

Even though the city has taken steps to have an inventory of ash trees in its territory, it remains incomplete.

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19 According to the information obtained, the following boroughs were involved: Le Plateau-Mont-Royal, Saint-Laurent and Le Sud-Ouest.

20 *By-law to stop the spread of the emerald ash borer on the territory of Montréal*, in the private domain.

21 *By-law concerning the subsidy for the treatment of ash trees located on private property in high-risk areas*.

RECOMMENDATIONS	
4.2.1.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal pursue the efforts undertaken to adopt a complete inventory of trees, in order to remain proactive, but also to adapt its intervention strategy better in the presence of insect pests.
4.2.1.C.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal, in the expectation of the eventual implementation of city-wide harmonized application, take the necessary actions to ensure continuing education of users regarding the vegetation management application.
4.2.1.D.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal, with the goal of favouring the real-time update of the inventory database of the vegetation management application, evaluate the possibility of enabling the boroughs to have the same technological tools it uses in field interventions.
BUSINESS UNIT'S RESPONSES	
4.2.1.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The implementation of the corporate municipal asset management system, under the responsibility of the SPO, provides for the gradual update of the inventory of trees in the public domain, starting in 2019. The SGPVMR is a stakeholder in this approach.* ***(Planned completion: July 2019)*** *The SGPVMR will award a contract next July to begin the update of the public tree inventory, with the collaboration of the boroughs. The SGPVMR will award a contract to conduct an inventory of the forest communities.* ***(Planned completion: December 2017)*** *The SGPVMR is currently proceeding to validate the private tree inventory. This is an ongoing update of the date in relation to by-law enforcement.* ***(Planned completion: September 2017)***
4.2.1.C.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] In fall 2016, the SGPVMR met with the Comité des usagers du système de gestion des végétaux to identify the short-term training priorities. Since then, it has coordinated a user group (borough employees) with a trainer (under the responsibility of the STI) to develop this summary training. However, the success of this approach largely depends on the availability of expert users, because this is primarily a system used by the boroughs.* ***(Planned completion: December 2017)***

4.2.1.D.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The STI is mandated to develop an application allowing real-time data capture on a mobile device, directly in the field. The tools should be accessible in test mode in August 2017.* ***(Planned completion: December 2017)***

4.2.2. Detection

4.2.2.A. Background and Findings

Detection of the emerald ash borer is the first strategic line of the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015* deployed by the SGPVMR.

These detection operations serve to direct the nature of the subsequent interventions intended to slow the spread of the emerald ash borer (tree felling, treatment by biopesticide injection, replacement of the tree), but also to evaluate over time whether the strategy works.

Although the detection operations are under the SGPVMR's responsibility, some boroughs nonetheless have invested additional detection efforts with the aim of covering their territory more widely. In particular, the Sud-Ouest borough conducted detection operations during the years 2014 and 2015. For 2016, the borough decided to cease detection operations given that its territory was widely infested (see Table 2 below). Moreover, the information obtained to date reveals that all Montréal territory is infested. No borough has escaped the insect invasion.

Detection operations are generally performed in the fall (between September and December). They seek to determine whether the ash trees located in a given territory are infested, so that actions then can be taken quickly to stop the spread of the insect, either by treating the infested tree with a biopesticide or by selective felling. Remember these detection operations conducted by the SGPVMR and by some boroughs only concern ash trees in the public domain, because ash trees on private land are the owners' responsibility. According to the information traced on the subject, if the insect is detected at an early stage of infestation, it will be easier to contain it within the intervention area and thus protect the ash trees located outside the area. In the case of major emerald ash borer infestation, the foliage of the ash tree yellows, the branches decay, and the treetop is increasingly sparse. A highly infested tree will die of the infestation eventually.[22]

The main feature of the SLAM approach is that the presence of the invasive species is treated by outbreak, i.e., by intervention area. Thus, when the insect's presence is

[22] Source: Conseil québécois des espèces exotiques envahissantes (CQEEE).

detected, the SGPVMR draws a 300 m circular intervention perimeter around this point, in order to conduct different pest detection and control activities within it. According to the information obtained from the SGPVMR, the choice of intervention areas to conduct detection operations is guided, in particular, by criteria such as the presence of a high density of ash trees in the territory, the identification of sectors where declining ash trees have been observed, given the higher probability they have been infested by the emerald ash borer, or the proximity of a known outbreak. These intervention area selection criteria appear legitimate.

Thus, these areas, established within a 300 m radius of the places where the ash trees infested by the emerald ash borer have been detected in the public domain (along the street, in local parks, in woodlands and in large parks) are what the SGPVMR calls "high-risk areas". Following the detection campaigns it conducts, the SGPVMR maps the limits of the high-risk areas identified in the territory of each of the city's boroughs (see Appendix 6.2). As we will see in section 4.2.3 of this report, within these areas, the SGPVMR prescribes felling of severely infested ash trees or proceeds with treatment of the neighbouring ash trees by injection of a biopesticide called "TreeAzin®".

For your information, let us mention that in the adult stage, the emerald ash borer is present during a short period of the year, between mid-May and the end of August. After their emergence, the adults reach the top of the ash trees to feed and mate. The females then will lay up to a hundred eggs in the fissures of an ash tree's bark. After hatching, the young larvae penetrate under the bark and dig galleries (see Appendix 6.1, Figure B). It is the larvae that destroy ash trees by feeding on a layer located under the bark, called phloem. By digging galleries, the larvae block the flow of the sap and cause the ash tree to die after two to five years, depending on the tree's vigour. Completion of the biological cycle between the egg stage and the emergence of adults can take one to two years.[23]

Apart from visual referencing of the signs and symptoms revealing the presence of the emerald ash borer at an advanced stage (e.g., existence of S-shaped galleries under the bark, decay of the treetop), the SGPVMR has preferred two detection techniques, the use of sticky traps hung on the tree branches and barking branches (see Appendix 6.1, Figure E). These two techniques have the advantage of allowing early detection of the emerald ash borer in infested trees that appear healthy and that show no outer signs or symptoms.

According to the information obtained, until 2013, the detection operations were essentially conducted in house, but since 2014, the SGPVMR has awarded contracts to specialized firms. At the time of our audit, the contracts awarded during the years 2014 and 2015[24] for detection amounted to $1.3 million (see Appendix 6.3).

[23] Source: SGPVMR website.
[24] The contracts awarded in 2015 are for a three-year term.

We find the SGPVMR adopted an annual detection intervention target. This target was integrated into the financial setup entitled *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)* and prepared in 2014 by the SGPVMR in collaboration with the Service des finances. Thus, according to this financial setup, the SGPVMR intended to perform 4,000 detections per year, starting in 2015. However, in light of the examination of the decision summaries supporting the award of detection contracts by the SGPVMR since 2014, we find this target was revised downward to 3,450 detections instead of 4,000. As we will see in section 4.3 of this report, dealing with the financial framework, the financial setup in question has not been revised to account for this change in the financial forecasts. Tables 1 and 2 below illustrate the trend of detection operations conducted by the SGPVMR since 2012 and by the Sud-Ouest borough since 2014.

Table 1 – Trend of Detection Operations Conducted by the SGPVMR Since 2012

Detection operations	2012	2013	2014	2015	2016
Annual detection target (according to the financial setup – PGFU[a])	2,400	2,650	3,450	4,000	4,000
Number of trees to be detected according to the contracts awarded by h the SGPVMR	In house	In house	3,450	3,450	3,450
Actual number of ash trees detected	2,552 [b]	2,658 [b]	3,476 [b]	3,376 [b]	N/A
Fulfillment rate	**106%**	**100%**	**108%**	**98%**	**N/A**

[a] *Plan de gestion de la forêt urbaine 2015-2025 (PGFU).*
[b] Data compiled by the SGPVMR – *Technical Data Sheet – Status Report – August 9, 2016.*

Table 2 – Trend of Detection Operations Conducted by the Sud-Ouest Borough in 2014 and 2015

Detection operations	2014	2015	2016
Annual detection target	138 [a]	112 [a]	112 [b]
Actual number of ash trees detected	210 [a]	160 [a]	0 [c]
Fulfillment rate	**152%**	**143%**	**N/A**

[a] According to the assessment reports produced for 2014 and 2015.
[b] According to the *Plan d'action 2014-2024 de l'arrondissement pour la gestion de l'agrile du frêne.*
[c] The borough decided to cease detection operations, given that its territory was widely infested.

To date, a little over five years have passed since the emerald ash borer was discovered in Montréal for the first time in July 2011. Thus, considering the magnitude of the budgetary funds required for such operations and the fact that the investigations undertaken over the past few years confirm the infestation of all Montréal territory, we believe it is opportune for the SGPVMR to reassess its strategy so that it can decide on the relevance of maintaining, ceasing or modulating the detection operations to be conducted, depending on the directions that will be adopted for the continuation of the fight against the emerald ash borer.

RECOMMENDATION	
4.2.2.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal reassess its strategy and decide on the relevance of maintaining, ceasing or modulating detection operations so that it can better identify the directions to be recommended for the continuation of the fight against the emerald ash borer in Montréal's territory.
BUSINESS UNIT'S RESPONSE	
4.2.2.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR annually reassesses its intervention strategies, in view of the evolution of the emerald ash borer infestation. Thus, detection on the street and on wooded grounds is no longer performed as of this year. The interventions are concentrated on treatment, felling and planting.* ***(Planned completion: April 2017 - Completed)***

4.2.3. Biopesticide Treatment

4.2.3.A. Background and Findings

Biopesticide treatment of the ash trees located around infested ash trees in the public domain is part of the SLAM strategy[25] at the origin of the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015* deployed by the SGPVMR. This operation depends on the detection results, which give a picture of the state of health of the trees and determined those that must be treated or felled. For example, the ash tree treatments performed in 2016 are based on the detection results from 2015. The SLAM strategy provides that healthy ash trees (15 cm or more in diameter) or ash trees with a low infestation rate are treated, whereas ash trees that are totally infested or that exhibit signs of decay (over 30% dead branches) are prescribed for felling.

[25] The strategy seeks to contain outbreaks and stop the spread of the insect.

Thus, since 2012, the SGPVMR has used the pesticide called "TreeAzin®", which has proved its effectiveness, against the emerald ash borer. Let us specify this pesticide does not cause the direct death of the emerald ash borer in the larval or adult stages. However, it is very effective in keeping the tree alive by preventing the emerald ash borer larva from continuing to dig galleries under the bark (see Appendix 6.1, Figures B and D). For the fully mature insect that feeds on leaves, it diminishes its reproductive capacity by reducing the quantity and viability of the eggs. TreeAzin® is injected by means of capsules inserted at the base of the tree (see Appendix 6.1, Figure F). The insecticide then is dispersed in the tree by the sap rising to the foliage. To be effective, the treatments are applied between June 1 and August 31.

According to a study conducted by a team of researchers at the Canadian Forest Service, a TreeAzin® injection protects the tree for two years. Consequently, repeated TreeAzin® treatments every two years are likely to keep healthy or weakly infested trees alive for prolonged periods, at a cost equivalent or lower than the removal and replacement or an urban tree.[26]

In this sense, the information obtained from the SGPVMR reveals the cost of treatment of an ash tree with the pesticide TreeAzin® can vary according to the number and size of the ash trees to be treated or the competition among the contractors who apply this type of treatment. Currently, the price[27] of the treatments on the market may vary between $3.50 and $7.00 per cm of diameter. On the other hand, felling the tree, removing the stump and planting a replacement tree can generate expenses ranging between $1,500 and $3,000, depending on the size of the tree. Thus, taking the example of an ash tree 60 cm in diameter, the costs associated with felling could reach $3,000, while with the same expenditure, estimating the cost of treatment at $5/cm of diameter, the ash tree could be treated every two years over a period of about 14 years.[28] It must be recognized that repeated treatments represent an advantageous alternative to keep ash trees alive as long as possible and thus spread the costs related to felling over time, while waiting for an alternative solution to be found that eradicate this pest completely. Added to this are the environmental, economic and social benefits of maintaining these trees, for example, maintenance of the canopy and reduction of heat islands, higher private property values, and the contribution to the quality of life.

Thus, although we could recognize that it is possible for an ash tree to receive a second treatment under the operations conducted by the SGPVMR in the identified high-risk areas, our audit nonetheless sheds light on the fact that the SGPVMR to date has not planned to renew the injections systematically as prescribed. Due to this fact,

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[26] Source: TreeAzin® – A natural systemic insecticide against the emerald ash borer in Canada, D.G. Thompson, 2013.

[27] This price is calculated according to the chest height diameter (CHD) of the ash tree in cm at a standard height 1.4 m above the ground.

[28] Estimate calculated according to the following assumptions: treatment cost at $5/cm CHD, 2% inflation, tree growth of 1 cm/year.

we did not find evidence of any structured monitoring mechanism for the purpose of identifying and documenting the list of ash trees injected during a first round, their location, the date of the injection, etc. In light of the explanations obtained from the managers and personnel contacted on this subject, we understand the detection and treatment strategy deployed to date was not necessarily intended to treat systematically every two years all the ash trees that satisfied the maintenance criteria, but rather to cover as much territory as possible to slow the spread of the insect. Everyone affirms that visual monitoring in the field of the high-risk areas where detection and treatment operations have been conducted is performed by the designated personnel[29] within the SGPVMR, to assess the progress of the situation. However, these interventions and the results recognized are not documented in any way.

There was also mention of an experimental monitoring protocol that has now existed for three years within the SGPVMR, concerning a sample of 277 ash trees. This protocol seeks to test the effectiveness of TreeAzin® by monitoring selected trees, which have received a repeated injection after two years. Concerning this experimental monitoring, we find that a table exists, qualifying the overall state of health of these 277 trees, according to the following statuses: "healthy", "low decline", "moderate decline", "high decline" or "dead". However, we do not find evidence of any documented evaluation concerning the analyses performed and the conclusions that must be drawn from this experimental monitoring. The SGPVMR's experts are convinced, however, that the TreeAzin® treatment strategy has paid off, in view of the results observed in the field.

In another vein, as in the case of detection, we recognize that the SGPVMR has adopted an intervention target in the number of trees that must be treated annually. This target was integrated into the financial setup entitled *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)* prepared in 2014 by the SGPVMR in collaboration with the Service des finances. Table 3 illustrates the trend of this target in relation to the number of ash trees actually injected by the SGPVMR since 2012.

[29] These personnel are inspectors, technical agents or forest engineers.

Table 3 – Trends of Treatments Applied by the SGPVMR Since 2012 in Relation to the Established Targets

	Number of ash trees				
	2012	2013	2014	2015	2016
Target – treatments "for conservation purposes" – outside the high-risk areas[a]	–	–	5,000	5,000	5,000
Target – treatments according to the regular program – within the areas[a]	1,100	1,515	7,000	13,046	14,225
Total treatments projected[a]	1,100	1,515	12,000	18,046	19,225
Number of ash trees actually treated[b]	1,100	1,370	12,158	18,379	N/A
Fulfillment rate	**100%**	**90%**	**101%**	**102%**	**–%**

[a] Data from the financial setup entitled *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)* prepared in 2014 by the SGPVMR in collaboration with the Service des finances.
[b] Data compiled by the SGPVMR – *Technical Data Sheet – Status Report – August 9, 2016.*

In this regard, let us mention the operations related to treatment of ash trees in the public domain located within high-risk areas (SLAM) are carried out under contracts awarded by the SGPVMR to specialized contractors. To this effect, our audit made it possible to identify contracts totalling $15.3 million over a period from 2013 to 2016. These contracts concern the supply of the insecticide product or the insecticide injection service (see Appendix 6.3).

A more attentive examination of Table 3 above allows us to recognize the existence of a target for treatment of ash trees "for conservation purposes". Since the wording of this target suggest that a lot of 5,000 ash trees/year should receive repeated treatments to keep them alive over a longer period, we carried our investigation farther. It was then explained to us that, since 2014, the SGPVMR has offered the boroughs the possibility of identifying additional ash trees, in their respective territories, that could benefit, based on the central administration's contracts, from a TreeAzin® treatment. The trees thus proposed by the boroughs had to be trees located outside the high-risk areas. By this offer, according to the information obtained, SGPVMR wanted to expand the SLAM intervention areas by favouring treatment of as many ash trees as possible in the territory, with the aim of further slowing the spread of the insect. We understand this initiative sought to fight the emerald ash borer invasion. Nonetheless, we remain perplexed regarding the confusion such an appellation may have occasioned. Indeed, some decision summaries regarding the awarding of contracts for ash tree injection services in the public domain implied the budgetary funds required to carry out what the SGPVMR calls the *Conservation Program* was

supposed to protect superior-quality ash trees in the long term.[30] In fact, however, the *Conservation Program*, as its name seems to suggest, in no way concerns a lot of trees the SGPVMR wishes to conserve in the long term by means of treatments every two years.

Finally, let us remember that some boroughs, complementing the operations conducted by the SGPVMR, have invested additional efforts from their operating budget,[31] in order to treat a greater number of ash trees in their territory. This is particularly the case for the Sud-Ouest borough, which was the subject of this audit, and which has adopted an action plan (2014-2024) against the emerald ash borer. Table 4 illustrates the trend of the targets established by the borough for treatment purposes for the years 2014 and 2015 relative to the number of ash trees actually injected with the insecticide TreeAzin®.

Table 4 – Trend of Treatments Performed by the Sud-Ouest Borough in 2014 and 2015[a]

	Number of ash trees	
	2014	2015
Projected treatment target	600	600
Number of ash trees actually treated	524[b]	608
Fulfillment rate	**87%**	**101%**

[a] This information is taken from assessment reports produced after the implementation of the action plan. The results for 2016 were not considered, given that the assessment report was unavailable at the time of our audit.

[b] For 2014, the treatments essentially were applied by the SGPVMR under the proposed SLAM strategy.

The audit conducted in this borough allows us to recognize that, contrary to the SGPVMR, the borough's action plan provides for the renewal of treatment of ash trees every two years. To this effect, the borough has adopted a documented tracking mechanism (on Excel spreadsheet) annually identifying the ash trees treated by the borough and tracking of the renewal of the injection every two years. Thus, based on the information contained in the file, we find the ash trees treated in 2014 (524) received a second injection in 2016, and it is anticipated that the ash trees injected in 2015 will receive a second treatment in 2017. More specifically, we observe that of the 524 ash trees treated in 2014, 18 have since been felled and 506 received a 2nd treatment in 2016, i.e.:

30 See GDD 1156620002 and GDD 1166628003, two contracts for ash tree injection services in the amount of $693,615.45 and $106,305.89 respectively.

31 We did not proceed to identify all the amounts invested for treatment purposes by the city's boroughs.

- 293 injections applied by the borough;
- 213 injections applied by the SGPVMR in the context of deployment of its SLAM strategy. Indeed, in 2016, the SGPVMR expanded the high-risk areas. Certain ash trees initially located outside the area and that had been treated in 2014 thereby received a second injection under the SGPVMR's interventions.

The other two boroughs covered by the audit[32] did not proceed with injections from their operating budget. The treatment operations for their ash trees were conducted entirely by the SGPVMR.

In conclusion, considering that four years ago the SGPVMR deployed its strategy against the emerald ash borer and that the scientific analysis trends to prove that TreeAzin® is effective for two years, we have questions, in some regards, about the coherence of the strategy deployed by the SGPVMR.

Indeed, in the absence of repeated injections every two years, the city exposes itself to the risk the insect will regain the upper hand and that a large proportion of the ash trees initially treated during a first round will have to be felled and replaced more quickly. In the circumstances, the city would only have gained a reprieve of two or maybe three years to protect the Montréal canopy. This very certainly risks compromising the achievement of the canopy enhancement target from 20% to 25% by 2025. Added to this are the risks of seeing an explosion of the costs inherent in felling dead trees and replacing them over a short period of time, with the consequences that a massive demand for services in this regard could generate a price increase on the part of private contractors.

Considering the current state of the infestation and the risks associated with the non-renewal of injections, we believe it is opportune, at this point, that the SGPVMR reassess its strategy with a view to deciding on the proportion of ash trees it wishes to include in a real long-term protection program, within which the ash trees would be repeatedly treated according to a frequency to be determined.

Finally, while the SGPVMR’s treatment program only covers ash trees in the public domain, the *By-law to stop the spread of the emerald ash borer on the private domain* (15-040), adopted in 2015, obliges private property owners to treat or to fell their ash trees (depending on the degree of infestation) when their property is located in a high-risk area identified by the city. This by-law will be discussed subsequently in section 4.2.8 of this report.

[32] Côte-des-Neiges–Notre-Dame-de-Grâce and Rivière-des-Prairies–Pointe-aux-Trembles boroughs.

RECOMMENDATIONS	
4.2.3.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal reassess the component of its strategy concerning the treatment of ash trees, with a view to deciding on the proportion of them it wishes to include in a real long-term protection program, in order to ensure the coherence of the strategy deployed against the emerald ash borer and favour the achievement of the target of a 5% expansion of the Montréal canopy by 2025.
4.2.3.C.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal take the necessary actions to document further the results and the underlying analyses of the operations put forward in the context of deployment of the strategy against the emerald ash borer and prove the effectiveness of the treatment, in view of the costs involved.
BUSINESS UNIT'S RESPONSES	
4.2.3.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR has established its strategy concerning the treatment of ash trees and has targeted 60,000 ash trees for conservation, with treatment cycles every two years.* ***(Planned completion: April 2017 - Completed)*** **Auditor General's comments** **The SGPVMR indicates in its response that it has targeted 60,000 ash trees for conservation, with treatment cycles every two years. However, let us specify these interventions only concern on-street ash trees and off-street ash trees located in local parks among the 70,867 inventoried at the time of our work. Indeed, the ash trees located in woodlands (estimated at approximately 100,000) found in large parks (e.g., Mount Royal Park, La Fontaine Park) are not yet covered by a customized intervention strategy, even though the emerald ash borer is also present in these parks.**
4.2.3.C	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR uses the only treatment it is possible to use in Montréal against the emerald ash borer, in compliance with federal and provincial laws and municipal by-laws. The SGPVMR refers to the scientific research conducted on the efficacy of the treatment and ensures monitoring of the health of the trees integrated*

	into the injection program. ***(Planned completion: no action will be implemented)***
	Auditor General's comments
	Moreover, we deplore that the SGPVMR does not intend to implement any action to further document the results and the underlying analyses of the operations put forward under the intervention strategies deployed. Indeed, although we do not challenge the choice of the recommended biopesticide treatment, it appears indispensable, in our opinion, that its efficacy be evaluated, given the operations deployed in the field, and documented. Moreover, to be able to provide the efficacy of the entire strategy deployed, the evaluation of the achievement of the results obtained relative to the targets should be documented, in our opinion, in order to account for it and thus favour informed decision-making for the next steps.

4.2.4. Felling and Disposal of Ash Residue

4.2.4.A. Background and Findings

As already mentioned, the strategy adopted by the city consists of spreading over time the costs associated with felling, particularly to avoid inconveniences (canopy loss and development of heat islands) caused by massive tree felling over a short period. In its strategy against the emerald ash borer, the city strategically fells all infested or declining trees to reduce the emerald ash borer populations. This selective felling has the purpose, on the one hand, of eradicating outbreaks to protect the other ash trees that make up the city's arboreal heritage and, on the other hand, of ensuring public safety, considering the hazards related to potential falling branches from dead ash trees.

Once the trees are felled, the ash tree residues (logs and branches) require safe disposal, always with the objective of restricting dispersion of the insect pest. According to the information obtained, the emerald ash borer can survive inside dead wood or cut logs. This is why the federal government, through the CFIA, which is responsible for the laws and regulations applicable to the presence of the emerald ash borer in Canada, imposes "quarantine" measures, associated with fines, to the regions affected by the insect. One of these measures is the ban on transporting firewood out of the regulated area. In Montréal, the collection of green residues must comply with these rules and requirements. All the branches intended for this collection must be deposited in tied bundles and must not be mixed with other green residues (grass cuttings, leaves and dead flowers).

These requirements are also valid for ash trees in the private domain. Indeed, the owner whose ash tree or trees exhibit(s) signs of decay must resort to the services of an expert to check whether the emerald ash borer is involved and whether the decline observed is irreversible. When 30% of an ash tree's branches are decayed, it is generally considered too damaged to be preserved by treatment. In this case, the tree must be felled without delay between October 1 and March 15 to limit the risk of dispersion of the insect. For this purpose, a felling permit is mandatory in Montréal, but in the case of ash trees, this permit can be obtained free of charge. Thus, following a request made by a citizen, a city inspector will assess the condition of the tree in view of issuing or not issuing an opinion in favour of felling it.

From an operational point of view, tree felling is a responsibility assumed entirely by the boroughs. Felling of ash trees in the public domain is supported by SGPVMR interventions. Indeed, after detection in the high-risk areas, the ash trees are categorized according to their state of health. Those considered dead or declining and not fit for treatment are classified as trees to be felled. A "felling prescription" list thus is provided to each borough concerning its public ash trees to be eliminated, with an indication of the locations and references of these trees.

It follows that, to control the risk the ash tree infestation will spread, the boroughs should plan the felling of the infested trees in the public domain, control felling in the private domain, and provide for sound management of the residues generated by these felling activities. On the other hand, as the department responsible for the emerald ash borer, the SGPVMR should ensure that all the components of its action plan are working and lead to effective results. By this fact, it should take actions to ensure the infested trees are really felled in accordance with the felling prescription formulated. According to the information obtained, the SGPVMR does not validate with the boroughs to ensure the prescribed trees have actually been felled. In this sense, it performs no specific control or validation on a sampling basis. The managers responsible within the SGPVMR justify this situation by the shortage of labour at their disposal, but also because they consider the managers in the boroughs should be accountable for performing the actions for which they are mandated. Nonetheless, with the objective of ensuring the coherence of the strategy against the emerald ash borer, it is our opinion that the SGPVMR should have provided for minimal post facto controls to validate performance by the boroughs of the prescribed felling after the detection operations conducted.

Another important component of the efforts against the emerald ash borer concerns the disposal of felled ash residue. The information obtained indicates that the primary dispersion vector of the emerald ash borer is the transport of infested ash wood. In this regard, two periods of activity of the insect influence the transport and treatment of ash wood:

- the high-risk period, which runs from April 15 to September 15, when the insect is considered to be an active adult. During this period, the transport to treatment sites of ash wood that has not been processed (e.g., into wood chips) is prohibited;
- the low-risk period, which extends from September 15 to April 15. During this period, only the insect's larvae may be present in ash wood. During this period, the boroughs and the related cities may prune, fell and transport ash wood to the treatment sites designated for this purpose, so that it is neutralized before the insect's emergence period.

It is therefore necessary to control the transport of ash wood and the periods during which it is transported to prevent the spread of the insect. The ash wood thus collected during pruning or felling operations must be destroyed systematically or processed so that it does not become the source of new outbreaks. Since the reclamation of residual materials is an agglomeration responsibility, we find that in August 2015, the city awarded three new contracts[33] valued at $4.1 million for a 58-month term to three specialized companies in order to receive and sort wood and market the sorted wood,[34] on behalf of all the cities constituting the urban agglomeration's territory. To respond to the growing pruning and felling activities, particularly of ash trees, these contracts specifically allow the city's boroughs and the ecocentres[35] to transport their wood to a site where it can be processed safely or reclaimed. Once the ash residue are transported to these contractors' processing centres, they are bound to comply with the requirements of the CFIA, which imposes restrictions on the transport of ash residue out of regulated areas.

According to the information obtained from the audited boroughs following pruning or felling operations, two approaches are distinguished:

- concerning ash trees in the public domain, when the size of the logs allows, generally for logs less than 20 cm in diameter, the borough must shred the wood and reduce it to chips with a wood chipper. Logs too big to be shredded on site are initially stored at a provisional site chosen by the borough before they are transported to the sorting centres of the companies awarded the above-mentioned contracts;
- for ash trees in the private domain, each property owner must resort to the services of a contractor to fell their declining ash trees. This contractor must comply with the CFIA's requirements to ensure safe disposal of the wood. In this regard, the SGPVMR has developed an authorization form for disposal of ash residue, which must be completed and approved by the borough to allow the contractor mandated by a citizen to dispose free of charge of the wood resulting from felling or pruning of any ash trees. The disposal of the ash residue must be done with one of the three companies specializing in the field, under a contract with the city. By means

[33] Resolution CG15 0461 and CE15 1363.
[34] Wood from tree trimming and/or felling activities and collections of Christmas trees.
[35] In addition to wood from felled ash trees, these contracts also provide for receiving of construction-renovation-demolition wood from the city's ecocentres.

of this form, the contractor mandated by the citizen undertakes, in particular, to transport:

- only ash wood from the address where it performed the work at the citizen's request;
- only branches or trunk sections with a diameter exceeding 20 cm. Branches with a diameter of less than 20 cm must be shredded on the citizen's property by the contractor according to the terms of their contract.

Moreover, we find that since 2012, always with the objective of limiting the spread of the emerald ash borer in its territory, the city has offered the interested boroughs a curbside service for shredding and collection of hardwood branches. This service, offered under a contract made with a specialized company, ensures citizens take responsibility for shredding branches deposited at curbside. According to the information located, for the years 2015 and 2016, 16 of the 19 boroughs accepted the offer of services.

According to the information obtained, it appears measures were provided for ash trees in both the public and private domains to limit as much as possible the transport of ash residue from felling or pruning and to dispose of it in accordance with the regulations in force.

RECOMMENDATION	
4.2.4.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal, with the goal of ensuring the coherence of its efforts against the spread of emerald ash borer, provide for the establishment of post facto controls allowing it to validate that ash tree felling prescribed in the boroughs has been performed.
BUSINESS UNIT'S RESPONSE	
4.2.4.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR considers it is not its responsibility to control the felling done by the boroughs and that the costs associated with this validation then would be diverted from the SGPVMR's operations against the emerald ash borer.* ***(Planned completion: no action will be implemented)*** **Auditor General's comments** **The performance by the boroughs of the felling prescribed by the SGPVMR was an integral part of the intervention strategy deployed to mitigate the insect would spread. Also, considering the fact that the performance of this felling was one of the conditions to**

	be observed by the boroughs to be entitled to the financial assistance offered by the SGPVMR, we find that a minimum amount of control should have been instituted to ensure the amounts granted are used for the stipulated purposes and to obtain the assurance that all the components of the strategy deployed work properly and lead to effective results.

4.2.5. Ash Wood Reclamation

4.2.5.A. Background and Findings

Ash wood reclamation is also an issue, considering that the ravages caused by the emerald ash borer will result in the felling of thousands of trees, leading the city to have to manage large quantities of wood. Since the insect acts only under the bark in the larval stage, the heart of the wood generally remains free of infestation. Ash wood is recognized, in particular, for its elasticity and its shock and compression resistance. It is a solid wood that is often used to manufacture sporting goods (e.g., hockey sticks), furniture, tool handles or floors. In the context of the efforts against the emerald ash borer, felling trees offers the city an opportunity to consider the user of wood in different forms and thus optimize its recycling and avoid waste.

Concerned about the reclamation of wood from felled public trees and considering the growth of felling to be anticipated due to the presence of the emerald ash borer in Montréal's territory, the managers interviewed at the SGPVMR told us that, in 2013, they mandated an external firm to conduct a market study of hardwood, and specifically ash wood. The mandate assigned to this firm included the production of a directory of businesses interested in using ash wood from an infested area, and an analysis of the different possibilities for reclamation of this wood. We consulted the report of this study. In particular, it highlights three product categories on the market allowing reclamation of wood:

- energy wood to be crushed or shredded (e.g., branches), which can be used as mulch or for composting;
- pulpwood fashioned in the form of logs intended for pulp and paper production;
- sawn lumber for good-sized logs.

The study in question also mentions that some potential uses could be interested, on condition the wood is already processed (sawn and dried), and points out that the city could also call on subcontractors or companies that use sawn lumber to process urban wood and use it to make special products, such as furniture, sculptures and decorations.

Despite the conclusions of the above-mentioned study, it appears that, to date, the city has not yet deployed real measures to reclaim wood from felled ash trees, except for

a few initiatives conducted locally by certain boroughs. The managers interviewed at the SGPVMR mentioned that, in the past, they have worked in collaboration with the Direction du matériel roulant et des ateliers[36] to find solutions to this issue. In particular, a public bench prototype has been proposed. Some NPOs have also expressed interest in using the wood to make urban furniture. There was also mention of efforts undertaken by the CMM which, through the creation of a reclamation committee on which the city was represented, studied several aspects and issues regarding reclamation of ash wood. According to the information obtained from the SGPVMR's designated representative, this committee is no longer active.

The information collected during our audit reveals the fact that some of the city's boroughs are working in isolation to propose felled ash wood reclamation projects, whereas it could be more cost-effective to look for a corporate solution unifying the wood volumes available for reclamation in each borough. In the opinion of the managers interviewed (in the boroughs and at the SGPVMR), the leadership responsibility in this matter is not yet clearly established at the city level. They consider a critical mass would be necessary to ensure the profitability of wood reclamation projects, which requires concerted action with the boroughs, particularly to:

- ensure adequate wood harvesting (training the pruners) according to the features required by the target market (e.g., the sawmill market, which requires the trunks be cut to produce logs (or bolts), offering maximum potential to produce boards without flaws);[37]
- find common storage sites;
- be able to benefit from the services of specialized appraisers to classify the harvested wood properly;
- find a potentially profitable market;
- evaluate all the legislative or regulatory aspects in relation to the treatment of contaminated wood.

In our opinion, although different reclamation avenues can be suggested, it remains that a comprehensive city-wide analysis should be conducted to evaluate, in particular, the profitability of the various possible solutions and ultimately, if applicable, to adopt a wood reclamation program.

Nonetheless, in the Côte-des-Neiges–Notre-Dame-de-Grâce borough, we find, in light of the information obtained, that initiatives have been undertaken since 2014 to recover wood from felled ash trees. In particular, after felling:

- ash bolts were sold at auction, for transformation into hardwood, among other products;
- ash wood was sold to an NPO to build a sailboat;

[36] This directorate previously was under the Service de la concertation des arrondissements et des ressources matérielles. It is now known as the Service du matériel roulant et des ateliers.

[37] Source: Market study for hardwood species presented to the city by an external firm, December 2013.

- tree trunks were transformed into boards by a mobile sawmill and used to manufacture a modest quantity of urban furniture;
- ash wood was reduced to chips and used as mulch. Moreover, self-service chip pickup sites and two days per year of free distribution are organized.

Regarding the Rivière-des-Prairies–Pointe-aux-Trembles and Sud-Ouest boroughs, the information obtained reveals that part of the wood from felled ash trees is shredded and reduced to chips, in the case of small-diameter branches. The mulch generated in this way is used for various gardening or composting projects. If applicable, the unused surplus is shipped to the city-owned Saint-Michel Environmental Complex. The large ash logs that cannot be shredded are transported to the sorting centre of one of the three specialized companies for receiving, sorting and wood marketing under contracts awarded by the city, as mentioned in section 4.2.4 of this report. Moreover, according to the information obtained from the Sud-Ouest borough, a contractual agreement soon will be made with an artist for the production of an artwork from felled ash wood.

Although this borough is not the subject of the current audit, we learned from the website of the Rosemont–La Petite-Patrie borough that, since 2015, the borough has set up a cabinet-making project in partnership with a Montréal social and occupational reintegration organization for the production of urban furniture installed on its commercial arteries, using wood from felled ash trees (e.g., multilevel benches, flower boxes and benches with built-in flower boxes). In addition, the wood from a number of ash trees is retained annually for the performance of everyday maintenance operations on various pieces of urban furniture, including the repair of bleachers, picnic tables and rink boards.

On the whole, although ash wood reclamation presents many challenges, solutions exist. To avoid duplication in each borough of the efforts to find wood reclamation solutions, it is important for the city to address this question by taking initiatives that will enable it to exploit and optimize city-wide the potential ash wood could offer.

RECOMMENDATION	
4.2.5.B.	We recommend that the city's Direction générale take the required actions to designate the business unit that will be responsible for assuming the leadership in city-wide wood reclamation and producing the necessary analyses that will allow the appropriate decisions to be made.

BUSINESS UNIT'S RESPONSE	
4.2.5.B.	***Direction générale*** *[TRANSLATION] The SGPVMR plays a leading role in the fight against the emerald ash borer and the formulation of ash tree felling prescriptions. Parallel to this, the SGPVMR is exploring how to institute good practices in city-wide reclamation of wood. For this purpose, the SGPVMR has created a technical committee composed of experts involved in these reclamation projects and undertakes analyses and discussions with multiple stakeholders. Many small-scale ash reclamation experiments have been conducted over the past few years, but large-scale reclamation of ash residue requires the establishment of a special administrative framework, which is not currently taken over. The SGPVMR is in the forefront on this issue for the time being, but only once the corporate strategy is clearly established will it become expedient to take a definitive position on the roles and responsibilities of the business units that could be involved for ash reclamation.* ***(Planned completion: January 2018)***

4.2.6. Awarding of Contracts by the Service des grands parcs, du verdissement et du Mont-Royal

4.2.6.A. Background and Findings

The SGPVMR offers support to the boroughs in the context of the efforts undertaken against the emerald ash borer and, concurrently, to achieve the canopy enhancement target (20% to 25%) by 2025. Apart from the financial assistance granted by the SGPVMR to the boroughs (budget of the Triennial Capital Expenditures Program [TCEP]), related to the program for replacement of felled ash trees in the context the fight against the emerald ash borer, which we will discuss in section 4.3 of this report on the financial framework, the collaboration offered to the boroughs concerns two other programs, the Ash Tree Injection Program and the Canopy Enhancement Program. For these two other programs, the collaboration offered to the boroughs is orchestrated by means of various contracts awarded by the SGPVMR.

4.2.6.1. Ash Tree Injection Program

4.2.6.1.A. Background and Findings

The SGPVMR applies the SLAM strategy which, as described above, seeks to slow the emerald ash borer infestation. A campaign for detection of the insect's presence allows the production of a list of high-risk areas and confirmation to the boroughs of the treated ash trees or the felling prescriptions. Complementing the SLAM strategy, the SGPVMR's *Conservation Program*, as explained above in section 4.2.3 of this

report, offers the boroughs the possibility of targeting, in their respective territory, a list of additional ash trees they wish to protect and that are located outside the high-risk areas identified by the SGPVMR. The ash trees on this list will be able to benefit from a TreeAzin® treatment under the injection contracts awarded by the SGPVMR.

Thus, the SGPVMR coordinates the awarding and performance of the emerald ash borer detection contracts, as well as all the ash tree injection contracts in the public domain. The supervision of the injection contracts has also been contracted out since 2016, due to the shortage of personnel within the SGPVMR.

Regarding the *Conservation Program*, we found that, in 2016, the SGPVMR gave the boroughs a 14-day deadline to send it the list of ash trees they wanted to include in the *Conservation Program*. This is a short deadline, considering the budget of the *Conservation Program* is known in advance by the SGPVMR.

Since the detection and injection efforts are coordinated entirely by the SGPVMR, no major problem was raised in this regard by the audited boroughs, except for the Sud-Ouest borough. Indeed, it is one of the three boroughs[38] of the city to have adopted a local action plan against the emerald ash borer, which is being carried out parallel to the SGPVMR's action plan. Its 10-year strategy, adopted in February 2014[39] by its borough council, covers all public ash trees in its territory. The borough thus provides for injection, reinjection and felling plans. The borough's strategy is different from the SGPVMR's strategy in the sense that the borough calls for a comprehensive approach instead of a sample-based approach. This means it also treats ash trees located outside the high-risk areas, since the entire territory has been considered infested since 2016, whereas the SGPVMR only treats ash trees located within the high-risk areas, as well as those covered by the *Conservation Program*.

According to the Sud-Ouest borough's stakeholders, the SGPVMR implemented its strategy without considering the one deployed by the borough, which results in duplication of efforts and inefficiency in the execution of its own plan. The borough's initial plans therefore must be adjusted each year according to the high-risk areas identified by the SGPVMR. Moreover, since the injection period is the summer, this leaves little time for the borough to review its planning and the distribution of its budget. Indeed, the greater the extent of the high-risk areas identified by the SGPVMR, the greater the budget that can be allocated by the borough for felling and planting, and vice versa. In a context of limited resources, it would be wise for the SGPVMR to adapt its support parameters when the borough has deployed and obtained approval of its local urban forestry plan. Sharing of the different responsibilities would facilitate the work in the field and prevent duplication of efforts. For example, it could envision a distribution of work based on the territory or a different budget modulation.

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38 These are the following boroughs: Le Plateau-Mont-Royal, Saint-Laurent and Le Sud-Ouest.

39 *Plan de développement durable de la foresterie urbaine, Volet gestion de l'agrile du frêne, plan d'action 2014-2024*.

RECOMMENDATION	
4.2.6.1.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal adopt its strategy when a borough has deployed a local urban forestry plan, in order to avoid duplication of efforts and favour better coordination.
BUSINESS UNIT'S RESPONSE	
4.2.6.1.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR constantly adapts and improves its strategy with the three boroughs that have deployed a local plan to fight the emerald ash borer. The SGPVMR intends, on an annual basis, to pursue the discussions with the boroughs concerned and make the required adjustments.* *For example, in June 2016, the SGPVMR made an agreement with the Saint-Laurent borough to provide financial compensation for the borough's efforts. In addition, the SGPVMR maintains a discussion and constant collaboration with the Plateau-Mont-Royal and Sud-Ouest boroughs and also compensates their efforts.* ***(Planned completion: December 2017)***

4.2.6.2. Canopy Enhancement Program

4.2.6.2.A. Background and Findings

In 2015, the SGPVMR became the prime contractor of an intensive planting program, which is in addition to the planting efforts already undertaken by the boroughs under their regular programs. Table 5 below presents a recapitulation of the tree planting and planting supervision, watering and maintenance contracts awarded for this purpose by the SGPVMR.

Table 5 – Recapitulation of the Contracts Awarded by the SGPVMR for Tree Planting, Planting Supervision, Watering and Maintenance Since 2015

Call for Tenders number	Nature of the contract	Quantity forecast (trees)	Quantity fulfilled (trees)	Amount in GDD[a],[d]	Average price per tree
AO 15-14275	Supply, planting and maintenance of trees	7,000	5,400[b]	$8,620,876	$1,232
AO 16-15070	Supply, planting and maintenance of trees	4,273	3,901[c]	$4,245,824	$994
Total		**11,273**	**9,301**	**$12,866,700**	
Call for Tenders number	**Nature of the contract**	**Quantity forecast (trees)**	**Duration**	**Amount in GDD[a],[d]**	
AO 16-15085	Supervision of watering, maintenance and the warranty	5,000	2016	$135,082	
AO 16-15087	Supervision of planting, watering, maintenance and the warranty	4,273	2016-2017	$416,095	
AO 16-15254	Supervision of watering, maintenance and the warranty	9,675	2016 to 2019	$579,219	
Total				**$1,130,397**	

[a] Amount of the contract, including taxes and contingencies, if applicable.
[b] Plantings for this contract are spread over the period from fall 2015 (2,701 trees) to summer 2016 (2,699 trees) for a total of 5,400 trees. The remaining 1,600 trees (7,000 - 5,400) will not be planted and will not be paid for by the SGPVMR.
[c] Forecast obtained from the SGPVMR based on the progress of the work as of November 15, 2016 (6,600 - 2,699). Final figures unavailable.
[d] Gestion des dossiers décisionnels.

In 2015, the city thus authorized a budget to award contracts for the supply, planting, maintenance and watering of 7,000 trees.[40] This number is aligned with the tree-planting objective of the *Plan d'action canopée 2012-2021*, which provides for the additional planting of 75,000 trees in the city's public domain over a 10-year horizon.

The 2015 call for tenders, underlying the contract awarded in the amount of $8.6 million, was the first of this magnitude to be issued for tree planting by the SGPVMR, since this operation is usually performed in the boroughs by blue-collar workers. Several failures were observed, particularly due to the technical specifications, which turned out to be imprecise regarding the nature and extent of certain work to be performed. For example, during the performance of the contract, it was realized that the tree transport costs during a change of planting sites were not stipulated in the contract. Moreover, the parties did not agree on the definition of stump pulling when root removal was required and on the quality of the loam that had to be used. This had the consequence of adding to the complexity of the relationship with the vendor and led to delays in the performance of the work.

40 Public call for tenders 15-14275.

Moreover, when this call for tenders was issued, not only were the tree planting sites not identified by the boroughs, but the tree species to be planted were not specified. According to the information obtained, the call for tenders was issued hastily to ensure the city honoured its commitment to its sustainable development plan[41], to improve the green infrastructure in the city by increasing the canopy index from 20% to 25% by 2025. This missing data regarding the planting sites and the type of tree species to be planted was specified after this contract was awarded, which would explain why the price of the tenders received turned out to be higher than expected.

The subsequent identification of the planting sites also turned out to be at the basis of the problems during the performance of the contracts. Among these problems, we particularly note the late transmission of the lists of planting sites by the boroughs and the errors they contained. Some boroughs even sent their list during the performance of the contract. Coordinates of proposed sites were wrong, and some sites were not ready (presence of stumps) or simply not suitable for planting. Once the lists were transmitted, the SGPVMR proceeds to validate the sites, ensuring that no conflict of use or development that cannot be referenced in the tools and systems, such as a water or gas inlet, does not conflict with the selected location. These problems related to the specifications and deficient planning caused substantial delays in the planting schedule. The planting work foreseen in 2015 therefore continued until June 2016, necessitating that an extension to the contract of one of the vendors be granted. The vendor is claiming additional costs from the city in relation of losses of time, unforeseen conditions and the additional costs of vegetation and transport. A portion of the additional costs billed was rejected by the SGPVMR. Thus, a decision-making summary for submission to the city authorities was prepared to obtain approval of additional expenditures totalling nearly $95,000 out of a total claimed of nearly $220,000.

In a project of this magnitude, the SGPVMR realized that the cancellation of planting sites will have a major impact on the implementation of the planting plan. Indeed, under this contract, the vegetation orders quite often were fulfilled before validation of the sites. The cancellation had the consequence that a substitute site had to be found quickly to plant the tree. Ultimately, despite the extension of the deadlines, the planting target was not achieved, because only 5,400 trees were planted out of the 7,000 planned and budgeted. The SGPVMR therefore reviewed its methods and undertook a correction of its program in the context of the 2016 call for tenders.[42]

The correction undertaken necessitated coordination of the efforts among all the stakeholders involved in the process, particularly the SGPVMR itself, the Service de l'approvisionnement and the boroughs, in order to review the alignment of the planning and tendering periods with the procurement, injection, felling and planting periods.

[41] This is the *Plan de développement durable de la collectivité montréalaise 2010-2015* and subsequently *Montréal durable 2016-2020*.

[42] Call for tenders 16-15070.

Thus, one of the first initiatives was to ask the boroughs to submit a list of potential locations and types of trees to be planted before the call for tenders is issued. Moreover, the SGPVMR opted for a sector-based procurement strategy. The city's territory thus was divided into four sectors and the technical specifications integrated maps of each borough, indicating the locations of all the projected plantings, as well as the tree genera and species to be planted. This would have allowed tenders to be obtained at better prices. Thus, with the needs better defined, the average price for the planting, maintenance and watering of a tree decreased from $1,232 to $994. This corresponds to a 24% reduction of the average price per tree.

Regarding the advancement of the deadlines for transmission of the planting location lists, this translated into a deadline fixed in February 2016 for the fall 2016 plantings and in May 2016 for the plantings scheduled for spring 2017. This earlier deadline means that only 12 boroughs were able to provide a list and thus participate in the program. It must be understood that the production of these lists of locations is added to the regular tasks of the borough's personnel and that this task may conflict with another task when not planned in advance. Moreover, site identification turned out to be more complex than anticipated in certain boroughs, which are faced with a shortage of sites available for planting. According to the information obtained from the SGPVMR, steps are anticipated to survey the priority areas in the territory where soil demineralization work[43] will have to be performed in order to generate new planting sites. Consequently, many fewer locations than the target stipulated in the *Plan d'action canopée* could be provided by the boroughs. In addition, although the available budget allowed planting of 7,000 trees in 2016, only 4,273 plantings were stipulated in the call for tenders.

Nonetheless, the corrective measures taken concerning the process had many positive effects. The lists transmitted by the boroughs still contained many errors. However, since they had been transmitted to the SGPVMR earlier in the process, this allowed it to cancel the sites, postpone them to a subsequent year, or find substitute locations before the contractors' crews arrived on the land. In 2016, a replacement site would not have been found for about a hundred trees purchased by the contractors, whereas in 2015, this problem occurred for several hundred trees. While waiting for a replacement site to be chosen, a storage site must be found for these trees. This obviously results in additional costs.

Well aware that the transmission of these lists is an essential factor in the procurement process and the smooth running of the contract, the people interviewed in the boroughs consider the time granted for communication of these lists was insufficient. According to the SGPVMR, the procurement schedule now is better coordinated with the planting schedule, meaning that the boroughs have more reasonable deadlines to produce their lists. The boroughs are informed by a letter, in some cases, up to

[43] Over time, urbanization led to the creation of a considerable number of mineralized surfaces in the territory (e.g., streets, parking lots, asphalt-paved yards).

12 months in advance and periodically during meetings with the SGPVMR, the division heads and the technical agents in the borough.

Other initiatives were deployed to favour exchanges between the SGPVMR and the boroughs, such as the establishment of a work coordination table, allowing the division heads and the technical personnel in the boroughs to be kept informed, work kickoff meetings between the contractors and the technical personnel in the boroughs, and retrospective analysis meetings upon completion of an intervention to draw conclusions and establish lessons learned. Better planning and better coordination upstream from the work, both by the SGPVMR and by the boroughs, would have allowed the number of plantings stipulated in the contract to be achieved. However, the final results were unavailable at the time we concluded our work.

The coordination and communications efforts already undertaken by the SGPVMR are laudable and had positive impacts on the fulfillment of the reforestation plan undertaken. Nonetheless, we believe it is expedient for the SGPVMR to establish a schedule of the key list production dates so that the stakeholders in the boroughs know the deadline for the documents they must produce. To draw up its schedule, the SGPVMR must also discuss and agree on deadlines with the stakeholders of the Service de l'approvisionnement in order to coordinate their interventions and provide for their timely availability. In addition to the communication of this schedule to the stakeholders involved, we believe the SGPVMR must oversee its fulfillment.

RECOMMENDATION	
4.2.6.2.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal establish and distribute a precise schedule of the key document production dates in order to improve communication of information to the stakeholders concerned and improve coordination of the performance of the work.
BUSINESS UNIT'S RESPONSE	
4.2.6.2.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR communicates on a recurring basis with the boroughs to request production of documents and responses to requests in relation to the planting programs (canopy enhancement and replacement of felled ash trees). Starting in 2017, two letters will be sent in spring of each year.* *The first letter pertains to the supply of lists of planting locations (including the vegetation choices) that will be integrated into the specifications for planting contracts (Canopy Enhancement Program).*

	The second letter concerns financial support for the various programs implemented by the SGPVMR, particularly the Felled Ash Tree Replacement Program. It is also addressed to the borough directors. It is accompanied by a request for a commitment by the boroughs to replace ash trees after prescribed fellings. A deadline to honour their commitments is also indicated in this letter. ***(Planned completion: April 2017 - Completed)***

4.2.7. Communication and Awareness

4.2.7.A. Background and Findings

To ensure the coherence of its strategy against the emerald ash borer, the city had to adopt provisions to favour public adherence by providing information on the insect's particularities and the recommended strategy to fight it. Measures to raise public awareness about the role and responsibility of citizens in fighting the emerald ash borer also had to be taken regarding ash trees not under the city's control, i.e., ash trees in the private domain.

In this perspective the first *Plan d'action de lutte contre l'agrile du frêne 2012-2015* integrated a communications component and, since then, measures have been undertaken and different initiatives were pursued in the following years, with the aim of informing the public and raising awareness. In particular, we were able to recognize the implementation of the following measures:

- Holding of press conferences;
- Publications in metropolitan newspapers and neighbourhood weeklies;
- Communication of information and video clips on the SGPVMR or boroughs' portals (e.g., photos of the insect, identification of an ash tree and the damage caused by the insect, treatment of an ash tree);
- Creation of a fact sheet concerning the emerald ash borer with the aim of responding to the public's requests in calls to 311;
- Distribution in the Bureaux Accès Montréal (BAM) of the boroughs of a guide for the public to identify and treat their ash trees.

Following the adoption in May 2015 of the *By-law to stop the spread of the emerald ash borer on the territory of Montréal* (By-law 15-040) and in June 2015 of the *By-law concerning the subsidy for the treatment of ash trees located on private property in high-risk areas* (By-law 15-063), the information obtained reveals that, in 2015, a little over 122,000 letters were sent to the property owners located in high-risk areas to inform them of their obligations regarding By-law 15-040. These by-laws will be discussed in more detail in section 4.2.8 of this report.

At the beginning of 2016, we were able to recognize that a major communications strategy had been deployed, with ash tree owners as the target audience. This

mandate entrusted to the city's Service des communications will have made it possible to observe the implementation of a series of actions, particularly:

- the holding in June 2016 of seven public information meetings in boroughs most affected by the emerald ash borer problem[44];
- publication and distribution of information pamphlets (intervention guide) for citizens and tree pruners, small posters for the BAM officers, site posters to be affixed to public ash trees, indicating, in particular, that they have been treated or are to be felled, door hangers distributed to citizens who have an ash tree on their land;
- preparation and mailing of other letters intended for ash tree owners, reminding them of their regulatory obligations;
- development of different Web tools (e.g., Info-citoyens [public information] buttons, promo button);
- print advertising in the media (e.g., Le Journal de Montréal, Le Métro, Le 24 H).

All of these measures give reason to believe public awareness has been raised regarding the emerald ash borer problem in Montréal's territory. Nonetheless, it is our opinion that communication and awareness efforts regarding the public's roles and responsibilities concerning emerald ash borers in the private domain will have to continue, based on the changes in the situation and the directions adopted by the city against this plague.

RECOMMENDATION	
4.2.7.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal and the Côte-des-Neiges–Notre-Dame-de-Grâce, Rivière-des-Prairies–Pointe-aux-Trembles and Sud-Ouest boroughs continue the communication and awareness regarding citizens' respective responsibilities concerning ash trees in the private domain, in order to encourage them to make an effort to stop the spread of the emerald ash borer.
BUSINESS UNITS' RESPONSES	
4.2.7.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR constantly adapts and improves its communications strategy with the public, in partnership with the Service des communications. In this regard, an evaluation of achievement of the communications objectives is produced, at the end of each year, and a communications plan is drawn up at the beginning of each year, based on this evaluation. This practice will*

[44] These are the following boroughs: Ahuntsic-Cartierville, Mercier–Hochelaga-Maisonneuve, Pierrefonds-Roxboro, Rivière-des-Prairies–Pointe-aux-Trembles, Saint-Laurent, Le Sud-Ouest and Villeray–Saint-Michel–Parc-Extension.

	be maintained for future years. However, the current reorganization of the Service des Communications adds to the complexity of the production and fulfilment of the communications plans and result in delays. ***(Planned completion: April 2017 - Completed)*** ***Côte-des-Neiges–Notre-Dame-de-Grâce borough*** *[TRANSLATION] Projected actions:* · *Six video clips;* · *Improvement of the website page on the emerald ash borer;* · *Social media.* ***(Planned completion: September 2017)*** ***Rivière-des-Prairies–Pointe-aux-Trembles borough*** As of May 12, 2017, the Bureau du vérificateur général had not received the action plan requested from the borough. ***Sud-Ouest borough*** *[TRANSLATION] The Sud-Ouest borough uses different means of communication and awareness raising regarding the emerald ash borer.* *Activities scheduled for 2017:* · *Door hanger delivered to the property owners near a public ash tree scheduled for felling;* · *Press releases about pickup of deciduous branches;* · *Various tools to be deployed for the inauguration of the work "Freinons la chute" (Stop the ash trees from falling) (billboards, workshops);* · *Installation of green ribbons with an awareness message on certain treated public ash trees (about 600 trees);* · *Information booths during the flower distribution of the beautification campaign;* · *Sending of notices to ash tree owners is anticipated in partnership with the SGPVMR.* ***(Planned completion: September 2017)***

4.2.8. Municipal By-Laws Governing the Efforts Against the Emerald Ash Borer in the Private Domain

4.2.8.A. Background and Findings

By-Law 15-040

Remember that the interventions conducted in the city's territory by the SGPVMR and the boroughs, in the context of the efforts against the emerald ash borer (e.g.,

detection, injection treatment, felling), are aimed at municipally-owned ash trees, i.e., ash trees in the public domain.

In the circumstances, to facilitate the detection of ash trees in the private domain and ensure harmonization of the interventions against the insect in public and private ash trees, the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015* envisioned amending the municipal by-laws.

Thus, at a meeting held on May 25, 2015[45], Montréal's city council adopted the *By-law to stop the spread of the emerald ash borer on the territory of Montréal* (By-law 15-040). This by-law, in force since June 2, 2015, provides for fines in case of an offence, ranging from $350 to $2,000. In addition to prohibiting the planting of ash trees, it prescribes the following aspects, among others:

- **Felling of dead or declining ash trees:** The owner of any ash tree, regardless of whether it is located in a high-risk area, of which 30% or more of the branches are dead, must fell or arrange for the felling of the ash tree before December 31 of the year the tree is discovered to be in this state. A felling permit issued free of charge must be obtained in advance;
- **Treatment of ash trees located in high-risk areas:** The owner of land located fully or in part in a high-risk area, as identified in the by-law, must proceed with the treatment of the ash trees on said land using a pesticide registered in Canada, before August 31 of the year the area was declared high-risk, if the ash trees have a diameter greater than 15 cm measured at 1.4 m above the ground;
- **Measures for disposal of ash wood:** Any person who fells or prunes an ash tree must dispose of the ash residue, depending on the period in which the operation is conducted, by a technique that completely destroys the emerald ash borer or the parts of the wood that can house the insect (e.g., shredding the wood into chips that measure no more than 2.5 cm on at least two sides, drying, roasting, fumigating).

Since the regulatory power in urban forestry belongs both to city council and the borough councils, it was necessary prior to the adoption of this by-law for city council to declare, at a meeting held on April 28, 2015[46], under section 85.5 of the *Charter of Ville de Montréal* (the Charter), that it has power over tree felling for a 10-year period in the case of ash trees.

At the same time, during this same meeting, city council adopted a by-law to amend the *By-law concerning the delegation of city council powers to borough councils*.[47] Thus, since June 2, 2015, this by-law has delegated the responsibility to the borough councils to see to the application of By-law 15-040 in their respective territories, except

[45] Resolution CM15 0690, May 25, 2015.
[46] Resolution CM15 0543, April 28, 2015.
[47] City council, By-law 02-002, December 18, 2001.

for the provisions regarding the action plans for woodlands, which are under the responsibility of the SGPVMR.

This having been said, our audit sheds light on the fact that, to date, the application in the field of By-law 15-040 concerning management of ash trees in the private domain has not really been monitored. Indeed, the responsible managers contacted in the three boroughs covered by this audit confirm that no intervention has yet been undertaken to ensure the application of this by-law. Moreover, a survey we conducted of the city's 16 other boroughs allows us to affirm only three of them[48] (16%) have taken measures to enforce By-law 15-040 in their respective territories. In all, 84% (16/19) of all of the city's 19 boroughs have taken no measure concerning the application of this by-law.

This situation undoubtedly accentuates the risks of wiping out the efforts against the spread of the insect conducted by the city on ash trees in the public domain. The reasons invoked by the boroughs to justify this situation cite the shortage of personnel necessary to cover this sphere of activity, both in terms of the number of inspectors and the qualifications required for the personnel assigned in arboreal matters.

Aware of this finding, the managers interviewed at the SGPVMR informed us their department had been mandated to take the required measures in view of enforcing the by-law in the boroughs' territory. For this purpose, on August 17, 2016, the city's executive committee resolved[49] to authorize the budget appropriations for the SGPVMR necessary for the creation of positions, including one technical agent and two inspectors in arboriculture, for a three-year period.

In the present case, although this responsibility to enforce By-law 15-040 has been delegated to the boroughs, the information obtained reveals the intention would not be to repatriate this delegation of powers. Indeed, it appears the SGPVMR instead proposes to offer the boroughs that so desire that its personnel, in collaboration with the borough, take charge of the interventions with a view to enforcing the by-law in their territory. At the time of our audit, it was anticipated that a presentation would be drawn up and delivered to the boroughs concerning the services to be offered by the SGPVMR, following which oral consent could be obtained from the interested boroughs.

This modus operandi leads us to question best management practices, whereby a formal offer of services is made between the stakeholders. Also, even though it is legally acceptable to proceed in this manner, we point out nonetheless that the *Charter of Ville de Montréal* provides for the terms of acceptance of an offer of services when

[48] These are the following boroughs: Mercier–Hochelaga-Maisonneuve, Le Plateau-Mont-Royal and Saint-Laurent.

[49] Resolution CE16 1371.

delegated responsibilities are involved. In particular, section 85 of the Charter stipulates the following:

> *"The city council may, subject to the conditions it determines, provide a borough council with a service related to a jurisdiction of the borough council; the resolution of the city council shall take effect on passage by the borough council of a resolution accepting the provision of services."*

This section of the *Charter of Ville de Montréal* shows the official nature of an offer of services and its acceptance by means of resolutions.

In our opinion, the formulation of a formal offer of services, which would be rendered official as prescribed in section 85 of the *Charter of Ville de Montréal* would have the following benefits, in particular:

- increase the transparency of the decisions made regarding the agreement concluded between the parties;
- clarify the sharing of the roles and responsibilities of the parties and the nature of interventions to be performed;
- set the benchmarks of the accountability to be provided to the boroughs that accepted the proposed offer of services.

Finally, let us mention that, in accordance with section 147 of the *Code of Penal Procedure,*[50] which prescribes, that a person must be authorized in writing by the prosecutor to issue a statement of offence, the executive committee resolved,[51] on August 16, 2016:

> *[TRANSLATION] "to authorize, for the territory of Ville de Montréal, any horticulture inspector, technical agent in horticulture, foreman, or any other employee of Ville de Montréal reporting to the Service des grands parcs, du verdissement et du Mont-Royal whose tasks consist of enforcing the by-laws, to issue, for and on behalf of Ville de Montréal, a statement of offence for any offence under one of the by-laws, resolutions or ordinances of Ville de Montréal adopted by the city council, the executive committee or the borough council of one of the boroughs of Ville de Montréal or for any offence under a statute or one of the regulations adopted under that statute, when Ville de Montréal is the prosecutor."*

In view of this resolution, there thus would be no problem to anticipate regarding the validity of the statement of offence the SGPVMR eventually could issue in the territory of the boroughs.

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[50] CQLR, c-25.1.
[51] Resolution CE16 1406, paragraph 7.

RECOMMENDATIONS	
4.2.8.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal, in a concern for instituting sound management practices and accelerating the startup of interventions in the private domain against the emerald ash borer, promptly establish the parameters of a formal offer of services to be presented to the boroughs for the application of By-law 15-040 in their respective territories and anticipate the possibility of rendering the agreement between the parties official, as prescribed in section 85 of the *Charter of Ville de Montréal*.
4.2.8.C.	We recommend that the Côte-des-Neiges–Notre-Dame-de-Grâce, Rivière-des-Prairies–Pointe-aux-Trembles and Sud-Ouest boroughs, in the event they do not adhere to the offer of services of the Service des grands parcs, du verdissement et du Mont-Royal, adopt the necessary provisions without delay to ensure in their respective territories the application of By-law 15-040 to stop the spread of the emerald ash borer in the private domain, in accordance with the responsibility that has been delegated to them to this effect.
BUSINESS UNITS' RESPONSES	
4.2.8.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR has developed an offer of services for the application of By-law 15-040, however, the distribution of powers between the SGPVMR and the boroughs concerning the implementation of this by-law must be clarified. A request for an opinion has been sent to the Service des affaires juridiques to improve the offer of services that will be proposed to the boroughs in 2017.* ***(Planned completion: December 2017)***
4.2.8.C.	***Côte-des-Neiges–Notre-Dame-de-Grâce borough*** *[TRANSLATION] On February 15, 2015, we sent an email for adherence to the SGPVMR offer of services.* ***(Planned completion: February 2017)*** ***Rivière-des-Prairies–Pointe-aux-Trembles borough*** As of May 12, 2017, the Bureau du vérificateur général had not received the action plan requested from the borough.

	Sud-Ouest borough *[TRANSLATION] The borough partially assures the enforcement of the by-law in its territory, in relation to the treatment and felling of private ash trees and the transport of wood:* · *Felling requests are all processed according to the by-laws in force;* · *An authorization for compliant disposal of ash logs is provided to citizens who have obtained an ash felling authorization certificate. This measure is made possible by the corporate contract awarded by the Service de l'environnement;* · *The borough adheres to the deciduous branch pickup program;* · *The borough undertakes to pursue its approaches with Parks Canada in relation to management of ash trees on federal property present on the portion of the Lachine Canal contained in our territory. These approaches made it possible to treat the majority of the ash trees in 2016. Parks Canada has committed to proceed with felling of the untreated ash trees.* ***(Planned completion: December 2017)*** *The borough undertakes to adhere to any SGPVMR offer of services that would be consistent with its efforts to achieve all the objectives sought by the enforcement of By-law 15-040. We are currently waiting for such an offer.* ***(Planned completion: will depend on the SGPVMR's offer)***

By-Law 15-063

Subsequent to the adoption of By-law 15-040, the city council, during a meeting held on June 15, 2015, also adopted[52] the *By-law concerning the subsidy for the treatment of ash trees located on private property in high-risk areas* (By-law 15-063). This by-law came into force on June 22, 2015, and applies to all the city's territory.

The objective of By-law 15-063 is to encourage, by financial support, the interventions in the private domain imposed under By-law 15-040, and more specifically for citizens who must have their ash trees treated and whose property is located in the high-risk areas identified in the schedule to By-law 15-040. The SGPVMR is the business unit responsible for the funding and administration of the financial assistance program. For the years 2015 and 2016, a budget envelope[53] totalling $1 million for each year respectively was available for this purpose.

Thus, By-law 15-063 provides that a cash subsidy is granted to the arboreal services company in consideration of the work that it carries out at the request of the owner, on

[52] Resolution CM15 0830, June 16, 2015.
[53] This budget envelope comes from the operating budget of the SGPVMR.

private property located in a high-risk area, on condition this company provided a reduction to the owner for an amount equal to that of the subsidy received. The calculation of the subsidy and the terms and conditions of its payment are those stipulated in the regulation. In particular, the amount of the subsidy, which cannot exceed $2,000 per private property over a two-year period, is calculated as follows:

- 50% of the cost of the work up to a maximum of $3 per cm of trunk diameter, measured at 1.40 m above the ground, to which a lump sum of $20 per private property is added.[54]

Regarding the main conditions of payment of the subsidy, the by-law stipulates the following:

- The arboreal services company must have been authorized in advance by the city, in consideration of compliance with certain conditions, including the obligation to hold the valid permits and certificates for the sale and use of pesticides;
- The lot on which any private ash trees have received pesticide treatments must be located within a high-risk area officially identified by the city (schedule to By-law 15-040);
- Any ash trees that have received treatments must have a diameter equal to or greater than 15 cm measured at 1.40 m above the ground;
- The work must not have been performed before June 1 or after August 31;
- The cost of the work performed shall not exceed $6 ($5 in 2015) per cm of trunk diameter, measured at 1.40 m above the ground;
- The arboreal services company must submit its subsidy application to the SGPVMR no later than five days after performing the work.

In light of the compilations performed by the SGPVMR, we recognize this financial assistance program has not had the expected success. Indeed, although the year 2016 presents better results, it remains that the budget envelopes available were little used. Table 6 presents the results obtained for 2015 and 2016.

[54] On April 18, 2016, the city council resolved to make amendments to By-law 15-063. Thus, the amount of the subsidy increased from $2.50 to $3 per cm of trunk diameter and it was decided to allocate a lump sum of $20 per private property, which was not the case in 2015.

Table 6 – Threshold of Use of the Financial Assistance Program for the Treatment of Ash Trees in the Private Domain for the Years 2015 and 2016

	2015	2016[a]
Number of private properties[b]	620	1,918[a]
Number of ash trees treated	1,393	4,055[a]
Approximate number of ash trees inventoried in the private domain	N/A	47,253[c]
Proportion of private ash trees treated	–	9%
Threshold of available budget envelope	$1,000,000	$1,000,000
Subsidies disbursed by the SGPVMR	$141,422[d]	$500,000[d]
Percentage use of the budget envelope	14%	50%

[a] Results obtained from the SGPVMR as of November 29, 2016.
[b] In accordance with By-law 15-063, this is a unit of assessment made up of land or parcels of land entered on the city's property assessment roll, as well as land or parcels of land that constitute a common area for an immovable held in divided co-ownership and that is included in each unit of assessment registered under the names of the undivided co-owners of the immovable.
[c] Preliminary result confirmed by the SGPVMR as of December 1, 2016.
[d] In December 2016, at the time of our audit, the SGPVMR had not finished processing all the applications received. It estimated at nearly $500,000 the total amount of subsidies disbursed for the year 2016.

As we mention in section 4.2.7 of this report, considerable efforts have been deployed, however, to raise public awareness about the impacts of this insect pest and encourage ash tree owners in the private domain to adhere to the plan undertaken by the city against the emerald ash borer, by taking action to have their ash trees treated. In particular, in 2015 and 2016, letters were sent (in English or French, as the case may be) to all owners of properties located in a high-risk area affected by the emerald ash borer. This communication, which we studied, sought to inform property owners of their obligations regarding By-law 15-040 and the existence of financial assistance offered by the city for treatment of ash trees displaying little or no signs of decline.

Nonetheless, we recognize mobilization in the private domain appears to be more difficult, without counting the fact that the financial assistance only concerns ash trees in the private domain located within an identified high-risk area. Consequently, the lack of measures taken by the owners of private ash trees to slow the infestation in the past few years will very certainly have favoured the spread of the insect, thus attenuating the efforts against the emerald ash borer undertaken by the city. This is why the introduction of the supervision mechanism to see to the application of the municipal by-laws adopted takes on its full meaning.

Moreover, our audit also consisted of examining the operation and the compliance of the application of By-law 15-063 concerning the disbursement, by the SGPVMR, of the subsidies requested by the arboreal service companies for the treatment of ash trees in the private domain.

The review of the main terms of payment of the subsidy made it possible to recognize the following facts:

- The arboreal service companies that obtained the payment of a subsidy in 2015 and 2016 under By-law 15-063 held the valid permits and certifications for the sale and use of the pesticide TreeAzin®;
- On the whole, the inspections conducted on the land prior to the disbursement of the subsidy by the SGPVMR made it possible to validate, in accordance with section 1 of the by-law, that these were treatments of an ash tree with a trunk 15 cm or more in diameter and that was not a declining ash tree (30% or more dead branches);
- The subsidies were paid to arboreal service companies for work performed during the permitted period (section 5 of the by-law), namely between June 1 and August 31.

Moreover, in light of the surveys conducted and the information obtained from the personnel assigned to processing the subsidy applications to the SGPVMR, we were able to recognize the unwieldiness of the process. On the other hand, the application of Ash Subsidy Management (ASM), which was developed in 2015, involves operating deficiencies that contributed to compromise the efficiency of processing of applications and to generate long delays for the disbursement of the subsidies. In particular, the rigidity of the application means it is impossible to change an erroneous data entry, record the history of the evolution of a non-conformity initially surveyed in the field and already integrated into ASM, or save a revised subsidy amount.

On the other hand, given the SGPVMR does not yet have a complete inventory of ash trees in the private domain, it was necessary to proceed with validation of queries by visiting the field directly, which requires more time. All these deficiencies will have necessitated numerous validations and maintenance of other parallel tracking tools. For example, for the year 2016, we recognize the processing periods of the subsidies disbursed sometimes exceeded 60 days and even reached as much as 126 days, i.e., over four months.

As of November 17, 2016, the SGPVMR still had to proceed with processing of approximately 130 subsidy applications (concerning about 450 trees). On that date, the processing periods of these applications ranged between 8 and 135 days. In our opinion, these delays eventually could discourage some contractors from doing business with the city, and have an upward effect on prices, in view of the limited supply of such services.

Also, in the current state of affairs and considering the budget envelopes available for the subsidy program have been fairly little used overall, it is appropriate to question the SGPVMR's capacity to process a greater number of applications within reasonable periods.

RECOMMENDATION	
4.2.8.D.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal take the necessary actions to process the subsidy applications under By-law 15-063 within reasonable periods, which will have been defined in advance by the Service des grands parcs, du verdissement et du Mont-Royal.
BUSINESS UNIT'S RESPONSE	
4.2.8.D.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR and the STI have collaborated to improve the GSF computer application, so that businesses can amend their reimbursement requests in the application. This adjustment will accelerate processing of the requests.* ***(Planned completion: June 2017)***

4.3. Financial Framework for Management of the Emerald Ash Borer and the Canopy

4.3.A. Background and Findings

As mentioned previously, in reaction to the discovery of new emerald ash borer outbreaks and recognizing that the budget appropriations allocated were going to be insufficient to perform all the necessary interventions to slow the progress of the infestation, the city's executive committee mandated the SGPVMR, in collaboration with the Service des finances to develop the financial setup entitled *Plan de gestion de la forêt urbaine 2015-2025 (PGFU).*[55] As indicated for the related decision-making summary, this financial setup was supposed to allow anticipation of the budget needs in order to manage the impacts of the fight against the emerald ash borer between 2015 and 2025.

According to the information obtained, the financial setup was produced in 2014 and the estimated costs it presented covered the period up to 2028. This is presented in two parts. Firstly, it distinguishes the intervention targets to be achieved annually and the costs to be anticipated against the spread of the emerald ash borer. Secondly, it also integrates the targets to achieve annually and the related costs in terms of tree planting for the implementation of the *Plan d'action canopée 2012-2021*.

For the establishment of the estimated annual costs related to the fight against the emerald ash borer, the managers responsible for the development of this financial setup indicate that the targets chosen regarding interventions to be performed

[55] Resolution CE13 0939, June 19, 2013.

annually (e.g., the number of detections, the number of treatments, the number of ash trees felled) were established by taking inspiration from the experience of other North American cities and studies on the subject. The intervention scenarios for which the SGPVMR had the possibility of opting consisted of:

- not conducting any special intervention and thus having to fell all the ash trees quickly over a short period of time; or
- applying a certain number of ash tree treatments to save as many as possible and thus protect the canopy.

According to the solutions established by the SGPVMR, the options of doing nothing to protect the ash trees would have represented an overall cost of a little more than $500 million[56] for the city. The SGPVMR instead recommended the scenario of saving 75% of the population estimated at 200,000 ash trees, for a total of 150,000 ash trees over a period extending up to 2028. The overall cost then was estimated at $169.5 million for this first part of the financial setup.

For the second part of the financial setup, consisting of implementing the *Plan d'action canopée 2012-2021* to increase the canopy index by 5% by 2025, the Montréal canopy study produced in 2011 by the SGPVMR established that, to achieve this goal, the city would have to plant 98,000 trees in the public domain. Considering a program already exists for regular tree planting by the boroughs, which contributes to canopy enhancement, the SGPVMR's planting objective was reduced to 75,000 additional trees to be planted by 2025. Thus, according to the financial setup, considering a certain number of trees had already been planted between 2012 and 2014, it was established that the annual planting target would be 7,073 trees from 2015 to 2024. In the financial setup prepared in 2014, the overall cost of this component then was estimated at nearly $94 million. In short, also considering certain administrative costs associated with management of the strategy, the SGPVMR, based on this financial setup, estimated the fight against the emerald ash borer, and concurrently the efforts to enhance the canopy, were going to generate expenditures of around $294 million by 2028 (see Table 7).

[56] Estimate established according to a population of 200,000 ash trees and an average cost per tree, including the costs associated with felling, stump pulling and the purchase, planting and maintenance of a replacement tree.

Table 7 – Overall Cost Estimated by the SGPVMR to Stop the Spread of the Emerald Ash Borer and Implement the *Plan d'action canopée 2012-2021*

	Period	Scenario chosen – SLAM strategy
Stopping the spread of emerald ash borer[a]	2011-2028	$170M
Plan d'action canopée 2012-2021 [b]	2012-2026	$94M
Management expenses[c]	2012-2028	$30M
Total		**$294M**

[a] Detection work began in 2011.
[b] According to the scenario established by the SPVGMR, the plantings began in 2012 and were supposed to continue up to 2024 to reach the target of 75,000 trees. The expenditures projected for the years 2025 and 2026 concerned maintenance over two years of these new planted trees.
[c] No management expenses were projected for 2011.

Regarding the budget, let us specify the underlying interventions against the emerald ash borer (e.g., detection, treatment of ash trees, felling) are funded from the operating budget. The interventions related to the implementation of the *Plan d'action canopée 2012-2021* (purchase and planting of trees) and the annual financial support granted to the boroughs by the SGPVMR to ensure the replacement of felled ash trees, are funded from the TCEP budget dedicated to the SGPVMR. Since 2012, the trend of the TCEP adopted by the city authorities is illustrated in Table 10 presented below. In relation to the TCEP, we find over time that four loan by-laws totalling $45.5 million (see Table 8) were adopted by the city council between 2012 and 2016. Of this amount, approximately $23 million had been spent or incurred at the time of our audit (see Table 9).

Table 8 – Loan By-Laws Related to the TCEP

Purpose of borrowing	By-law No. Resolution No. Resolution date	2012	2013	2014	2015	2016	Total
Purchase and planting of trees – *Plan d'action canopée 2012-2021*	12-032 CM12 0751 August 21, 2012	$2.5M					**$2.5M**
Fulfillment and management of the *Plan d'action canopée 2012-2021*	15-038 CM15 0364 March 24, 2015				$7M		**$7M**
Fulfillment and management of the PGIFU[a]	15-067 CM15 1013 August 18, 2015				$14M		**$14M**
Fulfillment and management of the PGFU[b]	16-047 CM16 0982 August 23, 2016					$22M	**$22M**
Total		**$2.5M**			**$21M**	**$22M**	**$45.5M**

[a] *Plan de gestion intégré de la forêt urbaine 2015-2025 (PGIFU).*
[b] *Plan de gestion de la forêt urbaine 2015-2025 (PGFU).*

Table 9 – Use (Expenditures and Commitments) of the Loan By-Laws Related to the TCEP

Loan By-law No.	Loan By-law amount	2012	2013	2014	2015	2016[a]	Total
12-032	$2.5M	$1.14M	$0.43M	$0.46M	$0.22M	$0.06M	**$2.31M**
15-038	$7M	–	–	–	$7M	–	**$7M**
15-067	$14M	–	–	–	$2.48M	$8.1M	**$10.58M**
16-047	$22M	–	–	–	–	$3.2M	**$3.2M**
Total	**$45.5M**	**$1.14M**	**$0.43M**	**$0.46M**	**$9.7M**	**$11.36M**	**$23.09M**

[a] Financial data recorded in the city's accounting system as of November 30, 2016.

Table 10 – Trend of the TCEP from 2012 to 2019

TCEP budget/ year	2012	2013	2014	2015	2016	2017	2018	2019	Total
2012	–	–	–	–	–	–	–	–	**–**
2013	–	–	–	–	–	–	–	–	**–**
2014	–	–	$0.75M	$0.75M	$0.75M	–	–	–	**$2.25M**
2015	–	–	–	$7M	$7M	$7M	–	–	**$21M**
2016	–	–	–	–	$12M	$12M	$12M	–	**$36M**
2017	–	–	–	–	–	$15.5M	$15.5M	$15.5M	**$46.5M**

Although the financial setup must allow anticipation of the budget needs of future years to manage the impacts of fighting the emerald ash borer and enhancing the canopy, it appears it has never been reviewed or updated since its establishment in 2014. Our audit discovered that various aspects of the initial strategy were not carried out as anticipated. Thus, the initial budget estimates in the financial setup should have been reviewed to allow better planning of the required budgets. For example, a reconciliation of certain parameters of the estimates used in the financial setup with the actual data compiled, and the facts recognized after operations were conducted in the field, allows us to recognize the following:

- The number of annual detections projected in the financial setup amounted to 4,000 interventions beginning in 2015, whereas in reality, the contracts awarded by the SGPVMR for the purposes of this operation between 2014 and 2017 instead projected 3,450 detections per year;
- The number of ash trees detected as positive (infested by the emerald ash borer and to be felled turned out to be greater than the number projected in the financial setup. Let us mention that the actual data we used comes from the most recent compilation report prepared by the SGPVMR. The report in question is entitled *Fiche technique – État de la situation – Évolution de la forêt urbaine*. It is dated August 9, 2016. No other more recent report was available at the time of our audit in December 2016. The result of the comparison is presented in the following Table 11.

Table 11 – Number of Ash Trees Detected as Positive and to be Felled – Projected Versus Actual

	2015	2016
Number of ash trees detected as positive and to be felled – projected according to the financial setup (PGFU[a])	400	480
Number of ash trees detected as positive and to be felled – actual	572	783
Variance	**+ 172**	**+ 303**

[a] *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)*.

The greater than expected number of ash trees infested by the emerald ash borer translates concretely into additional costs to be anticipated regarding felling, stump pulling and tree replacement operations, in particular. This finding reveals an underestimate of the costs in the financial setup.

- The number of trees actually planted under the implementation of the *Plan d'action canopée 2012-2021* turned out to be less than the number planned in the financial setup. The comparison is presented in the following Table 12.

Table 12 – Number of Plantings Performed Relative to the Number of Plantings Planned in the Financial Setup for 2015 and 2016

	2015	2016	Cumulative
Number of plantings planned according to the financial setup (PGFU[a])	7,073	7,073	14,146
Number of plantings performed – actual	2,701	6,600 [b]	9,301
Variance	**4,372**	**473**	**4,845**

[a] *Plan de gestion de la forêt urbaine 2015-2025 (PGFU)*.
[b] Results obtained from the SGPVMR according to the progress of the work as of November 15, 2016. Trees may be planted up to December 5, according to the specifications.

To date, we therefore recognize a planting deficit of a little over 4,800 trees. This aspect was addressed in section 4.2.6 of this report dealing with tree planting in replacement of felled ash trees and for canopy enhancement. In light of this result, it appears that to achieve the planting objective of the *Plan d'action canopée 2012-2021*, the strategy and concurrently the financial setup will have to be revised, because the accumulated delay will have to be carried over to subsequent years. This must result in a re-evaluation of the necessary financial and human resources in order to increase the canopy index as projected.

- Expenditures made in 2015 and 2016, some of which will affect the subsequent years, had not been projected in the financial setup, in particular:
  - contracts to conduct the inventory of ash trees in the private domain;
  - contracts to ensure supervision of the plantings and quality control of the work;
  - a subsidy program for the treatment of ash trees located in the private domain;
  - five additional people were hired in 2016 within the SGPVMR, including a forest engineer, a planning advisor, a technical agent and two horticulture inspectors.[57]

- Beginning in 2017, expenditures will be necessary to proceed with the performance and supervision of soil demineralization work in view of creating additional sites for planting new trees.

In the final analysis, a large number of factors may cause the strategy deployed to evolve differently than the one initially foreseen. In the circumstances, it is therefore unavoidable the parameters of the estimates supporting the financial setup will have to be reviewed. In addition to the above-mentioned aspects, other factors must be taken into account, in particular:

- the effectiveness of the pesticide depending on the frequency of treatment and the proportion of trees treated;

[57] Resolution CE16 1374, decision-making summary No. 1164107005.

- citizen adherence to fighting the plague and proceeding to treat their ash trees on their private property;
- the resources available to perform the required interventions (in house or external).

Moreover, considering many municipalities in Québec and in the rest of Canada are now faced with an emerald ash borer problem in their territory, there is good reason to expect the demand for replacement trees will increase strongly and that the pressure on supply will have an impact on market prices. There could even be a shortage of trees on the market, which could compel the SGPVMR to reassess its criteria regarding the type of tree it requires by accepting smaller trees. This would lead to additional maintenance costs to ensure their survival (e.g., installation of protectors).

In this context, we consider the periodic and even annual review of a financial setup is indispensable to allow planning of budget needs.

RECOMMENDATION	
4.3.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal periodically update the financial setup supporting the approved action plan, so it reflects the revised parameters and the budget needs, in view of allowing better coordination of resources.
BUSINESS UNIT'S RESPONSE	
4.3.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR has solicited the Service des finances to update the financial setup for the urban forest.* ***(Planned completion: June 2017)***

Moreover, aware of the additional financial efforts generated for the boroughs by felling[58] of infested or declining ash trees, the SGPVMR offered them financial assistance to help them proceed, in particular, with replacement of the ash trees felled in the fight against the emerald ash borer.

Thus, since 2015, a program for replacement of felled ash trees has been set up by the SGPVMR and budget appropriations from its TCEP have been transferred to the boroughs. The terms of this budget transfer to the boroughs were stipulated in a commitment letter addressed to the director of each borough. Obtaining budget appropriations was conditional on the boroughs' written commitment to perform the following operations, in particular:

[58] The trees are felled by and at the expense of the boroughs from their respective operating budgets.

- fell the number of ash trees stipulated in accordance with the felling prescription provided by the SGPVMR following its emerald ash borer detection operations;
- proceed with planting of a specified number of trees (exact number indicated in the commitment letter in consideration of the budgets transferred) in replacement of the felled ash trees, in addition to the plantings projected in the borough's regular program.

Our audit first involved ensuring that the amounts promised to the boroughs had actually been transferred to them and, secondly, evaluating the control and monitoring measures instituted by the SGPVMR to ensure the budgets allocated were used for the purposes projected by the boroughs.

Thus, we were able to recognize, for the years 2015 and 2016, that the boroughs shared a TCEP budget of $2.98 million in 2015 and $2.91 million in 2016 (total of $5.89 million).

However, an examination of the commitment letters signed by the three boroughs audited for the years 2015 and 2016 and the form of terms and conditions attached to them allowed us to recognize the absence of certain specifications it would have been relevant for the SGPVMR to provide, in our opinion. In particular, we note that:

- no clear indication or directive exists, specifying the nature of the expenditures the boroughs are authorized to fund by means of these TCEP budget appropriations transferred to them. Although these budget appropriations must serve to proceed with the replacement of the felled trees, it would have been useful, for the benefit of the boroughs, to specify the nature of the eligible expenditures for performance of the operation (e.g., purchase of the tree, labour or tools necessary for planting). In light of the comments obtained from some stakeholders interviewed in the boroughs, these imprecisions created confusion regarding the use of the available funds. Although this cannot be the only reason, we nonetheless find, as of November 30, 2016, that 49% of the TCEP budget appropriations thus transferred to the city's boroughs by the SGPVMR still had not been utilized ($2.9 million out of $5.89 million);
- no mention is made of the consequences of non-compliance with the commitments made by the borough in consideration of the budget funds obtained;
- no mention exists regarding the accountability mechanisms expected by the SGPVMR on the part of the boroughs, so it can control that the money transferred is used for the stipulated purposes and that the trees felled are indeed replaced as stipulated in the commitment.

Moreover, the responsible managers interviewed at the SGPVMR confirmed to us they have not instituted special measures to corroborate the boroughs' compliance with the commitments they made in terms of trees to be replaced in consideration of the financial assistance obtained, and have not monitored the use of the budget appropriations granted. They justify this situation by the internal staff shortage, but

also by the fact they consider the managers in the boroughs must be accountable for the actions to which they have committed.

In a context where resources are limited and considering the impacts the non-performance of the operations underlying this budget transfer could represent for the achievement of the targets of the *Plan d'action canopée 2012-2021*, we believe controls should be instituted by the SGPVMR to ensure the financial assistance allocated to the boroughs serves the stipulated purposes and contributes to achieve the objectives.

RECOMMENDATION	
4.3.C.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal review the terms of application of the financial assistance granted to the boroughs so the documents attesting to the commitment made between the parties incorporate the required specifications regarding the use of the funds, non-compliance with the commitments, and the expected accountability mechanisms, so it can exercise better control of the funds transferred to the boroughs.
BUSINESS UNIT'S RESPONSE	
4.3.C.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR plans to integrate the necessary details into the letter addressed to the boroughs regarding the use of the funds, non-fulfillment of commitments and the expected accountability mechanisms.* ***(Planned completion: June 2017)***

4.4. Accountability

4.4.A. Background and Findings

The implementation of major action plans, such as the *Plan d'action montréalais de lutte contre l'agrile du frêne 2012-2015* and the *Plan d'action canopée 2012-2021,* must be governed by the establishment of accountability mechanisms to allow evaluation of the effectiveness of the actions undertaken. For this purpose, management reports must be produced periodically and contain enough information to enable the responsible managers, and ultimately the city's authorities, to assess the efficiency of the operations and the degree of progress of the measures proposed, given the targets set.

Our audit allowed us to recognize there is no formal report periodically presenting an overview of the progress of the situation, in view of the targets set to fight the emerald

ash borer, and concurrently to achieve the canopy enhancement objectives. According to the information obtained, such a report concerning 2016 would be scheduled for the beginning of 2017.

According to the division head responsible at the SGPVMR, the dossier nonetheless is followed closely by the city's Direction générale; quarterly meetings have been held to discuss its progress. However, we have not found reports or minutes supporting the content of the aspects discussed at these meetings.

This having been said, to allow a better evaluation of the nature of the monitoring performed, we looked up and consulted the documentation produced by the SGPVMR since the deployment of the strategy to fight the emerald ash borer and manage the canopy. Thus, as we mentioned previously, the only reports we traced since the adoption of the *Plan d'action montréalais de la lutte contre l'agrile du frêne en 2012* are as follows:

- *Plan d'action montréalais contre l'Agrile du frêne 2012-2015 – Bilan 2012 et programme 2013*;
- *Forêt urbaine – Bilan 2015 – Plan d'action 2016*.

We notice the first document is undated, while the second, dated March 24, 2016, takes the form of a PowerPoint presentation. In both cases, we were unable to identify the recipients of these documents precisely. According to the information obtained, it appears these reports were not deposited officially with the authorities, but were transmitted to the management of the SGPVMR. These reports present the results obtained in terms of units of measure or highlights.

For example, they present:

- the number of new outbreaks discovered in 2012 relative to 2011;
- the number of streetside ash trees treated with the pesticide TreeAzin® in 2011 and 2012;
- the number of plantings carried out in 2015 and the forecasts for 2016;
- the trend of the number of ash trees detected, treated and to be replaced from 2011 to 2015;
- the different actions taken (e.g., the adoption in 2015 of By-law 15-040 to stop the spread of the emerald ash borer on the territory of Ville de Montréal and By-law 15-063 concerning the subsidy for the treatment of ash trees located on private property in high-risk areas);
- the results of the subsidy program (By-law 15-063);
- certain eventual action priorities.

It appears no report was produced for the years 2013 and 2014.

We also learned of several documents prepared for the purposes of public communications to the media. These are technical data sheets or press releases

transmitted to the Mayor's office and the executive committee. These documents, prepared for communications purposes in the years 2012, 2013 and 2014, present a summary picture of the progress of the fight against the emerald ash borer in the city's territory and also present the results obtained in terms of units of measure (e.g., the number of ash trees detected, the number of ash trees treated, the number of ash trees felled). However, these are not reports prepared for management and monitoring of the progress of operations.

Strategically and operationally, we recognized the existence of targets sent annually, which were integrated into the financial setup prepared in 2014. On the one hand, these targets to be achieved annually concern the operations against the emerald ash borer (e.g., the number of detections, the number of treatments, the number of ash trees felled and replaced). On the other hand, targets were also established concerning the number of additional trees to be planted annually in order to increase the canopy index by 5% by 2025.

In this regard, remember that in the context of the implementation of the *Plan d'action canopée 2012-2021*, it was agreed the city would coordinate planting in the municipal public domain, whereas an NPO would see to coordination of tree planting in the private and institutional domain. The 2014 financial setup therefore envisioned the SGPVMR had to plant 7,073 trees per year beginning in 2015 in the public domain, whereas in the private domain, the NPO undertook to plant 13,550 trees beginning in 2015. Regardless of whether these are targets are related to the operations against the emerald ash borer or annual planting targets for the implementation of the *Plan d'action canopée 2012-2021,* we do not find any assessment, management report or presentation document comparing the achievements in the field with the targets set. Moreover, no annual assessment has ever been produced more specifically concerning the *Plan d'action canopée 2012-2021*. However, this was one of the recommendations formulated by the Commission permanente sur l'eau, l'environnement, le développement durable et les grands parcs following the study, in May 2014, of the emerald ash borer issue and the *Plan d'action canopée 2012-2021*. In response to this report, the executive committee also considered it opportune to table an annual report of activities of the *Plan d'action canopée 2012-2021* in the city council.[59]

Also, we find the SGPVMR does not have any management report allowing compilation of the actual trends of all the costs incurred to date city-wide (including the expenditures made by the boroughs) to fight the emerald ash borer and enhance the canopy in Montréal. As we mentioned previously in section 4.3 of this report regarding the financial framework, the only report at the SGPVMR's disposal in this sense concerns a document entitled *Fiche technique – État de la situation – Évolution de la forêt urbaine*. The most recent available version of the report is dated August 9, 2016. The first part of the report presents, for the years 2012 to 2016 (in progress), the results

[59] GDD 1143430015, response to Recommendation R-1.

in terms of number of interventions performed (e.g., the number of detections, the number of treatments, the number of ash trees felled), whereas the second part presents an approximate summary of the actual expenditures and the TCEP budgets pertaining to these same years, only for the SGPVMR.

Upon examining the documents presented to the Commission sur les finances et l'administration, in view of the adoption of the operating budgets and the TCEP budgets from 2012 to 2016, we perceive the exercise of a certain form of accountability regarding the main actions performed and the actions projected for the following year. However, this again is a presentation in terms of units of measure compiled (e.g., the number of trees planted, the number of injections applied), but these results do not provide indications regarding the degree of achievement of the established targets. Without comparison with the objectives, it is more difficult, and even impossible, to evaluate the results of the implemented strategy at their fair value, accounting for the human and budgetary resources available.

Finally, we find it is only very recently, on September 2 and 23, 2016 in the context of the approval and coordination process for the city's major projects and programs, that a PowerPoint presentation[60] was delivered to the members of the two management committees, namely the Comité corporatif de gestion des projets d'envergure (CCGPE), chaired by the city manager, and the Comité de coordination des projets d'envergure (CCPE), chaired by the chairman of the city's executive committee. These two presentations, which were identical, all in all, essentially sought to report on the changes in the TCEP budget approved relative to the actual expenditures invested for the year 2015 and the year 2016 in progress. According to the information obtained from the SGPVMR's managers, although the implementation of the *Plan d'action montréalais contre l'agrile du frêne 2012-2015* and the *Plan d'action canopée 2012-2021* began in 2012, it is only since January 2016 that the dossier is considered a major program and that the SGPVMR must complete a quarterly table entitled *Tableau de suivi des projets et programmes d'immobilisations prioritaires pour l'année 2016* for the Bureau des projets et programmes d'immobilisations reporting to the city's Direction générale.

For the three boroughs audited, we recognize the following facts:

- The Sud-Ouest borough, which is only one of the three boroughs audited to have adopted a 10-year action plan (2014 to 2024) against the emerald ash borer in its territory, has produced two reports to date, concerning the years 2014 and 2015. According to the information obtained from the people interviewed, these reports were presented to the elected officers of the borough. In both cases, the results of the operations conducted by the borough (e.g., detection, treatment, felling, planting) are close to the targets established in the action plan;

[60] The presentation document was entitled: *Plan de la forêt urbaine – Verdissement (Plan d'action canopée 2012-2021) et remplacement de frênes – Nº investi : 34 700 – État d'avancement.*

- For the Côte-des-Neiges–Notre-Dame-de-Grâce and Rivière-des-Prairies–Pointe-aux-Trembles boroughs, since the operations against the emerald ash borer are essentially conducted by the SGPVMR, they have various Excel files identifying the operations under their responsibility (e.g., the list of trees felled, the list of plantings).

RECOMMENDATIONS	
4.4.B.	We recommend that the Service des grands parcs, du verdissement et du Mont-Royal adopt management reports allowing periodic tracking of the progress of operations and the degree of advancement of the actions undertaken, accounting for the targets set, in view of facilitating the evaluation of the strategy deployed and favouring informed decision-making in fighting the emerald ash borer and in canopy enhancement.
4.4.C.	We also recommend that the Service des grands parcs, du verdissement et du Mont-Royal annually produce a formal report to account for the overall situation regarding the fight against the emerald ash borer and, concurrently, the achievement of the Montréal canopy target.
BUSINESS UNIT'S RESPONSES	
4.4.B.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] The SGPVMR has adopted management reports allowing tracking of operations and the progress of the actions taken.* ***(Planned completion: April 2017 - Completed)***
4.4.C.	***Service des grands parcs, du verdissement et du Mont-Royal*** *[TRANSLATION] See the proposed action for Recommendation 4.1.B. (Action plans for management of the emerald ash borer and the canopy).* ***(Planned completion: April 2018)***

5. Conclusion

The appearance in 2011 of the emerald ash borer in Montréal's territory undoubtedly represented a major challenge. Indeed, the city's sustainable development directions sought to enhance the canopy by 5% over a 10-year horizon,[61] whereas ash trees represented a significant portion of its arboreal stock (one tree in five was an ash) and

[61] The *Plan d'action canopée 2012-2021* envisioned the additional planting of 75,000 trees in the public domain, in addition to the 23,000 planted on the average by the boroughs under their regular planting program and the 142,000 trees in the private domain.

no solutions existed (and still do not exist to date) to eradicate the emerald ash borer completely.

Thus, starting in 2012, while countering the negative impacts associated with canopy loss,[62] the action plan deployed by the city to fight this plague sought to gain time by slowing the insect infestation, while offering the benefit of spreading over time the costs associated with massive felling of ash trees and their replacement over a short period. In 2014, the financial setup developed by the city revealed the fight against the emerald ash borer and, concurrently, the efforts to enhance the canopy, could generate expenditures then estimated at approximately $294 million up to 2028, without considering the cost of the actions undertaken within the boroughs.

Since then, we have been able to recognize the considerable efforts deployed by the city to fight the insect infestations and tend to enhance the canopy. In particular, several contracts totalling approximately $30 million have been awarded since 2013 to external firms in relation to detection, treatment and planting work.

Nonetheless, we must recognize it is difficult to date to assess the extent to which the strategy deployed by the city is working efficiently and contributing to the achievement of the objectives. On the one hand, no assessment or formal diagnosis exists to date presenting the overall picture of the progress of the situation, given the targets established and incorporated into the 2014 financial setup against the emerald ash borer and, concurrently, achieve the canopy enhancement targets. On the other hand, the operations performed and the evaluation of the recognized results are not documented sufficiently. Periodic tracking of the progress of operations currently tends to be done informally instead of being part of a well-defined accountability process.

Whether they concern interventions against the emerald ash borer or interventions related to canopy enhancement, the facts recognized reveal the necessity of reassessing the direction of the strategy deployed in order to ensure coherence, accounting for the objectives. For example, the following aspects will have to be considered:

- Systematic renewal of ash tree injections every two years, as recommended, has not been planned by the Service des grands parcs, du verdissement et du Mont-Royal (SGPVMR). This exposes the city to the risk the insect will regain the upper hand and that a large proportion of the ash trees initially treated during a first round will have to be felled and replaced more quickly. As applicable, it thus will be necessary to decide what proportion of ash trees the city wishes to include in a long-term protection program;
- The late planting of additional trees necessary to meet the canopy enhancement target of 5% by 2025 and the problem related to the identification of new planting sites in the territory, combined with the fact the *Plan d'action canopée 2012-2021*

[62] In particular, increase in heat islands, decrease in air quality, impairment of neighbourhood esthetics and property values.

did not really account for the magnitude of the damage caused by the insect infestation;

- The problem associated with the non-enforcement of By-law 15-040[63] concerning ash trees in the private domain, which represent approximately 22% of all ash trees in Montréal territory, and low interest of citizens in the financial assistance program instituted for the treatment of ash trees on their property (By-law 15-063).[64] The inaction in the private domain could have contributed to lessen the city's efforts to fight the insect in the public domain.

We find the SGPVMR will have to prove the extent to which the strategy deployed has made it possible to counter the insect invasion and achieve the objectives enabling the municipal administration to decide what strategy to put forward to meet the new targets. Consequently, an updated action plan based on the actual results obtained should be drafted and formally approved, which invariably will have an impact on the financial framework. In particular, the investments will have to be adjusted according to the operational rhythm sought to achieve the annual and long-term targets. Agreements will also have to be made with the boroughs to favour the achievement of common objectives.

Finally, citizens are increasingly aware of the importance of the environment and want public administrations to become more involved to provide them with a pleasant living place. The city's sustainable development plan, *Montréal durable 2016-2020*, sets out directions in this sense. However, it must be demonstrated that this plan is respected in the context of the established budget constraints, and that the best decisions are made to achieve it. Both the public domain and the private domain will have to contribute to this collective reforestation effort.

[63] *By-law to stop the spread of the emerald ash borer on the territory of Montréal*, adopted in May 2015.
[64] *By-law concerning the subsidy for the treatment of ash trees located on private property in high-risk areas*, adopted in June 2015.

6. Appendices

6.1. Images Associated with the Emerald Ash Borer

Figure A – Adult emerald ash borer

Source: © David Cappaert, Michigan State University, Bugwood.org, CQEEE

Figure B – Sinuous galleries created by the emerald ash borer in the larval stage

Source: © David Cappaert, Michigan State University, Bugwood.org, CQEEE

Figure C – Ash tree foliage

Source: Portail des grands parcs et verdissement, Ville de Montréal

Figure D – Damage caused by the emerald ash borer in the larval stage

Source: © CFIA

Figure E – Branch barking technique

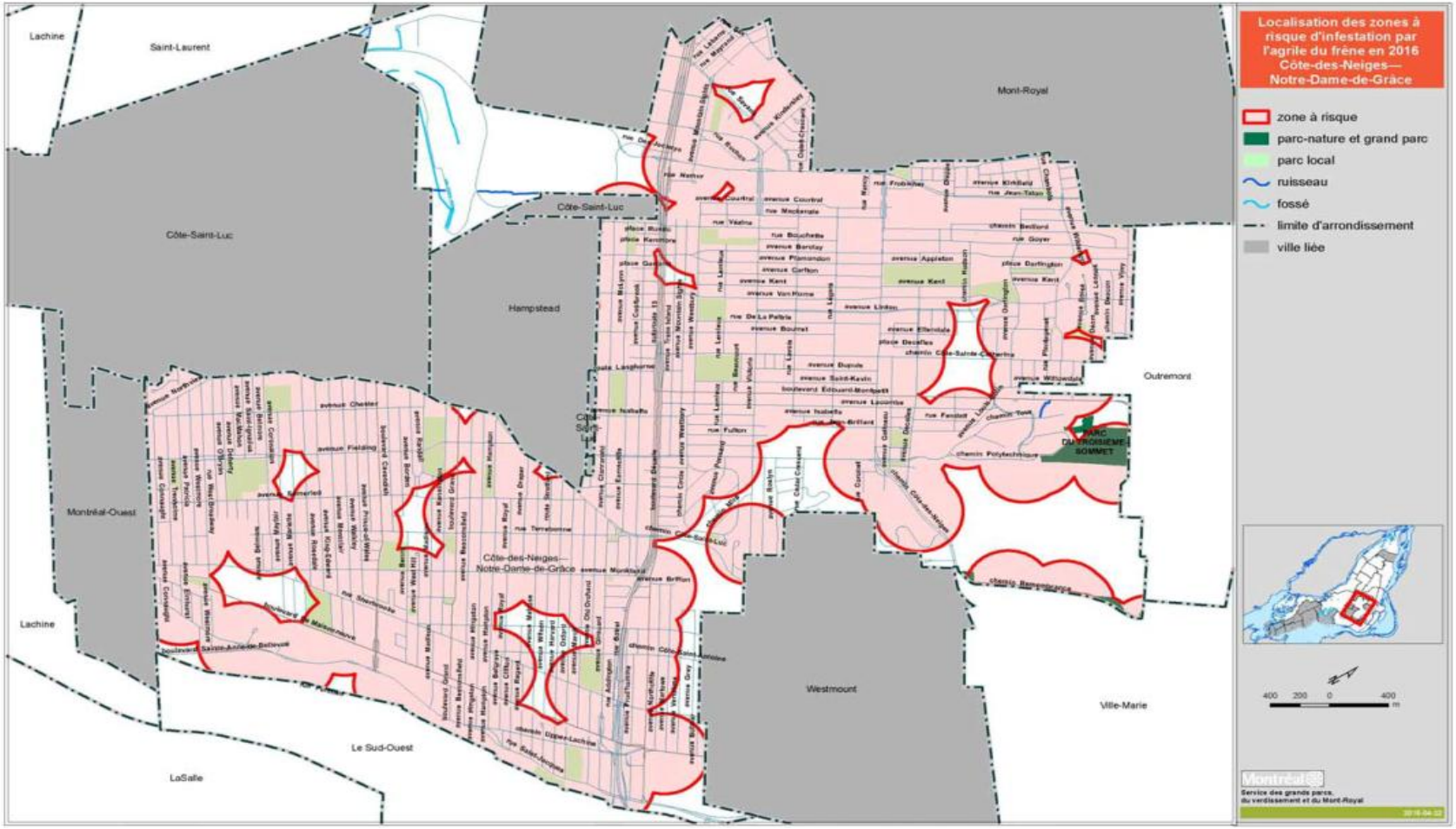
Source: CQEEE

Figure F – Injection treatment with the bioinsecticide TreeAzin®

Source: Portail des grands parcs et verdissement, Ville de Montréal

6.2. High-Risk Areas in 2016 Concerning the Three Boroughs Audited

Figure A – Côte-des-Neiges–Notre-Dame-de-Grâce Borough[65]



[65] Source: SGPVMR, May 2016.

Figure B – Rivière-des-Prairies–Pointe-aux-Trembles Borough

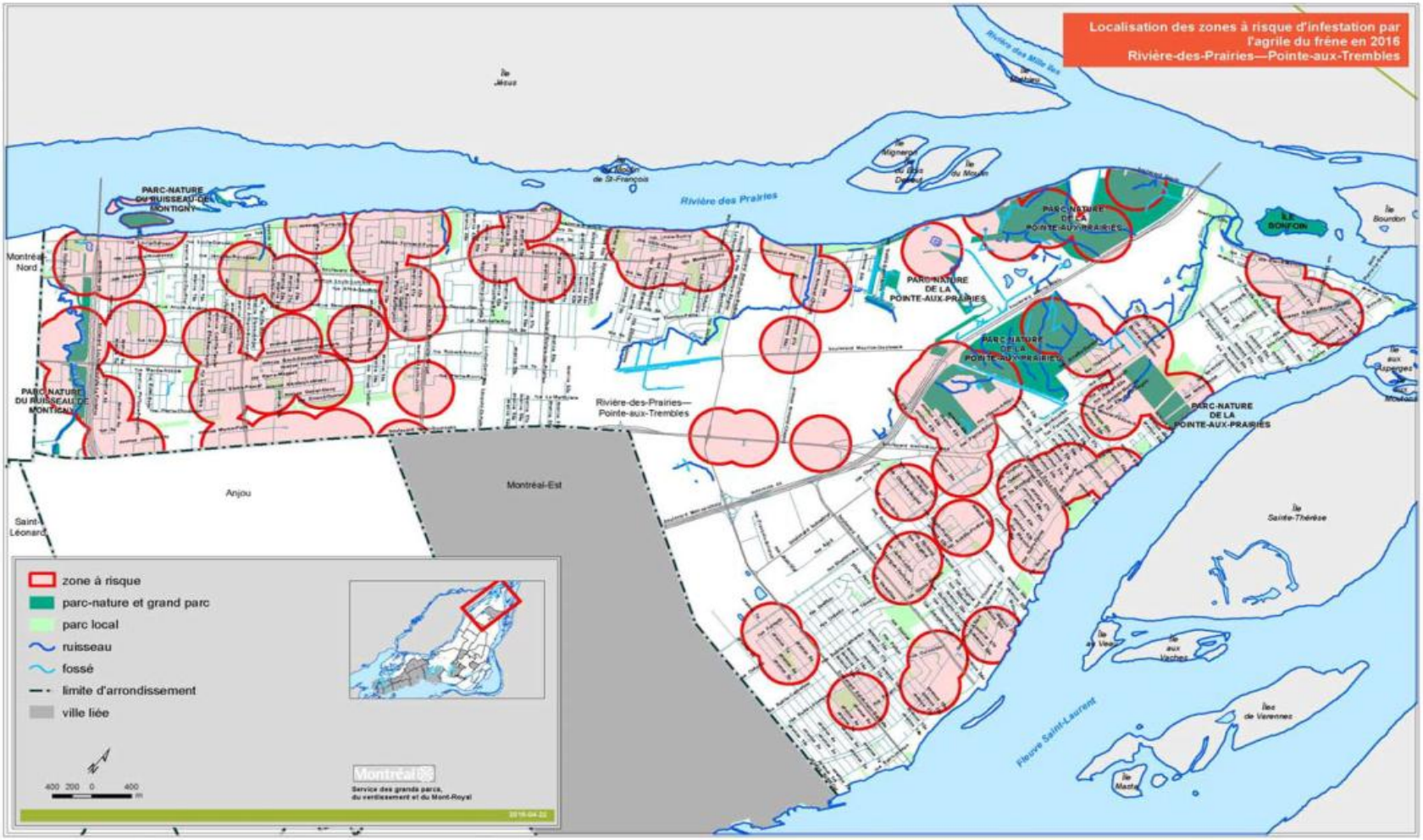
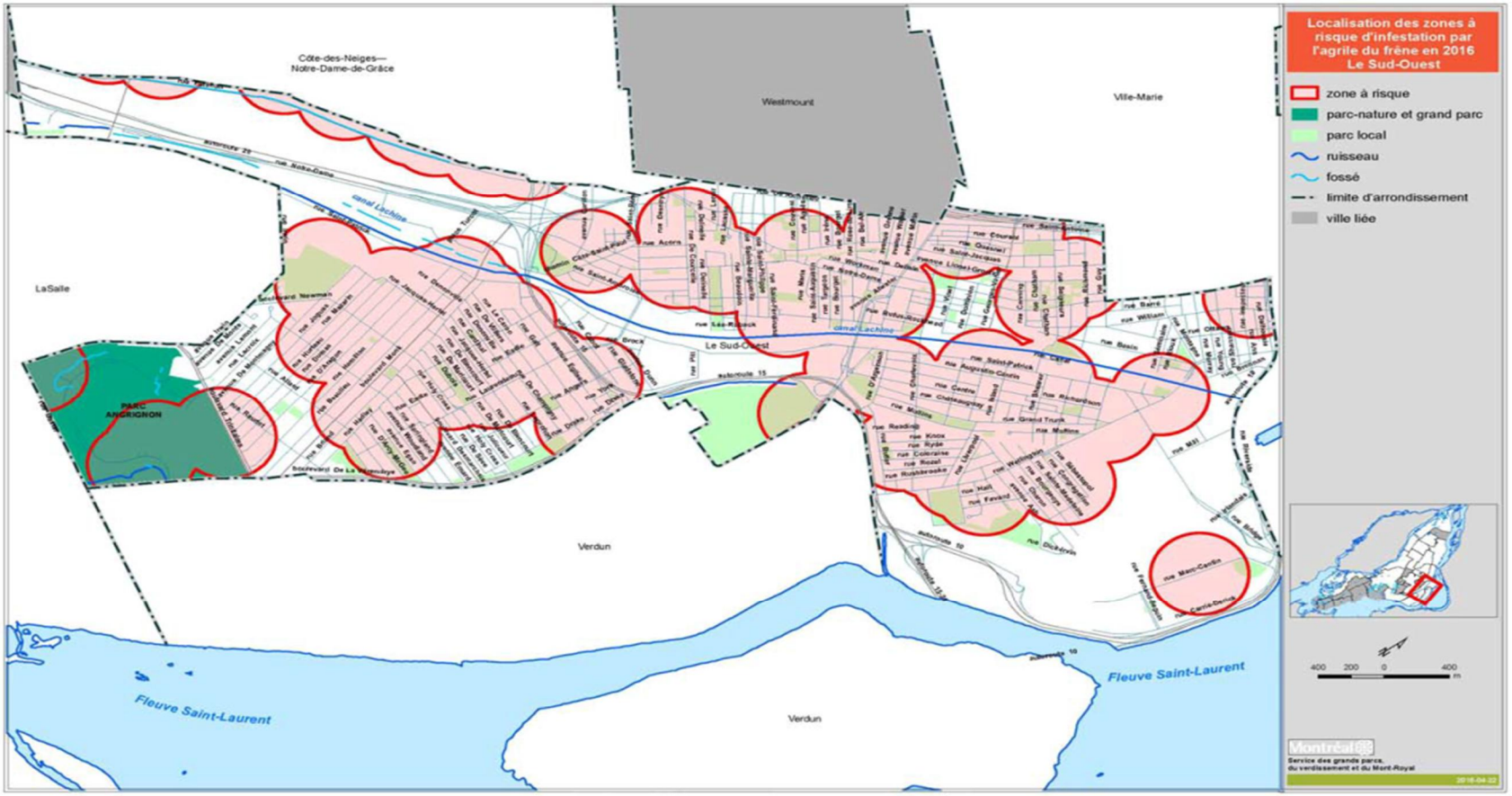


Figure C – Sud-Ouest Borough



6.3. Main Contracts Awarded by the Service des grands parcs, du verdissement et du Mont-Royal to Fight the Emerald Ash Borer and Enhance the Canopy

Work categories	Call for Tenders or decision number	Term of the contract	Amount in GDD[a][c]
Detection			
· Public domain	14-13899	2014	$77,264
· Public domain	14-13900	2014	$69,762
· Public domain	15-14498	2015 to 2017	$733,793
· Large parks	14-13898	2014	$113,474
· Large parks	15-14497	2015 to 2017	$350,099
Total – detection			**$1,344,392**
Products and injection			
· Products (insecticides)	Negotiated agreement CM13 0431	June 2013 to May 2016	$450,000
· Products (insecticides)	Negotiated agreement CM13 0431	12 additional months	$2,092,505
· Products (insecticides)	Negotiated agreement CM16 0604	30 months	$9,363,564
· Injection and supply of insecticide	14-6698	2014	$1,998,553[b]
· Injection (High-risk area and *Conservation Program)*	15-14268	2015	$693,615
· Injection (High-risk area)	16-15237	2016	$610,027
· Injection (*Conservation Program*)	16-15349	2016	$106,307
Total – products and injection			**$15,314,571**
Planting			
· Site identification	14-13992	2015	$99,241
· Supply, planting and maintenance of trees	15-14275	2015-2019	$8,620,876
· Supply, planting and maintenance of trees	16-15070	2016-2018	$4,245,824
· Supervision of planting (internal)	–	2015	$–
· Supervision of watering, maintenance and warranty	16-15085	2016	$135,082
· Supervision of planting, quality control, maintenance and watering	16-15087	2016-2017	$416,095
· Supervision of planting, quality control, maintenance and watering	16-15254	2016-2019	$579,219
Total – planting			**$14,096,337**

[a] Amount of the contract, including taxes and contingencies, if applicable.
[b] This amount includes a sum of $1,341,029 representing insecticide costs.
[c] Gestion des dossiers décisionnels.

6.4. Purpose and Evaluation Criteria

Purpose

The purpose of this audit was to evaluate the measures with which the city deployed a strategy governing management of the problem related to the emerald ash borer in the territory of the Montréal agglomeration.

Evaluation Criteria

- An inventory of the existing ash trees in the urban agglomerations territory (public and private domains) was conducted and made it possible to obtain an overview of the progress of the situation.
- An action plan against the emerald ash borer was drafted and formally approved by the authorities concerned. Measures arising from this action plan were implemented (e.g., infestation detection, treatment or tree felling measures, tree replacement and raising public awareness).
- A financial framework indicating the main funding sources was adopted to support the initiatives to stop the spread of the emerald ash borer.
- Reports presenting the progress of the situation in terms of the results of the actions undertaken, accounting for the amounts invested, are produced and periodic accountability is exercised with the municipal authorities.