



# 4.3.

## Management of the *Climate Change Adaptation Plan*

February 24, 2020

**2019 Annual Report**

Auditor General of the Ville de Montréal



# OBJECTIVE

Ensure that the measures provided for in the *Climate Change Adaptation Plan for the Montréal Urban Agglomeration (CCAP) 2015–2020* were appropriately planned and were implemented.

# RESULTS

The *CCAP* adopted by the urban agglomeration council in 2015 includes adaptation measures that must be implemented by both the departments and boroughs of the Ville de Montréal (the City) and the related municipalities. Responsibility for this *CCAP* now falls to the Bureau de la transition écologique et de la résilience (BTER), which is currently working on a new Climate plan that will replace the *CCAP*. There are several problems raised by the planning and implementation of these measures. In this regard, we believe that improvements should be made in the following key areas:

- The competencies of the bodies involved in implementing the climate change adaptation measures should be clarified in order to facilitate their execution;
- Governance should be put in place throughout the Montréal agglomeration to support a broader management of climate change adaptation in order to promote the implementation of the *CCAP*;
- The planning of activities surrounding the implementation of the *CCAP* will have to be strengthened in order to provide a clear framework for the choices made (methodology, evaluation of effectiveness, prioritization, targets and indicators, etc.);
- Monitoring mechanisms will have to be more rigorous to allow for the collection of more reliable data for decision-making;
- Knowledge development in the field of adaptation to climate change should be monitored in a structured and organized manner with a view to promoting the creation and implementation of innovative solutions in this field;
- The content of reports needs to be reviewed and accountability reporting needs to be done more frequently to better inform decision makers so that they can take corrective action as quickly as possible.

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

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

*It should be stressed that business units were given the opportunity to agree to this, and we will submit their comments later.*



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# LIST OF ACRONYMS

<b>BTER</b>	Bureau de la transition écologique et de la résilience
<b>CCAP</b>	<i>Climate Change Adaptation Plan for the Montréal Urban Agglomeration</i>
<b>CUD</b>	Citizens' Universal Declaration of Climate Emergency
<b>FCM</b>	Federation of Canadian Municipalities
<b>GHGs</b>	Greenhouse gases
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>OQACC</b>	Observatoire québécois de l'adaptation aux changements climatiques
<b>UMQ</b>	Union des municipalités du Québec



## 1. BACKGROUND

In October 2018, the Intergovernmental Panel on Climate Change (IPCC)<sup>1</sup> published a special report on the consequences of global warming of 1.5°C. One of the important messages highlighted in this report is that the consequences of global warming of an average of 1°C are already real (melting ice in the Arctic, sea levels rising and extreme weather events). Climate change is already affecting ecosystems and people around the world. These are significant impacts that already require adaptation measures. According to this report, if the current rate of Greenhouse gases (GHGs) emissions is maintained, the global warming threshold of +1.5°C will be reached between 2030 and 2052.<sup>2</sup>

According to a recent report produced by the Government of Canada (in 2019),<sup>3</sup> over the course of the last 70 years, average temperatures in Canada increased by 1.7°C to 2.3°C<sup>4</sup> depending on the region. In Québec, the average temperature increase is reported to have been 1.1°C during the same period. According to this same report, temperatures is also expected to increase even more in the future.<sup>5</sup> The municipalities recognizes that: *“Due to its northern location, Québec must prepare for a more significant increase in temperatures.”*<sup>6</sup>

Also, in 2017 and 2018, GHGs levels increased globally.<sup>7</sup> This observation also applies to Canada for the period of 2016 and 2017.<sup>8</sup> Furthermore, the more the climate warms, the more the number of climatic events and their impacts increase.

Pursuant to the Paris Accord of 2015, countries agreed to strengthen their capacities to deal with the consequences of climate change.

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<sup>1</sup> The Intergovernmental Panel on Climate Change was established in 1988. It is a place of expertise aimed at synthesizing the work carried out in laboratories around the world. It brings together the expertise of the scientific community on the issue of climate change and the role played by humankind. The IPCC is made up of scientists elected by the plenary assembly to represent the different disciplines and regions of the world.

<sup>2</sup> “Global warming of 1.5°C.” Intergovernmental panel on climate change. Switzerland, October 2018.

<sup>3</sup> “Canada’s Changing Climate Report.” Government of Canada, Environment and Climate Change Canada, 2019 (CCCR-2019).

<sup>4</sup> Ibid., page 117.

<sup>5</sup> Ibid., page 431.

<sup>6</sup> “Changements climatiques : pour des municipalités plus résilientes,” in *Revue Urbaine* Le magazine de l’Union des municipalités du Québec (UMQ), vol. 40, no. 01, March 2019, page 20.

<sup>7</sup> “Global Energy & CO2 status report.” International Energy Agency. GECO 2019.

<sup>8</sup> “National Inventory Report 1990–2017: Greenhouse Gas Sources and Sinks in Canada. Canada’s Submission to the United Nations Framework Convention on Climate Change.” Government of Canada, 2019.

Created in 2018, the Global Commission on Adaptation<sup>9</sup> produced a report in September 2019 in which it states that climate change is already happening and that the impacts are becoming more severe each year. Global actions to reduce climate change are promising but insufficient, and significant efforts are needed to adapt to the conditions that are now inevitable, including rising temperatures, rising sea levels, destructive storms, unpredictable heavy rainfall and ocean acidity.<sup>10</sup> Thus, the world can no longer limit itself to trying to reduce GHGs; it is essential that it prepare for the impacts of climate change that are already at work. According to the Global Commission on Adaptation, a dollar invested in climate change adaptation yields significant benefits in terms of mitigating future damage in addition to other technological, economic and environmental benefits.

For example, climate change can take different forms, including extreme heat events in the summer, frequent and/or more intense rainfall causing flooding and severe storms and thunderstorms. These phenomena have impacts on municipalities that can affect different aspects of their communities and their citizens. Moreover, recent events that occurred in Québec municipalities have demonstrated the impacts they can have on infrastructure, economic activity, the built environment, quality of life and citizens' health, not to mention the magnitude of the financial losses and the costs required to restore damaged or destroyed property.

In such a context, adapting<sup>11</sup> to climate change becomes as much a priority as reducing GHGs emissions for governments and municipalities.

Municipalities are the places where people live and work, which is an important factor with respect to the impacts of climate change and the population density in these places. Both organizations representing municipalities and governments recognize that municipalities are front-line players when it comes to addressing the impacts of climate change. Through their role as local governments, they are in a position to manage the risks and measures related to climate change, particularly through land-use planning, building public infrastructure, adopting and enforcing municipal by-laws, implementing emergency response services and operating transportation networks.

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<sup>9</sup> The Global Commission on Adaptation was established in 2018 and validated by the United Nations. It includes several key figures who have held important positions as ministers, chief executive officers or mayors. It is headed by former UN Secretary-General Ban Ki-Moon, Bill Gates and Kristalina Georgieva, the Managing Director of the World Bank. It has been adopted by 17 countries, including Canada, to encourage bold solutions to build resilience to the threats of climate change.

<sup>10</sup> Global Commission on Adaptation. Report titled "Adapt Now: A Global Call for Leadership on Climate Resilience," September 2019, page 3.

<sup>11</sup> Definition of adaptation: Process by which communities and ecosystems adjust to climate change and its associated effects, in order to limit their negative consequences and enjoy their potential benefits. For human environments, adaptation makes it possible to prepare for new climate conditions. In natural environments, plant and animal populations will also adapt, but in a reactive way, and will suffer more negative short-term impacts. Adaptation concerns every level of decision-making (individual, local, regional, national, international) and demands a worldwide and highly integrated approach, as issues affect many sectors and often stretch beyond administrative limits. (Source: Follow-up of the *Climate Change Adaptation Plan (CCAP)*, Ville de Montréal, 2019.)

The governing bodies<sup>12</sup> representing the municipalities have put forward tools for implementing climate change mitigation and adaptation initiatives (guides, funding programs and analyses). Among the municipal priorities identified by the Federation of Canadian Municipalities (FCM) for the 2018 budget was, “*Working together to tackle climate change.*”

In Québec, more than 300 municipalities—representing close to two thirds of Québec’s population, including Montréal’s—have supported the “Citizens’ Universal Declaration of Climate Emergency (CUD).”<sup>13</sup>

The federal government has produced a number of documents for municipalities on climate change adaptation, including guides on the subject.

The Québec government has also produced documents relating to the fight against climate change, including the adoption of the first *Action Plan on Climate Change 2006–2012*, which led to the creation of the *Climate Municipalities Program*. This program includes financial assistance to municipalities for various climate change mitigation projects, including the development of a *CCAP*.

In 2010, the Ville de Montréal (hereinafter the City) applied for financial assistance on behalf of the Montréal agglomeration under phase 2 of this program. The Québec government confirmed financial assistance in the amount of \$1,880,781 that same year. In managing this financial assistance granted by the Québec government, the City acted on its own behalf as well as on behalf of the 13 related municipalities.<sup>14</sup>

Following receipt of this financial assistance, City officials worked on the development of a *CCAP* for the Montréal agglomeration, among other things. In 2012, the City, along with all of the participating related municipalities, signed a financial assistance agreement related to the amount granted by the government after the urban agglomeration council had approved the agreements in 2011.

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<sup>12</sup> The UMQ and the FCM.

<sup>13</sup> The CUD is a document drafted and promoted by a group of environmental activists which is calling for an immediate reduction in GHGs emissions and a transition to a carbon-neutral society.

<sup>14</sup> The Town of Hampstead filed an application for financial assistance directly to the department concerned and is therefore not included in this plan. The Town of Dorval Island is not covered by the plan since it does not have permanent residents and does therefore not meet the requirements for eligibility for financial assistance under the *Climate Municipalities Program*’s normative framework.

In December 2015, the urban agglomeration council adopted the *Montréal CCAP 2015–2020*. The plan includes two main sections, Report and Adaptation Measures, and is structured around three main objectives, namely:

1. *Consolidate all the adaptation measures already in place which contribute to climate change adaptation, even if they do not refer to it;*
2. *Provide relevant, tailored information regarding climate change risks to the 34 municipalities and boroughs included in the Agglomeration's territory and to Central Services;*
3. *Plan the Montréal agglomeration's development as well as maintenance and repair operations while taking into account the constraints associated with climate change.*

The report section presents the diagnosis and the vulnerabilities to climate change facing the Montréal agglomeration. It also presents the observed and anticipated impacts on the population, infrastructure, the natural environment and all activities taking place on the territory of the Montréal agglomeration. This section therefore presents the six climate hazards identified within the Montréal agglomeration, namely:

- higher average temperatures;
- heavy rainfalls;
- heat waves;
- destructive storms;
- droughts;
- river floods.

On the basis of these climate hazards and vulnerability diagnoses, 24 adaptation measures<sup>15</sup> were identified, as presented in Appendix 5.2. The section on adaptation measures includes commitments<sup>16</sup> that the City's departments, the boroughs and the participating related municipalities have chosen to implement in order to respond to these climate hazards to adapt to climate change. For example, with respect to the climate hazard concerning "heat waves," the *CCAP* presents adaptation measure 3.2, which reads as follows: "Provide spaces for people to cool off and avoid exposure to oppressive heat (cooling islands)." In response to this, one borough committed to "Increasing the capacity of air-conditioned public spaces and extending operating schedules during heat waves (libraries, community centres, etc.)."

Globally, for the City's departments, the boroughs and the related municipalities, hundreds of commitments will have to be put in place between now and 2020 in order to successfully implement the *CCAP*.

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<sup>15</sup> In the case of measures, these include both commitments and actions for adaptation.

<sup>16</sup> In the case of commitments, these also include actions for adaptation.

In 2018, the City created the Bureau de la transition écologique et de la résilience (BTER) and placed it in charge of the *CCAP* (which was formerly the responsibility of the Service de l'environnement).

The City is currently at work on the production of a new *Climate Plan* as a successor to the soon-to-expire *CCAP 2015–2020*. This plan was announced at a press conference held in Montréal on June 19, 2019. In December 2019, the Direction générale set its organizational priorities, one of its themes being the ecological transition. In a way, these priorities are part of the City's strategic alignment with Vision Montréal 2030—aimed at creating a common and shared vision of the metropolis for the next decade. The new *Climate Plan* is part of this priority, and it will inspire and guide both individual and collective actions as of the beginning of 2020.

## 2. PURPOSE AND SCOPE OF THE AUDIT

Pursuant to the provisions of the *Cities and Towns Act*, we carried out a resource optimization audit mission on the "*Management of the CCAP*". We carried out this mission in accordance with the Canadian Standard on Assurance Engagements (CSAE) 3001 of the *CPA Canada Handbook – Assurance*, as well as with the other Canadian assurance standards that apply to the public sector, as issued by the Auditing and Assurance Standards Board with the support of CPA Canada.

The objective of this audit was to ensure that the measures provided in the *CCAP* were planned appropriately and implemented.

The responsibility of the Auditor General of the Ville de Montréal consists of providing a conclusion on the audit's objective. For that purpose, we gathered sufficient and appropriate evidence to support our conclusion and gain reasonable assurance. Our evaluation is based on the criteria that we deemed valid under the circumstances. These criteria are presented in Appendix 5.1.

The Auditor General of the Ville de Montréal applies the *Canadian Standard on Quality Control (CSQC) 1* of the *CPA Canada Handbook – Assurance*. Consequently, he maintains an extensive quality control system that includes documented policies and procedures with respect to compliance with the rules of ethics, professional standards and applicable legal and regulatory requirements. He also complies with the rules on independence as well as with the other rules of ethics of the *Code of ethics of chartered professional accountants*, which are based on the fundamental principles of integrity, professional competence and diligence, confidentiality and professional conduct.

Our audit work covered the period extending from when the urban agglomeration council adopted the *CCAP* in December 2015 up to August 31, 2019. However, certain earlier planning aspects were also examined. Our audit was carried out mainly between September 2019 and January 2020. We also took into account information provided to us up to February 2020.<sup>17</sup>

We carried out most of our work within the following business units:

- Bureau de la transition écologique et de la résilience;
- Service de l'eau;
- Service de l'urbanisme et de la mobilité;
- Ahuntsic-Cartierville borough;
- Île-Bizard–Sainte-Geneviève borough;
- Montréal-Nord borough;
- Pierrefonds-Roxboro borough.

At the end of our work, a draft audit report was presented to the relevant managers in each of the audited business units for discussion purposes. The final report was then sent to the management of each business unit concerned, for the purpose of obtaining action plans and timetables for their implementation, as well as to the Direction générale. A copy of the final report was also sent to the deputy director-general, Mobilité et attractivité, to the deputy director-general, Qualité de vie, to the deputy director-general, Service aux citoyens, and to the city manager, Service de la concertation des arrondissements. Also, a copy of the final report was sent for information purposes to the managers of the boroughs not directly concerned by our audit so that they can implement the recommendations when the situation warrants it.

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<sup>17</sup> The month corresponding to the month in which the last letter of representation was received.

## 3. AUDIT RESULTS

### 3.1. Jurisdiction, Governance, Roles and Responsibilities

#### 3.1.1. Jurisdiction Regarding Adaptation

##### 3.1.1.A. Background and Findings

Jurisdictions are associated with decision-making bodies. For the Island of Montréal, these bodies concern the Montréal agglomeration, the City, the boroughs and the other related municipalities. Jurisdictions could be said to represent the respective responsibilities exercised by these bodies over municipal activities. These jurisdictions are held by the authorities by virtue of laws and regulations delegating authority.

The *CCAP* includes a large number of commitments that the boroughs, the City's departments and the related municipalities have implemented or plan to implement for each of the adaptation measures. These commitments cover a very wide variety of topics. For example, there are commitments relating to land use planning, sports and leisure activities, civil security, the environment and infrastructure maintenance.

In addition, jurisdiction over the budget is also shared among decision-making bodies, making the management of the climate change adaptation process more complex and representing significant constraints.

The urban agglomeration council played a role with respect to these commitments. Indeed, some stem from the modifications made to the *Montréal Urban Agglomeration Land Use and Development Plan* that came into force in April 2015, somewhat before the urban agglomeration council adopted the *CCAP*.

Also, for the purposes of managing the funding and developing the *CCAP*, including the adaptation measures, the City signed an agreement with each of the related municipalities, which includes a series of conditions.

In this context, our audit work consisted namely in verifying whether legal steps had been taken to clarify all the powers of each governing body, including those of the urban agglomeration council, particularly as they relate to climate change adaptation, before the *CCAP* was adopted. Our work also consisted in verifying whether, based on the results of this process, measures had been identified to develop solutions to ensure the adaptation measures were implemented, taking into account the jurisdictions shared between the authorities.

According to information we obtained from BTER staff, no such steps were taken prior to the *CCAP* being adopted. Also, we were unable to locate any documents to this effect. However, we did find documents of a legal nature related to decision-making summaries that have to do mainly with, on the one hand, the review of the agreement between the City and the Québec government for funding under the *Climate Municipalities Program* and on the other hand with the agreements with the related municipalities regarding this funding.

Such an approach seems critical to us for the following reasons:

- Firstly, although the *CCAP* was adopted by the urban agglomeration council, one related municipality did not participate and therefore is not included in the *CCAP*, and another related municipality (Dorval Island) was not included for reasons related to the normative framework of the Québec government's *Climate Municipalities Program*. The 2011 decision-making summary indicates that the Québec government accepted the Town of Hampstead's separate application for financial assistance under the program. Given that not all of the related municipalities were included in the *CCAP*, we deem it important to clarify the jurisdiction of the Montréal agglomeration with respect to climate change adaptation.
- Secondly, the adaptation measures concern a number of different types of subjects that in turn refer to various laws and regulations, jurisdiction over which is shared among the various bodies. It seems important to us that all of the authorities' jurisdictions regarding these subjects be identified and clarified, in order to develop more detailed knowledge of them with a view to developing solutions aimed at ensuring that the adaptation measures are implemented. For example, with regard to the boroughs' jurisdictions, the *Charter of Ville de Montréal* stipulates that city council, when it deems that it is in the general interest of the City, may declare itself as having jurisdiction over all boroughs, for a period of time that it determines, to exercise a power or jurisdiction that is granted under law to all of the borough councils.<sup>18</sup>

Once such a process has been completed, we believe that the BTER will be better able to develop solutions, given the shared jurisdictions between the governing bodies. It will thus be in a position to know the limits of its interventions and the existing means of reinforcing obligations with respect to its interventions.

BTER staff told us that under the new *Climate Plan*, they had recently begun a process aimed at identifying the specific jurisdictions that should be associated with given subjects.

In our opinion, this is a good initiative since it is critical that the BTER take the necessary steps to clarify the jurisdictions of the various bodies with respect to climate change adaptation measures for the reasons outlined above and to ensure that the bodies' roles and responsibilities are clear and known to all.

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<sup>18</sup> CQLR, chapter C-11.4, section 85.5.

## RECOMMENDATION

**3.1.1.B.** We recommend that the Bureau de la transition écologique et de la résilience take the necessary measures to clarify the jurisdictions of the different governing bodies when it comes to climate change adaptation measures, in order to identify the legal or administrative means needed to ensure their implementation.

## RESPONSE

**3.1.1.B.** *The audit report was issued to the business unit concerned between February 3 and 12, 2020. The business unit agrees with the recommendation. The Bureau du vérificateur général has asked the business unit to establish an action plan for implementing this recommendation by May 18, 2020.*

## 3.1.2. Governance, Roles and Responsibilities

### 3.1.2.A. Background and Findings

Governance refers to the set of measures and rules, as well as the decision-making, information and monitoring bodies that ensure an organization's proper functioning and control. This includes providing strategic direction and ensuring that risks are managed, resources are used responsibly and objectives are met. Its role is also to ensure respect for public authorities, citizens and partners. It is based on the following four principles:

- accountability;
- transparency;
- compliance with the law;
- participation.

The business units' roles and responsibilities are part of governance; it is therefore important that these roles and responsibilities be well defined.

As previously mentioned, jurisdiction over the various subjects related to the adaptation measures described in the *CCAP* is shared among the boroughs, the City, the other related municipalities and the Montréal agglomeration. Various laws and regulations govern these responsibilities. As a result, the municipal organizational structure of the territory of the Island of Montréal is complex, making it equally complex to develop and manage climate change adaptation measures. Consequently, this has the effect of limiting the BTER's authority over the boroughs and related municipalities. BTER staff also told us that, in the current situation, it was impossible for them to impose the implementation of the adaptation measures.

For these reasons, we feel it is important to clarify the governing bodies' jurisdictions in relation to adaptation measures and to clearly define the business units' roles and responsibilities.

We therefore sought to verify whether the roles and responsibilities of the business units were clearly defined with respect to certain aspects of the implementation of the adaptation measures, for example, with regard to appointing a person responsible for the adaptation measures, evaluating the measures, monitoring their implementation and developing knowledge.

Our audit work found that not all of the roles and responsibilities, regarding these aspects within the audited business units were clearly defined.

With respect to the existence of an individual responsible for the *CCAP*, we found that there is not always a named or identified person within the business unit. In some cases, a staff member had acted as the lead but had left some time ago. However, no one else had been appointed to assume responsibility for the *CCAP*.

With respect to evaluating the adaptation measures, the staff members with whom we met in the boroughs and the two audited departments had different positions on this issue. For the boroughs, it appears that the BTER would be in the best position to carry out this evaluation. For the departments, the response obtained was less affirmative. In some cases, the department would be able to take on this responsibility and, in other cases, it would be the BTER.

We found that there was not always a clearly identified individual (or individuals) responsible for monitoring the implementation of the adaptation measures and actions and that their responsibilities were not always clearly defined. For example, in two audited boroughs (Île-Bizard–Sainte-Geneviève and Pierrefonds-Roxboro), although people were appointed to respond to us, they told us that they had not been formally designated as responsible for monitoring. In the case of the Service de l'urbanisme et de la mobilité and of the Direction de la Mobilité, no one had been formally appointed to assume responsibility for monitoring. In addition, a member of staff from the Service de l'eau told us that they do not have a clear mandate to monitor the implementation of an adaptation action under the *CCAP*.

We found that responsibility for monitoring aimed at research and knowledge development was not clearly defined within the audited boroughs, the audited departments and the BTER. For example, once an innovative adaptation solution is proposed by a department or a borough, it must be taken in charge with the objective that it be implemented. Our interviews with the staff we met with at the Service de l'eau revealed that this was not clearly defined.

Moreover, the Direction de l'urbanisme has particular expertise in its field and is called upon to provide support to the boroughs and related municipalities. However, the personnel with whom we met at the Direction de l'urbanisme told us that it did not have a specific mandate to produce guides to support boroughs, other municipal departments and related municipalities on aspects related to the implementation of adaptation measures with respect to urban planning.

In our view, it is important that the business units' overall roles and responsibilities in the climate change adaptation process be clearly defined. For example, the Service de l'eau and the Service de l'urbanisme et de la mobilité, in addition to being responsible for implementing certain adaptation commitments, also provide support to the boroughs, other municipal departments and related municipalities. It is important that this responsibility in the adaptation process be clearly defined in order to determine the support they can provide to the boroughs, other departments and related municipalities.

Our audit work also revealed that the City signed financial assistance agreements with each of the participating related municipalities, following the agreement reached with the Québec government concerning the funding obtained under the *Climate Municipalities Program*. The financial assistance agreements provide certain conditions for the development and preparation of the *CCAP*, including the obligation for the related municipality to pass a resolution confirming acceptance of those climate change adaptation measures contained in the *CCAP* that are specific to the related municipality. However, according to BTER staff, not all of the related municipalities have confirmed, by resolution of their municipal council or executive committee, the adaptation measures as provided for in section 4.3.1 of the agreement. It is important to remember that one of the related municipalities did not participate in the *CCAP*. Also, it should be noted that these agreements do not provide for the implementation of adaptation measures and commitments.

We also found in the audited boroughs that the *CCAP* as well as the adaptation measures and commitments contained therein were not well known to all staff members involved in implementing them.

We believe that the involvement of the boroughs, City departments and all related municipalities in the adaptation process should be clearly defined. Organizations such as the Union des municipalités du Québec (UMQ) and the FCM have stated that the municipalities are at the forefront of the impacts of climate change as well as in terms of adaptation responses. It has often been pointed out by various authors and scientists that climate change transcends local boundaries and that action must also be taken at the global level. However, because of its size, structure, leadership and the expertise of its departments in various fields, the City has a significant influence on the design and strategy of climate change adaptations.

Consequently, once the jurisdiction of the concerned bodies has been clarified with regard to adaptation and the roles and responsibilities of the business units have been clearly defined, it is important that the municipal administration identify the means to ensure the involvement of all bodies and business units in the climate change adaptation process to ensure that the adaptation measures are implemented.

For example, these means could include:

- concluding agreements with the related municipalities and boroughs;
- the urban agglomeration council using the means provided for by law (e.g., modification of the Montréal urban agglomeration's land use and development plan and delegation of powers);
- city council using the tools and legal means provided for in the *Charter of Ville de Montréal* (e.g., repatriation of powers, amendment of the *Master Plan*, declaration of a strategic issue and delegation of powers to the boroughs).

In our opinion, in order to improve the management of the climate change adaptation process and the development of these means to ensure that everyone is involved in implementing the adaptation measures, it is essential that governance be established at the level of the territory of the Montréal agglomeration and the City, which should focus on the following aspects:

- a clearly defined set of measures, rules, decision-making and monitoring bodies to ensure proper functioning and control in the implementation of the adaptation measures;
- clear strategic direction provided for climate change adaptation;
- the establishment of mechanisms to ensure that objectives are met, that climate change risks and impacts are mitigated and that resources mobilized in the process of adapting to climate change are used responsibly;
- governance oriented so as to respect citizens, public authorities and partners.

In addition, this governance should aim to:

- obtain the commitment of the bodies and business units to achieving individual and collective results, i.e., for the entire Montréal agglomeration;
- develop a common vision and understanding of the objectives to be achieved;
- achieve results and share these results among all of the actors involved.

Finally, during the course of our audit work, we retraced a written note, sent by the BTER to the City's boroughs in July 2019, concerning the development of a new *Climate Plan*. The note stated that "... the BTER team is preparing the agglomeration's next *Climate Change Adaptation Plan*, which will address the reduction of greenhouse gas emissions from the community and municipal activities as well as adaptation to climate change." However, a BTER staff member told us in December 2019 that, as part of the next *Climate Plan*, the related municipalities will be met and invited to participate in achieving all of the actions of the new *Climate Plan*. They could therefore possibly be parties to the Montréal agglomeration's *Climate Plan*.

We are puzzled by this situation since, in the case of the CCAP adopted in 2015, the City was acting on its own behalf and on behalf of the participating related municipalities. In addition, in the *Climate Municipalities Program*, which provided the City with funding for the development of the CCAP, the Québec government states:

*“The successful implementation of an action plan and, where applicable, an adaptation plan, depends not only on the municipal bodies drafting them, but also on the contribution of non-governmental organizations, public institutions (e.g., schools), citizens and other potential partners (e.g., businesses, neighbouring municipal bodies). That is why it is necessary to plan ways to reach out to these players and raise their awareness so that they can participate in the municipal effort to combat climate change.”<sup>19</sup>*

The decision-making summaries prepared by the City in 2010 and 2011 concerning the application for financial assistance under the *Climate Municipalities Program* and the agreement with the Québec government each include this sentence: *“In terms of reduction and adaptation plans, their successful implementation depends on the contribution of all of the players involved.”<sup>20</sup>*

We believe that it is important that the municipal administration’s message be clear and non-contradictory. Without the participation of related municipalities in the climate change adaptation process, Montréal’s climate change strategy is likely to be flawed since the related municipalities are intertwined on the territory of the Island of Montréal with the boroughs, and their contribution to this process is not negligible. The involvement of the related municipalities and boroughs allows the City to work on the entire territory of the Island of Montréal and is therefore more likely to lead to a successful climate change adaptation process.

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<sup>19</sup> *Climate Municipalities Program*, revised version dated August 22, 2011, Québec government, ministère du Développement durable, de l’Environnement et des Parcs, page 4.

<sup>20</sup> Decision-making records Nos. 1105072001 and 1095072002.

## RECOMMENDATION

**3.1.2.B.** We recommend that the Bureau de la transition écologique et de la résilience, in collaboration with the Service de l'eau and the Service de l'urbanisme et de la mobilité, as well as Ahuntsic-Cartierville, Île-Bizard–Sainte-Geneviève, Montréal-Nord and Pierrefonds-Roxboro boroughs, ensure that the roles and responsibilities in relation to climate change adaptation measures are clearly defined in order to foster sound management of the climate change adaptation process.

## RESPONSE

**3.1.2.B.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## RECOMMENDATION

**3.1.2.C.** We recommend that the Direction générale, in collaboration with the Bureau de la transition écologique et de la résilience, develop a governance strategy to ensure the involvement of all of the Montréal agglomeration's governing bodies and business units in order to promote the successful implementation of the *Climate Change Adaptation Plan*.

## RESPONSE

**3.1.2.C.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## 3.2. Planning and Implementation of Adaptation Measures

### 3.2.1. Planning the Implementation

#### 3.2.1.A. Background and Findings

Planning consists basically of developing an action plan to implement adaptation measures, for example, by selecting and prioritizing the most structuring measures based on selection criteria related to reducing the impacts of climate hazards and cost-benefits. It also consists of developing measures and ensuring they have quality targets and indicators in addition to setting up support mechanisms for their implementation. Finally, planning must provide for the evaluation of the measures in terms of their effectiveness.

For the boroughs and the related municipalities, the commitments appearing in the *CCAP* were selected from a list of commitments proposed by the Service de l'environnement according to the 24 measurements and 6 climate hazards that it had selected. These commitments were sent to each borough and the related municipalities. The boroughs and related municipalities had to select the commitments that concerned them and that could affect them.

For the departments, the Service de l'environnement consulted them and requested they propose ideas for action to adapt to climate change.

In 2013, the Service de l'environnement had prepared a document titled *Stratégie d'adaptation de la collectivité montréalaise aux changements climatiques* for the development and design of the *CCAP*. It is, essentially, a planning document that presents the adaptation strategy to be followed for the Montréal community, which identifies the key ingredients for a successful adaptation, the description of the *CCAP* project and the constraints related to climate change adaptation. This document included a prioritization of the adaptation options.

However, in reviewing the documents we obtained and the interviews we conducted with BTER, department and borough staff members, we found that adaptation measures and commitments were not prioritized in any way, particularly in terms of available resources or specific criteria, whether those included in the *CCAP* or the new ones.

Our audit work also revealed that the adaptation commitments were selected and deployed without regard to any cost-benefit analysis or effectiveness analysis to assess whether they were the most appropriate to achieve the intended impacts. Thus, we did not find any methodology for selecting adaptation commitments. We note that the most structuring measures were not selected with the objective of prioritizing them.

Moreover, we observed that many of these commitments are also found in sustainable development plans or other documents. A review of the *CCAP* shows that it included commitments that had already been completed at the time of its design and adoption by the urban agglomeration council. In our view, grouping elements already in place with real adaptation commitments to be implemented does not allow for an assessment of the level of the effort contributed to climate change adaptation.

BTER staff told us that under the next *Climate Plan*, the issue of prioritizing adaptation measures will be taken into consideration. The mid-term follow-up report of the *CCAP* released in October 2019<sup>21</sup> provides guidance on "*Prioritizing the adaptation measures to be put in place.*"

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<sup>21</sup> *CCAP* follow-up review, October 2019, BTER, Resolution CG19 0459 of the urban agglomeration council, October 24, 2019, session.

Given the absence of an analysis of the adaptation measures for prioritization purposes according to determined criteria, the commitments selected by the business units are likely to not necessarily be the most appropriate and effective in response to the climate hazards that impact the City and the related municipalities. The lack of a prioritization methodology also means that reviewing links between different adaptation actions is hindered.

For example, our audit work revealed shortcomings in implementation planning, including the lack of a real action plan for implementation, the lack of a methodology for selecting adaptation commitments and the lack of a criteria-based prioritization of the measures.

In our view, there is a need to revisit planning to develop a real action plan for implementing the adaptation measures, and said plan must be accompanied by a timetable and follow-up. A methodology must be developed to identify the commitments that are the most appropriate, i.e., the most structuring, to foster adaptation. Finally, it is also important to develop an approach to prioritize these measures according to the defined criteria.

## RECOMMENDATION

**3.2.1.B.** We recommend that the Bureau de la transition écologique et de la résilience, in collaboration with the Service de l'eau and the Service de l'urbanisme et de la mobilité, as well as Ahuntsic-Cartierville, Île-Bizard–Sainte-Geneviève, Montréal-Nord and Pierrefonds-Roxboro boroughs:

- adopt a real action plan for implementing the adaptation measures, to ensure that they are implemented;
- develop a methodology for selecting adaptation commitments, in order to identify the most structuring ones;
- develop an approach for prioritizing the adaptation measures based on defined criteria.

## RESPONSE

**3.2.1.B.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## 3.2.2. Targets and Indicators

### 3.2.2.A. Background and Findings

The target can be seen as representing the goal that you want to achieve. It can be expressed as a number or a percentage. It is used to express the results achieved when it is associated with an indicator, making it possible to illustrate the degree of progress. An indicator must have certain characteristics to be effective. It must be reliable, precise, specific, understandable, simple, usable by all stakeholders, applicable over time, relevant to the objective or target and useful for enlightening the decision-making process.

It is therefore important that targets be set, as they help to illustrate the desired results in a more concrete way. It is also important that these targets be accompanied by indicators with the above characteristics, in order to express as clearly as possible the progress achieved in implementing the adaptation measure and commitment.

During our audit work, we sought assurance that targets and indicators had been set for the adaptation commitments to the extent possible.

Our audit work revealed that the *CCAP* had objectives, but very few targets. However, during the review of documents obtained and through several interviews with staff in the audited boroughs and departments, we found available data on the status of several adaptation commitments in the *CCAP*. It was therefore possible to set targets in several of these cases and incorporate them into the *CCAP*.

The BTER's staff acknowledges that there is a weakness in the *CCAP* with respect to targets and that the next *Climate Plan* will include targets. Given that the BTER's staff is aware of this situation, we believe that this is an issue which they must correct.

With regard to indicators, our audit work showed that several of the borough commitments made in the *CCAP* were accompanied by monitoring indicators. This was not always the case for the departments.

A review of the CCAP's monitoring indicators, however, reveals gaps and inconsistencies. For example, in the case of similar commitments related to the City's *By-law 11-010 concerning the protection of buildings against sewer back-up*, the indicators are not the same in the different audited boroughs. In the case of Ahuntsic-Cartierville borough, the indicator is "adoption of the by-law." For Île-Bizard–Sainte-Geneviève, Montréal-Nord and Pierrefonds-Roxboro boroughs, the following indicators apply:

- "Number of buildings where valves were installed/number of valves";
- "Number of buildings where valves were installed";
- "Number of inspections and corrections."

In our view, these indicators do not meet many of the criteria we mentioned at the outset. The indicator for Ahuntsic-Cartierville borough does not illustrate the degree of progress and is of no use to enlighten the decision-making process. Moreover, it is not relevant since this by-law was already adopted by city council in June 2011 and came into force on July 1, 2011, for this borough. The indicators for the other three boroughs lack precision since there is no reference to the total number of buildings concerned. As a result, they are of little use in enlightening the decision-making process and do not illustrate the degree of progress.

With respect to other commitments made by Ahuntsic-Cartierville borough, we were able to identify other indicators that are similarly worded. For example, for the commitment to apply *By-law 13-023 concerning the use of drinking water*, the indicator is worded as follows: "Application of the by-law." In Île-Bizard–Sainte-Geneviève and Montréal-Nord boroughs, the same commitment is accompanied by this indicator. Once again, this indicator is not very precise and does not illustrate the degree of progress made.

Other examples of indicators with commitments from the audited boroughs are worded as follows:

- "Change in the programming";
- "Number of projects";
- "Square meters (m<sup>2</sup>) of permeable liner".

These indicators have shortcomings, they are not very precise and they do not illustrate the degree of progress. They often lack a reference to a target against which to measure progress, as well as a reference to the initial picture (e.g., the number to be reached out of the total number).

In general, for the four boroughs audited, we also found that commitments were not always accompanied by an indicator.

In our view, it is important that additional effort be invested to ensure consistency in the indicators that are set for similar commitments. Care must be taken to ensure that the criteria we set out at the outset are met when selecting or developing indicators.

We also believe that efforts need to be invested at the planning stage, when adaptation commitments are selected, to ensure that they are accompanied by quality indicators and targets. Otherwise, at the time of monitoring, there is a risk that targets and indicators may not be useful and may therefore need to be reformulated or others selected. In fact, our audit work showed that indicators were indeed reformulated at the time of monitoring for the preparation of the mid-term report published in October 2019.

The documents proposing measures and commitments addressed to the boroughs, the City's departments and the related municipalities during the development of the CCAP included a guideline on indicators, which stated the following: *"Indicate the monitoring indicator used for each measure listed. You may use the recommended monitoring indicators from the proposed action file as a guide."*

Although the proposal documents included this directive concerning, among other things, the selection of the monitoring indicator, we believe that it was not accurate enough. In our opinion, this directive needs to better define the development of targets and indicators to ensure that the most appropriate ones are selected or developed, including the requirement to meet the criteria we previously stated.

Finally, departments' adaptation commitments should also be accompanied by indicators where possible. Indeed, we noted a similar problem for the audited departments with regard to targets and indicators.

## RECOMMENDATION

3.2.2.B. We recommend that the Bureau de la transition écologique et de la résilience ensure that:

- the measures and commitments contained in the *Climate Change Adaptation Plan* are accompanied by targets and indicators so that progress can be tracked;
- the indicators developed are consistent and their quality meets recognized criteria;
- the guidelines produced are specific enough to facilitate the selection of relevant indicators.

## RESPONSE

3.2.2.B. *The audit report was issued to the business unit concerned between February 3 and 12, 2020. The business unit agrees with the recommendation. The Bureau du vérificateur général has asked the business unit to establish an action plan for implementing this recommendation by May 18, 2020.*

## 3.2.3. Support Mechanisms for Implementation

### 3.2.3.A. Background and Findings

The implementation of adaptation measures and commitments is an activity that can be complex for the boroughs, the City's departments and the related municipalities. Various types of support mechanisms are available to facilitate this implementation.

The personnel we met or contacted in the boroughs and departments told us of a need for support when it comes to implementing adaptation measures and commitments.

In addition, City departments have expertise in several areas related to these adaptation measures and commitments. More specifically, the staff of the Direction de l'urbanisme pointed out to us that the *Montréal Urban Agglomeration Land Use and Development Plan*, which was amended in 2015, included urban planning and development aspects related to climate change adaptation measures. For example, these aspects included heat island control, increasing the canopy and reducing the quantity and improving the quality of surface water. However, implementing these measures can prove to be difficult for the boroughs and related municipalities, particularly in view of their complexity. Guides aimed at supporting them in the implementation of these measures could be produced by management. However, the staff we met with told us that they do not have a specific mandate in this regard, which would be necessary to guide their work.

Also, as part of our audit work, we were able to retrace a memo sent on July 12, 2019, to borough directors as part of their contribution to the new *Climate Plan* intended to replace the *CCAP*. The memo states:

*“... note that, after the plan is released, the BTER’s team will work to support the administrative units responsible for implementing the measures contained in the plan.”*

In our view, this is a promising avenue for the BTER. However, we believe that the BTER should already address the issue of support to the boroughs, the City’s departments and the related municipalities, particularly with respect to adaptation measures that have yet to be implemented, since the *CCAP* is still in force. In any event, for both the *CCAP* and the next *Climate Plan*, the BTER should assess the needs in terms of support to facilitate the implementation of adaptation measures and develop a support mechanism accordingly. It should also assess the expertise of the City’s departments to determine their potential contribution. In this regard, it should examine the possibility of giving specific mandates to the departments concerned to produce, in particular, guides or tools to support the boroughs, the other departments and the related municipalities in the implementation of the adaptation measures.

In our opinion, such support is essential to the successful implementation of the adaptation measures. The BTER must exercise its leadership to implement a support mechanism and must provide guidance, with the assistance of the departments concerned, with respect to the mandates to produce guides or any other means of support.

### **RECOMMENDATION**

**3.2.3.B.** We recommend that the Bureau de la transition écologique et de la résilience proceed with an assessment of needs in terms of supporting the boroughs, the City’s departments and the related municipalities and develop mechanisms to support them in adopting the adaptation measures in order to facilitate their implementation.

### **RESPONSE**

**3.2.3.B.** *The audit report was issued to the business unit concerned between February 3 and 12, 2020. The business unit agrees with the recommendation. The Bureau du vérificateur général has asked the business unit to establish an action plan for implementing this recommendation by May 18, 2020.*

## 3.2.4. Mechanisms for Assessing the Adaptation Measures

### 3.2.4.A. Background and Findings

Once implemented, the adaptation measures and commitments should, in principle, produce beneficial effects that provide authorities with some assurance that citizens will be better prepared to deal with the impacts of climate change. Since resources are used for implementation and enforcement purposes, an evaluation of their performance and the results they generate makes it possible to verify the effectiveness of the adaptation measures and commitments and to make the necessary corrections.

Our audit work did not provide any evidence that the effectiveness of the adaptation measures and commitments in the *CCAP* had been evaluated in any way. The fact that few targets have been included in the *CCAP* does not help to support this type of evaluation.

However, the staff we met or contacted in the audited business units told us that assessing the effectiveness of the adaptation measures and commitments presents certain difficulties. In some cases, the science is not yet available or it is very costly to conduct an evaluation of the effectiveness of an adaptation measure. However, we found that for some adaptation measures, there are tools available to assist stakeholders. For example, with respect to reducing urban heat islands, the Bureau de normalisation du Québec<sup>22</sup> has produced guidelines and the Québec government<sup>23</sup> has published a guide to facilitate measurement assessment.

We are aware of the difficulties surrounding this type of evaluation; however, we believe that efforts must be made to identify guides and tools that can be used for evaluation purposes or to develop such tools.

In our view, it is important that efforts be made to evaluate these adaptation measures and commitments given that resources are or will be invested. It is important to know the merits of these measures before allocating resources to them and to reassure decision makers to this effect.

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<sup>22</sup> Reducing the Urban Heat Island Effect – Parking Lot Development – Design Guide, BNQ 3019-190/2013 Guidelines, Bureau de normalisation du Québec, 2013.

<sup>23</sup> Urban Heat Island Mitigation Strategies, Institut national de santé publique du Québec, Québec government, July 2009.

## RECOMMENDATION

**3.2.4.B.** We recommend that the Bureau de la transition écologique et de la résilience take the steps it deems appropriate to identify and develop tools to evaluate the effectiveness of the adaptation measures and commitments.

## RESPONSE

**3.2.4.B.** *The audit report was issued to the business unit concerned between February 3 and 12, 2020. The business unit agrees with the recommendation. The Bureau du vérificateur général has asked the business unit to establish an action plan for implementing this recommendation by May 18, 2020.*

## 3.2.5. Budgeting Exercise

### 3.2.5.A. Background and Findings

Groupe AGÉCO<sup>24</sup> published a study in May 2019 on behalf of the UMQ<sup>25</sup> on assessing the costs to municipalities of adapting to climate change. The study targeted Québec's ten largest cities<sup>26</sup> for various projects, including drinking water supply, water intake management and pavement and building rehabilitation. According to this study, climate change adaptation costs could reach \$2 billion for Québec's ten largest cities within five years. These costs could even double for all of Québec's municipalities, which is a considerable amount of money.

It is an increasingly known fact that adapting to climate change is costly for municipalities and will cost even more in the years to come.

It is therefore essential that a budgeting exercise be carried out with regard to climate change adaptation. The study also states:

*"The budgeting exercise is necessary to achieve sound and proactive investment planning. The support to be provided to municipal authorities to carry out this exercise appears crucial to better understand the extent of the needs."<sup>27</sup>*

<sup>24</sup> This group is a private consulting firm that specializes in the accountability of organizations and economic studies. It conducts a variety of studies and analyses.

<sup>25</sup> *Vers de grandes villes résilientes : Le coût de l'adaptation aux changements climatiques. Évaluation du coût de l'adaptation aux changements climatiques pour les 10 grandes villes du Québec.* Groupe AGÉCO, commissioned by the UMQ. Final report, May 2019.

<sup>26</sup> Gatineau, Laval, Lévis, Longueuil, Montréal, Québec City, Saguenay, Sherbrooke, Terrebonne and Trois-Rivières.

<sup>27</sup> *Vers de grandes villes résilientes : Le coût de l'adaptation aux changements climatiques. Évaluation du coût de l'adaptation aux changements climatiques pour les 10 grandes villes du Québec.* Groupe AGÉCO, commissioned by the UMQ. Final report, May 2019, page 20.

A review of the *CCAP* shows that it does not cover any financial or budgetary aspects. The same is true of the *CCAP* monitoring report produced by the BTER in 2019. However, BTER staff told us, during meetings, that the next *Climate Plan* will include aspects allowing for the disclosure of information, both of a budgetary and financial nature, related to climate and that the City's Service des finances has been mandated to examine the question of including such information in the City's annual budget and annual financial report.

Both Vancouver and Toronto,<sup>28</sup> among others, included a section presenting unaudited climate-related information in their 2018 financial reports, including some financial and budgetary information.

The staff we met at the Service des finances noted that the climate change budgeting exercise, including adaptation, is in its infancy and presents both challenges and complexities because it is difficult to establish costs in some cases. However, this issue is currently being analyzed by the Service des finances in collaboration with other major Canadian cities to standardize the methodology and disclosure of climate-related financial information. Consideration is also being given to finding solutions.<sup>29</sup> It is therefore legitimate to know the size of the resources that could be allocated since public funds are involved.

We believe that this is a good initiative that should be pursued, as we deem it necessary in order to know the extent of the resources involved in implementing the *CCAP* and to facilitate decision-making on the choices to be made.

## RECOMMENDATION

**3.2.5.B.** We recommend that the Service des finances, in collaboration with the Bureau de la transition écologique et de la résilience, develop a model that would enable it to determine all of the costs involved in implementing the *Climate Change Adaptation Plan* in order to make an informed decision.

## RESPONSE

**3.2.5.B.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

<sup>28</sup> City of Vancouver – 2018 Annual Financial Report, page 29; City of Toronto, 2018 Annual Financial Report, page 126.

<sup>29</sup> The staff of the Service des finances of the City mentioned to us that a note on climate will be published in the 2019 Annual Financial Report.

## 3.3. Monitoring the Implementation of Adaptation Measures

### 3.3.1. Monitoring Mechanisms

#### 3.3.1.A. Background and Findings

To ensure the implementation of the adaptation measures, the degree of progress needs to be assessed through monitoring. This step is important because it not only provides information on the implementation status of the adaptation measures, but also makes it possible to measure whether the established targets have been met.

As part of our audit work, we sought to determine the mechanisms that are in place to monitor the implementation of the adaptation measures.

Our audit work revealed that only a single more formal follow-up was carried out to report on the status of implementation of the adaptation measures and commitments. This follow-up was carried out with a view to producing the mid-term report provided for in the *CCAP* for 2017–2018, the final report of which was published in October 2019. The monitoring process was initiated by a team from the Service de l'environnement, which is now part of the BTER. A tracking tool was developed by the Service de l'environnement for each of the boroughs, for each of the departments concerned and for each of the participating related municipalities and was sent to them in March and April 2018 for completion. Our audit work revealed that the monitoring tool was only obtained by the business units in 2018. However, in the business units we audited, it is the only monitoring tool that reports on all of the business unit's actions and commitments that we traced. We believe it is important that the monitoring tool be used as soon as possible to allow them to monitor the implementation of the commitments that concern them.

For the boroughs and related municipalities, the monitoring tool includes a directive to provide information to the Service de l'environnement. The Service de l'environnement states that it:

*"... prepares the mid-term report of the Climate Change Adaptation Plan for the Montréal Urban Agglomeration (CCAP) 2017-2018.*

*To do so, information is requested about the commitments made by your city/borough. On the one hand, this information aims to identify the status of the adaptation measures in each city/borough. On the other hand, it aims to identify the status of adaptation to climate change in the Montréal agglomeration."*

In the case of the departments, a similar guideline is mentioned, but the monitoring tool includes an additional guideline: *“You must fill in the ‘Status as of December 31, 2017,’ column for your orientations, objectives and actions identified in relation to hazards: in progress, completed or not started.”* We have not traced another directive relating to the monitoring of the implementation of adaptation measures and commitments produced by the BTER. Furthermore, according to a staff member whom we contacted at the Service de l’eau, a clear directive had not been given to the person in charge of the follow-up of the adaptation measures and commitments that concerned the department. A more specific monitoring tool directly related to the adaptation commitment had not been developed at the administrative unit level. The connection with the adaptation commitment appearing in the *CCAP* and in the monitoring tool that includes all of the business unit’s commitments is therefore more difficult to make.

The BTER collected the monitoring tools once completed by the business units in order to design the mid-term report. However, we noted in the monitoring tool for the audited districts marked as “processed” that, for several commitments, there were no indicators. For Ahuntsic-Cartierville borough, 57% of the commitments had an indicator. For Île-Bizard–Sainte-Geneviève, Montréal-Nord and Pierrefonds-Roxboro boroughs, respectively, 73%, 76% and 66% of the commitments had an indicator.

In the Pierrefonds-Roxboro borough, we noted that new adaptation commitments were implemented, but they had not been recorded in the monitoring tool or in another monitoring document. For example, for the past three years, in the case of construction projects, a reduction in the number of parking spots has been applied in order to reduce paved surfaces, which, by the same token, helps fight against heat islands. The directive that is part of the monitoring tool indicates that new commitments must be included in the monitoring tool.

Our audit work reveals that the monitoring tool used by the Direction de l’urbanisme of the Service de l’urbanisme et de la mobilité that includes the adaptation commitments was not updated following the organizational restructuring in January 2019. Commitments that have become the responsibility of the Service de l’habitation since this restructuring can be found in the monitoring tool of the Service de l’urbanisme et de la mobilité. This situation creates a risk that some of these commitments may not be tracked.

Furthermore, our audit work revealed that, in general, a manager had not always been formally appointed in each business or administrative unit to follow up on the adaptation measures and commitments. We found that monitoring tools had not been updated with respect to the names of the individuals responsible for them. For example, the name of a person in charge who had left the borough some time previously was still in the monitoring tool, and was the only name that appeared in the tool. As a result, no other manager had been appointed. In other cases, the name of an official is mentioned in the tool, and this person informs us that they are not necessarily responsible for monitoring. In one borough, the people we met were not aware of the monitoring tool. In another borough, although the names of some staff members appear in the monitoring tool as the people responsible for the adaptation commitments, they were not aware of the monitoring tool.

Our audit work reveals shortcomings and a lack of rigour in monitoring the implementation of the adaptation measures and commitments. We believe that monitoring is an important step in the adaptation management process. It must therefore be well supervised and rigorously applied. The weakness in monitoring the implementation of adaptation measures and commitments has several impacts, including the following:

- difficulties in accurately measuring progress, due to the lack of indicators for all of the commitments;
- the risk that adaptation measures and commitments will not be implemented;
- weakness in accountability.

## **RECOMMENDATION**

**3.3.1.B. We recommend that the Bureau de la transition écologique et de la résilience:**

- **review monitoring practices in order to put in place mechanisms to follow the implementation of the measures and commitments;**
- **develop and issue clear directives to all staff concerned to foster a consistent application of the mechanisms established.**

## **RESPONSE**

**3.3.1.B.** *The audit report was issued to the business unit concerned between February 3 and 12, 2020. The business unit agrees with the recommendation. The Bureau du vérificateur général has asked the business unit to establish an action plan for implementing this recommendation by May 18, 2020.*

## RECOMMENDATION

**3.3.1.C.** We recommend that the Service de l'eau and the Service de l'urbanisme et de la mobilité, as well as Ahuntsic-Cartierville, Île-Bizard–Sainte-Geneviève, Montréal-Nord et Pierrefonds-Roxboro boroughs, apply the guidelines of the Bureau de la transition écologique et de la résilience for monitoring the implementation of the adaptation measures and commitments to be able to ensure relevant accountability.

## RESPONSE

**3.3.1.C.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## 3.3.2. Data Validation Mechanisms

### 3.3.2.A. Background and Findings

Data collection is important as it provides the basis for monitoring, measuring and reporting on the progress of the CCAP. Therefore, validating the data to ensure accuracy is also important, since the data is used for the purposes just described. In the absence of validation mechanisms, the information provided using this data presents various risks, including inconsistency and unreliability, while affecting decision-making.

It is important to recall that the data and information contained in the monitoring tools were used to develop the follow-up report produced in 2019.

In order to verify whether mechanisms for validating the data appearing in the monitoring tools have been put in place, we carried out a sampling exercise.

For the audited boroughs, we selected an adaptation measure and a commitment in the final version of the monitoring tool provided by the BTER, for each of the six climate hazards. Among the selected commitments, some did not include data. For the four boroughs, we therefore obtained the following number of samples:

- Ahuntsic-Cartierville borough: six commitments, including one without data;
- Île-Bizard–Sainte-Geneviève borough: six commitments, including one without data;
- Montréal-Nord borough: six commitments;
- Pierrefonds-Roxboro borough: six commitments, including one without data.

We thus wanted to validate the samples in order to determine whether the data entered in the monitoring tool for each borough, which was processed by the BTER once it was received, was accurate. However, we were not able to validate all the data in the samples. In fact, only an insignificant proportion of the data proved to be accurate. The data and evidence of it were erroneous, incomplete or missing.

During the interviews we conducted in the four boroughs, the staff we met or contacted told us that they did not always have a specific data validation mechanism in place as part of this process.

In addition, a review of the commitments with an indicator in the monitoring tools of the four audited boroughs shows that several do not include data:

- Ahuntsic-Cartierville borough: data not provided for 71% of these commitments;
- Île-Bizard–Sainte-Geneviève borough: data not provided for 55% of these commitments;
- Montréal-Nord borough: data not provided for 21% of these commitments;
- Pierrefonds-Roxboro borough: data not provided for 35% of these commitments.

In our view, this lack of data should be questioned and the commitments should be re-examined to determine whether data can be collected and entered into the monitoring tool. For example, applying *By-law 11-010 concerning the protection of buildings against sewer back-up* is an adaptation commitment in the four audited boroughs. Two of the four boroughs did not insert any data even though this by-law requires the production of a list of annual inspections and, in principle, data should exist.

In the case of the audited departments, we selected the adaptation commitments in the monitoring tool marked “Completed” because the department monitoring tools do not include data. We therefore sought to verify whether the adaptation commitments with this mention are supported by data and whether a validation mechanism exists. Our audit work shows that adaptation commitments are supported by other documents that include data, which are found in specialized computerized applications due to their number and complexity. Although department staff told us that the data is subject to validation, we did not find evidence of a document clearly indicating that the commitment data in the monitoring tool marked “Completed” had been validated. We question the fact that the department monitoring tool does not include data when it is available. Data could therefore be included in the monitoring tool.

For its part, the BTER has not set up a data validation process. According to the people we met, it relies on the boroughs, the City’s departments and the related municipalities for this information.

In our view, it is important that data be included in the monitoring tool. Data allows more accurate measurements of the progress of implementation of the adaptation measures and commitments. Data validation mechanisms must be implemented and applied to ensure their accuracy. Where validation mechanisms exist and data has been validated, the monitoring tool should be documented to this effect.

Lack of validation or evidence of validation creates the risk that data may be incomplete or even erroneous, with the important consequence of making the CCAP mid-term report itself unreliable and not conducive to informed decision-making. BTER staff told us that the mid-term report is one of the tools they intend to use in developing the next *Climate Plan*.

### RECOMMENDATION

**3.3.2.B.** We recommend that the Service de l'eau and the Service de l'urbanisme et de la mobilité, as well as Ahuntsic-Cartierville, Île-Bizard–Sainte-Geneviève, Montréal-Nord and Pierrefonds-Roxboro boroughs, develop a data collection mechanism for all of the commitments in connection with the implementation of the climate change adaptation measures, ensure their reliability and include them in the monitoring tool, in order to provide accountability that is useful for decision-making.

### RESPONSE

**3.3.2.B.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## 3.3.3. Cost Monitoring and Data Collection

### 3.3.3.A. Background and Findings

Monitoring costs provides information on whether the money spent was sufficient to achieve what was planned. It also makes it possible to establish the amounts spent in relation to what was achieved.

We therefore wanted to verify whether costs were tracked as part of the implementation of the adaptation measures and commitments. However, our audit work revealed that there was no tracking of specific costs in the context of this implementation. As mentioned earlier, the CCAP does not include financial information and there was no budgeting exercise. Also, the monitoring tools developed for the preparation of the mid-term report do not include financial information. The same applies to the mid-term report produced in 2019.

Costs were tracked in the context of the floods of 2017 and 2019, but this is mainly related to expenditures for the implementation of emergency and civil security measures.

A review of the documents related to the action plan for the development of the CCAP shows that cost tracking was not planned from the outset with respect to implementing the adaptation measures and commitments.

As stated in the study conducted for the UMQ, which produced a report in May 2019, adaptation to climate change represents significant costs.<sup>30</sup>

Our audit work therefore revealed that data on the costs of implementing the adaptation measures had not been collected as part of this follow-up. However, according to the interviews we conducted with employees in the audited departments, some costs related to the adaptation measures could be identified.

However, the study conducted on behalf of the UMQ, which included the City, raises important questions that the municipal administration must address:

*“Such a study to measure the costs of climate change for municipalities in a structured and concrete way is a first in Canada. Most studies do not deal with the costs of adapting to climate change, so a critical lack of existing data was identified in the course of this study.”<sup>31</sup>*

*“Moreover, their difficulty in providing some of the data revealed a significant gap in cities’ degree of preparedness to face the climate challenge. For example, although adaptation plans have been adopted, there has been virtually no complementary budgetary exercise.”<sup>32</sup>*

*“In the absence of real data, it is very difficult for cities to put a figure on the investments and expenditures associated with the implementation of these measures, which are often themselves required to bring infrastructure up to standard.”<sup>33</sup>*

In our view, it is essential that steps be taken to put in place mechanisms to collect cost data regarding the implementation of the adaptation measures and commitments.

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<sup>30</sup> Final report commissioned by the UMQ. *Vers de grandes villes résilientes : Le coût de l’adaptation aux changements climatiques. Évaluation du coût de l’adaptation aux changements climatiques pour les 10 grandes villes du Québec*. May 2019, page 20.

<sup>31</sup> Final report commissioned by the UMQ. *Vers de grandes villes résilientes : Le coût de l’adaptation aux changements climatiques. Évaluation du coût de l’adaptation aux changements climatiques pour les 10 grandes villes du Québec*. May 2019, page 4.

<sup>32</sup> Final report commissioned by the UMQ. *Vers de grandes villes résilientes : Le coût de l’adaptation aux changements climatiques. Évaluation du coût de l’adaptation aux changements climatiques pour les 10 grandes villes du Québec*. May 2019, page 3.

<sup>33</sup> Final report commissioned by the UMQ. *Vers de grandes villes résilientes : Le coût de l’adaptation aux changements climatiques. Évaluation du coût de l’adaptation aux changements climatiques pour les 10 grandes villes du Québec*. May 2019, page 3.

As mentioned earlier, the Service des finances has begun to reflect on financial and budgetary issues related to the fight against climate change, including adaptation, in order to develop solutions to these issues.

Such mechanisms will thus make it possible to obtain data that can be used for various purposes, in particular to quantify the investments and expenses associated with the implementation of the adaptation measures and commitments, to monitor costs and to carry out cost-benefit studies on the choice of measures and commitments selected.

## RECOMMENDATION

**3.3.3.B. We recommend that the Bureau de la transition écologique et de la résilience, in collaboration with the Service des finances, develop mechanisms for collecting data on the costs associated with the implementation of the *Climate Change Adaptation Plan* in order to establish the importance of the resources allocated by the City in the process of adapting to climate change and to potentially demonstrate the cost-benefit justification in order to make an informed decision.**

## RESPONSE

*3.3.3.B. The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## 3.4. Monitoring and Knowledge Development

### 3.4.A. Background and Findings

Adaptation to climate change involves actions and commitments touching on a wide range of issues, including biodiversity, rainfall, heat, temperature, leisure and sports activities, urban planning and infrastructure and many more. The consequences of climate change on the City's assets and activities as well as on the population can affect a significant number of these issues. In order to fully understand these consequences and to develop adaptation solutions in the form of measures, a wealth of knowledge is essential. Consequently, knowledge development is essential, and one of the ways to foster it is through monitoring. When it comes to adapting to climate change, this type of monitoring consists of surveying and researching strategic and relevant information that can lead to the discovery of innovative solutions or facilitate the resolution of various problems. To be effective, it must be organized, supervised and structured in such a way that concerned staff members are actively involved.

In this regard, the Observatoire québécois de l'adaptation aux changements climatiques (OQACC) states in its November 2017 report: *"Information represents an essential input for adaptation."*<sup>34</sup>

We looked at how knowledge development was organized in the business units.

In 2017, the City reached a three-year agreement with the Ouranos<sup>35</sup> group concerning research on regional climatology and adaptation to climate change. This agreement covers the implementation of various projects. A report was produced for the period from June 2017 to October 2018. One project was completed, which involved mapping the players involved in climate change adaptation and the development of resilience on the Island of Montréal.

In the CCAP's follow-up report published in 2019,<sup>36</sup> the BTER identified several orientations, the fifth of which aimed to "Develop knowledge." For this orientation, the report concluded that *"external expertise remains one of the keys to success in deepening climate knowledge and increasing access to climate data."* The report also states that the partnership with Ouranos *"facilitates access to innovative tools and knowledge on regional climatology and adaptation to climate change as well as to its network of experts."*

Although efforts have been made to foster the development of knowledge with the help of external partners, our audit work revealed through interviews that, in general, within the audited business units, some staff members carry out activities aimed at developing knowledge, but these activities are more at an individual level. We found that no one has been formally appointed to be responsible for such monitoring at the business unit level. Nor has a person been appointed at the BTER to assume responsibility for such monitoring at the level of the City or the Montréal agglomeration. The monitoring carried out by the business units and the BTER for knowledge development is neither organized nor structured.

Although monitoring can be done with the help of external partners, we believe it is important to consider internal knowledge development expertise.

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<sup>34</sup> *Niveau et déterminants de l'adaptation aux changements climatiques dans les municipalités du Québec* (OQACC-006), OQACC, November 10, 2017, page 10. The OQACC is an organization developed in collaboration with the Institut national de santé publique du Québec as part of health measures of the Québec government's 2013–2020 Climate Change Action Plan (CCAP 2020). These objectives are intended to equip public health authorities in their efforts to monitor adaptation to climate change. It is associated with priority 6 of the CCAP 2020 (action 6.6) and aims to support research in adaptation

<sup>35</sup> Ouranos is a research consortium on regional climatology and adaptation to climate change. It is the result of a joint initiative of the Québec government, Hydro-Québec and the Meteorological Service of Canada, with the participation of UQAM, the INRS, Université Laval and McGill University.

<sup>36</sup> CCAP follow-up report, October 2019, page 57.

It is also important, as part of such monitoring, that clear leadership be exercised by a person in charge when it comes to taking in hand an innovative idea or project in the field of adaptation. Our audit work enabled us to note that, in the context of the innovative Water Square<sup>37</sup> project, the leadership in this area was not clear. Someone must therefore be officially appointed to assume responsibility for the innovative ideas and projects proposed, in particular by City staff, so that they can be carried out and included in the process that could lead to their implementation. In our opinion, the BTER must play this role since it is responsible for the CCAP.

## RECOMMENDATION

**3.4.B. We recommend that the Bureau de la transition écologique et de la résilience:**

- set up an organized and structured monitoring system, particularly in the field of adaptation to climate change, with the goal of fostering knowledge development of the staff concerned throughout the territory;
- formally appoint an individual to assume responsibility for monitoring knowledge development and provide leadership on innovative ideas and projects, particularly in the area of adaptation, so that these innovations move forward with a view to being implemented.

## RESPONSE

**3.4.B.** *The audit report was issued to the business unit concerned between February 3 and 12, 2020. The business unit agrees with the recommendation. The Bureau du vérificateur général has asked the business unit to establish an action plan for implementing this recommendation by May 18, 2020.*

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<sup>37</sup> A structure designed to retain rainwater and facilitate rainwater management. This project was proposed in the Plateau-Mont-Royal borough.

## RECOMMENDATION

**3.4.C.** We recommend that the Service de l'eau and the Service de l'urbanisme et de la mobilité, as well as Ahuntsic-Cartierville, Île-Bizard–Sainte-Geneviève, Montréal-Nord and Pierrefonds-Roxboro boroughs, formally appoint an individual to assume responsibility for monitoring knowledge development on adaptation to ensure organized and structured monitoring.

## RESPONSE

**3.4.C.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## 3.5. Accountability Reporting

### 3.5.A. Background and Findings

Accountability reporting should be done on a regular basis to assess progress made in implementing the adaptation measures and to support informed decision-making on corrective action. In addition, accountability reporting must be carried out in a timely manner, for example, after a major event that has an impact on the organization and the population, to allow decision makers to take corrective action quickly so that they can be prepared for the next similar event.

The CCAP provides for the production of two reports, a mid-term report and a final report. The first report was produced by the BTER for the territory of the Montréal agglomeration. The CCAP states: *"We plan to carry out a mid-term report for the climate change adaptation plan in 2017–2018."* The mid-term report was not made available on the Internet until October 2019. In our view, the mid-term report was produced late, as the period covered by the CCAP is quickly coming to an end (2020), and the BTER is currently at work on a new *Climate Plan*. This leaves little time for decision makers to make corrections or significant changes. Moreover, as the impacts of climate change are becoming more and more evident year after year, we believe it is important to establish more frequent accountability reporting. The BTER staff told us that the new *Climate Plan* will include annual accountability reporting. This is an avenue that we share.

The mid-term monitoring report indicates that one borough and one related municipality did not provide the completed monitoring tool: Mercier–Hochelaga-Maisonneuve borough and the City of Côte-Saint-Luc. We believe that it is important for the BTER to obtain monitoring data on the implementation of the adaptation measures from all of the boroughs and related municipalities.

As we mentioned earlier, the data generated by the boroughs to produce their reports raises significant questions, since we were unable to validate a significant number of samples of commitments that we selected. In addition, the results presented in the report raise questions, since the *CCAP* included very few targets from the outset. For the boroughs and related municipalities, the report presents the degree of progress as a percentage of actions undertaken. In our opinion, this lacks precision, since we are left in the dark with respect to the degree of progress on the *CCAP*. For the City's departments, the report presents the degree of progress on various points, including the percentage completed, the percentage completed on an ongoing basis, the percentage in progress and the percentage not started. However, as we have already pointed out, these results raise questions since the monitoring tools produced by the audited departments that were used to create the report do not include data, targets or specific indicators. It is important that the follow-up report provide a more accurate picture of the progress of the *CCAP*. It is therefore important to better document the monitoring tool in terms of data.

With regard to accountability reporting by the boroughs or departments on all of the adaptation measures concerning them more specifically, we have found no evidence of such accountability reporting.

Given that significant events have occurred over the past five years, including floods (in 2017 and 2019) and intense heat waves (in 2018), we sought to determine whether accountability reports were produced for these events, particularly with respect to the adaptation measures. Our work shows that for the audited boroughs that were affected by a major event, accountability reports were prepared during and after the event. However, a review of the documents obtained and retraced in connection with these accountability reports shows that the reports deal mainly with aspects related to civil protection and emergency activities. We believe that accountability reporting, specifically with respect to the adaptation measures, would be appropriate in the context of these events, since several questions need to be asked, including whether the adaptation measures implemented were sufficient or not to deal with a given event.

Finally, it is difficult to obtain an overview of the overall picture and to know precisely the extent to which the adaptation measures and commitments have been implemented from the only follow-up report, made public in October 2019, for accountability purposes. As a result, it is very difficult to know whether the *CCAP* is meeting the third objective set.<sup>38</sup>

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<sup>38</sup> Plan the Montréal agglomeration's development as well as maintenance and repair operations while taking into account the constraints associated with climate change.

## RECOMMENDATION

**3.5.B.** We recommend that the Bureau de la transition écologique et de la résilience:

- review the periodicity and quality of accountability reporting on the adaptation measures to enable decision makers to benefit from relevant information on the progress made with respect to the *Climate Change Adaptation Plan for the Montréal Urban Agglomeration* and to make the necessary corrections as quickly as possible;
- ensure that data on the implementation of the adaptation measures are obtained from all of the boroughs and related municipalities in order to produce a complete accountability report.

## RESPONSE

**3.5.B.** *The audit report was issued to the business unit concerned between February 3 and 12, 2020. The business unit agrees with the recommendation. The Bureau du vérificateur général has asked the business unit to establish an action plan for implementing this recommendation by May 18, 2020.*

## RECOMMENDATION

**3.5.C.** We recommend that the Service de l'eau and the Service de l'urbanisme et de la mobilité, as well as Ahuntsic-Cartierville, Île-Bizard–Sainte-Genève, Montréal-Nord and Pierrefonds-Roxboro boroughs, periodically report on the implementation of the adaptation measures that concern them in order to know the extent to which they have been implemented and to promote informed decision-making.

## RESPONSE

**3.5.C.** *The audit report was issued to the business units concerned between February 3 and 12, 2020. The business units agree with all the recommendations concerning them. The Bureau du vérificateur général has asked them to establish action plans for implementing these recommendations by May 18, 2020.*

## 4. CONCLUSION

The impacts of climate change are becoming increasingly important while the reduction of Greenhouse gases (GHGs) on a global scale remains far from significant. These impacts affect local living environments more directly. Municipalities are the most affected in terms of their assets and activities; at the same time, they are also at the forefront of developing and implementing adaptation measures, as the director of Ouranos recently pointed out<sup>39</sup>:

*“One of the major fronts for action on climate issues is adaptation to climate change, i.e., learning to live with the reality that the climate has already begun to change, a trend that is bound to continue. And, of course, the municipal world is at the forefront of the impacts related to this change.”<sup>40</sup>*

Faced with this situation, and in order to protect its assets and to be able to provide services to citizens and ensure their safety on a daily basis, the Ville de Montréal (hereinafter referred to as the City) has a duty to develop plans and measures to adapt to climate change with the help of higher authorities, the urban agglomeration council and governments. Under these circumstances, the management of the *Climate Change Adaptation Plan (CCAP)* must be orchestrated in such a way as to deal with the impacts of climate change as effectively as possible.

In order to deal with the impacts of climate change, in 2015, the Montréal urban agglomeration council adopted a *CCAP* involving all of the boroughs and the 13 related municipalities.<sup>41</sup> A diagnosis of vulnerabilities was first established for the Montréal urban agglomeration and for each borough and related municipality. The Bureau de la transition écologique et de la résilience (BTER), created in 2018, is the business unit responsible for managing the *CCAP*, particularly with regard to the production of follow-up reports and the new *Climate Plan* that will replace the *CCAP* adopted in 2015.

Based on our audit work, we conclude that the *CCAP* should be better managed to ensure appropriate planning for the implementation of the adaptation measures and commitments.

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<sup>39</sup> Ouranos is a research consortium on regional climatology and adaptation to climate change. It is the result of a joint initiative of the Québec government, Hydro-Québec and the Meteorological Service of Canada, with the participation of UQAM, the INRS, Université Laval and McGill University.

<sup>40</sup> “Changements climatiques : pour des municipalités plus résilientes,” in *Revue Urbaine* Le magazine de l’Union des municipalités du Québec (UMQ), vol. 40, no. 01, March 2019, page 20.

<sup>41</sup> The related municipalities of Hampstead and Dorval Island are not part of the *CCAP*.

A review of the plan to implement the adaptation measures and commitments shows that it is deficient in several respects, including the lack of a real action plan for their implementation, the lack of a methodology for the selection of adaptation commitments, a gap in the evaluation of the effectiveness of the selected commitments, the lack of prioritization of the measures and commitments, few commitments with targets, and indicators that do not always meet recognized criteria.

Based on the only official report, produced in October 2019, it is difficult to have an overall picture and to establish precisely how many of the adaptation measures and commitments have been implemented to date. Under the circumstances, it is very difficult to see how the *CCAP* could meet the third objective that was set.

Given that one of the organizational priorities of the municipal administration is the ecological transition, that the new *Climate Plan* is part of this and that it is essential that adaptation to climate change be considered as a major issue in the fight against climate change, we recommend, among other things, that the City:

- take steps to ensure that the authorities of all of the governing bodies involved in the process of adapting to climate change are clarified in order to identify the means of ensuring the adaptation measures are implemented;
- establish governance at the level of the Montréal agglomeration as a whole to support broader management of the climate change adaptation process and the successful implementation of the *CCAP*;
- strengthen the planning of activities related to implementing the *CCAP* in order to provide a clear framework for the choices made (methodology, evaluation of effectiveness, prioritization, targets and indicators) to measure the results thereof;
- ensure that more rigorous monitoring mechanisms are developed so that reliable data is collected that can be used to assess and report on results;
- establish an organized and structured monitoring system to promote the development of knowledge in the field of adaptation in order to enable the management of information with a view to promoting the creation and implementation of innovative solutions in this field;
- review the content and frequency of accountability reporting so that it is carried out on a more sustained basis to better inform decision makers so that they can take corrective action as quickly as possible.

The current *CCAP* is coming to an end soon, and the issue of the impacts of climate change is increasingly present. Although efforts have been made under this plan, it is important that the next *Climate Plan*, on which the BTER is currently at work, allows for the planning and implementation of concrete and structuring adaptation measures to produce results that will have to be measurable. It is also essential that the next plan be developed in such a way as to consider not only the importance of the role of each authority in the adaptation process, but also the involvement of all of the authorities concerned for collective action to address this critical issue. We believe that this is a complex issue and, in order to foster the effectiveness of the adaptation process, we believe that the municipal administration should consider establishing territorial governance at the level of the Montréal agglomeration as a whole so that local and global management can be exercised.

The municipal administration must be able to demonstrate that the most appropriate choices are made, given the investments involved. A model should therefore be developed that takes into consideration all of the costs incurred in implementing the *CCAP* so as to justify the decision-making process.

## 5. APPENDICES

### 5.1. Objective and Evaluation Criteria

#### Objective

Ensure that the measures set out in the *Climate Change Adaptation Plan for the Montréal Urban Agglomeration (CCAP) 2015–2020* have been adequately planned and that they have been implemented.

#### Evaluation Criteria

- The development and implementation of the adaptation measures were planned.
- The roles and responsibilities of the various players (Ville de Montréal office and departments, boroughs and related municipalities) are clearly defined.
- The measures set out in the *Climate Change Adaptation Plan* have been implemented.
- Monitoring mechanisms are in place to ensure the implementation of the adaptation measures.
- Formal accountability reporting is done on a regular and timely basis.

## 5.2. Adaptation Measures for Each Climate Hazard

### CATEGORIES OF ADAPTATION MEASURES FOR EACH CLIMATE HAZARD

#### Increase in average temperatures



- Protect biodiversity
- Increase the resilience of infrastructure to freeze-thaw phenomena
- Adapt the offering of winter recreational activities and maintenance activities
- Increase the offering of summer recreational activities and maintenance activities
- Control undesirable plant species

#### Heavy rainfalls



- Control or collect rainwaters
- Increase the resilience of infrastructures and buildings to rainwaters
- Minimize impermeable surfaces
- Ensure the capacity of storm sewer and combined sewer systems
- Increase and preserve the vegetation cover
- Develop emergency response measures for heavy rainfalls

#### Heat waves



- Counter heat islands
- Design spaces allowing people to refresh themselves and avoid exposure to extreme heat (cool areas)
- Protect biodiversity against heat waves
- Develop emergency response measures for heat waves

#### Destructive storms



- Increase the resilience of infrastructures and buildings to strong winds and freezing rain
- Develop emergency response measures for extended power failures (in winter conditions)
- Increase the resilience of vegetation to strong winds and freezing rain

#### Droughts



- Ensure both the quality and quantity of drinking water
- Increase the resilience of infrastructures and buildings to the drying out of soils
- Increase the resilience of vegetation to droughts

#### River floods



- Increase the resilience of infrastructures and buildings to flooding of river banks
- Develop emergency response measures for flood-prone areas
- Increase the stability of river banks against erosion

Source: *Climate Change Adaptation Plan 2015–2020 – Summary Version*