

Adapted version of the original  
french document, translated by  
Traducta for the Town of Hudson

Town of Hudson

Conservation plan for  
wetlands and natural  
areas – Urbanization  
perimeter

Hudson (QC)

February 2017

M03983A





**Development of a conservation plan for wetlands/natural  
areas and its mapping for the urbanization perimeter of the  
Town of Hudson**

Project no. M03983A

Prepared by:

---

Goulwen Dy, M.Sc. Biology  
Environmental Professional

Verified by:

---

Stéphanie Besner, M.Sc. Biology  
Project Manager

February 2017





## Project team

### Town of Hudson

---

Nathalie Lavoie	Urban Planner
Étienne Lavoie	Assistant Municipal Inspector

### CIMA+

---

Christian Gagnon	B.Sc. Biology	Project Director
Stéphanie Besner	M.Sc. Biology	Project Manager
Goulwen Dy	M.Sc. Biology	Design and writing
Marc-André Ducharme	M.Sc. Geography	Geomatics and cartography
Marie-Christine Eked	Administrative Assistant	Review and layout

## Reference to be cited

CIMA+, 2016. *Conservation plan for wetlands/natural areas within the urbanization perimeter of the Town of Hudson*. Report prepared for the Town of Hudson. 48 pages + appendices





## Table of contents

<b>1. Introduction .....</b>	<b>1</b>
1.1 Context 1 .....	
1.2 Objective of the mandate .....	1
<b>2. Methodology .....</b>	<b>2</b>
2.1 Study area.....	2
2.2 Acquisition of reference data .....	3
2.2.1 Data collection.....	3
2.2.2 Reference documents .....	3
2.2.3 Map database.....	4
2.3 Evaluation of development potential .....	4
2.4 Evaluation of the ecological value of wetlands .....	4
2.4.1 Reference scope .....	5
2.4.2 Sources and available data .....	5
2.4.3 Updating of reference data.....	6
2.4.4 Choice of general criteria for the evaluation of the ecological value of wetlands .....	7
2.4.5 Details of the multi-criteria analysis.....	9
2.4.6 Transformation of quantitative data.....	12
2.4.7 Ecological value classification method .....	12
2.5 Delimitation of the conservation area.....	12
2.5.1 Special status species.....	13
2.5.2 Wetlands .....	13
2.5.3 Connectivity between natural areas .....	14
2.5.4 Natural recreation resources of the Town .....	15
2.5.5 De facto protected area.....	15
2.6 Public presentation of the preliminary conservation plan.....	15
2.7 Presentation of the plan to the MDDELCC .....	16
<b>3. Linking of the conservation plan to territorial planning tools .....</b>	<b>17</b>
3.1 Development principles of the Town's territory .....	17
3.2 Development forecast of the Town .....	18
3.2.1 Local context .....	18
3.2.2 Occupation of the lands within the urban perimeter .....	18

3.2.3	Development forecast of the Town.....	18
<b>3.3</b>	<b>Protection principles for the Town's natural areas .....</b>	<b>19</b>
3.3.1	Government orientations regarding the protection of wetlands.....	19
3.3.2	Orientations of the CMM regarding the protection of natural areas .....	20
3.3.3	Orientations of the RCM regarding the protection of natural environments .....	20
3.3.4	Orientations of the Town regarding the protection of natural areas .....	22
<b>4.</b>	<b>Portrait of natural areas and enhanced landscapes .....</b>	<b>25</b>
4.1	Physiographic units and topography .....	25
4.2	Waterways .....	25
4.3	Wetlands .....	26
4.4	Plant species with special status.....	27
4.5	Wildlife species with special status .....	28
4.6	Forest ecosystem .....	29
4.7	Lands of aesthetic interest .....	29
4.8	Green spaces .....	30
4.9	Private ecological area – the Clark-Sydenham property.....	30
4.10	Conservation nuclei.....	31
4.11	Ecological corridors .....	32
<b>5.</b>	<b>Proposed conservation plan.....</b>	<b>34</b>
5.1	Wetlands .....	34
5.2	Status species.....	36
5.3	Natural constraints on development.....	36
5.4	Lands of aesthetic and landscape interest .....	36
5.5	Heterogeneity of habitats.....	37
5.6	Green spaces .....	37
5.7	Conservation nuclei and ecological corridor.....	38
<b>6.</b>	<b>Proposal of additional measures .....</b>	<b>40</b>
6.1	Measures directed at the restoration, creation, protection, or ecological development of a wetland, body of water, or land environment.....	40
6.1.1	The creation of wetlands/natural areas .....	40
6.1.2	Restoration of existing wetlands/natural areas.....	40
6.1.3	Protection adjacent to existing wetlands/natural areas .....	40
6.1.4	Ecological development .....	40
6.2	Voluntary conservation program .....	40





6.3	Implementation of a Green Fund.....	41
<b>7.</b>	<b>Collection of comments following presentations of the conservation plan for wetlands and natural areas.....</b>	<b>42</b>
7.1	Public concerns and comments.....	42
7.2	Concerns and comments from the MDDELCC.....	42
<b>8.</b>	<b>References .....</b>	<b>43</b>

## List of figures

Figure 1	Study area (urbanization perimeter of the Town of Hudson).....	2
Figure 2	Graphic representation of the delineation principles of the conservation area.....	13

## List of tables

Table 1	Allocation of types of land occupation.....	7
Table 2	Evaluation of criteria that can be documented as part of a conservation plan for wetlands (Joly et al., 2008).....	8
Table 3	Details of the multi-criteria analysis .....	10
Table 4	Intensity classification based on land occupation .....	11
Table 5	List of vacant sectors with a high development potential.....	19
Table 6	Goals and criteria of the CMM regarding the protection of wetlands.....	20
Table 7	Ecological value of wetlands.....	26
Table 8	List of wildlife species with special status likely to be observed in the study area .....	27
Table 9	List of wildlife species with special status likely to be observed in the study area .....	28
Table 10	List of municipal parks included within the study area.....	30
Table 11	Conservation nuclei of the study area.....	31
Table 12	Interlinking of ecological corridors in the study area.....	32
Table 13	Detailed composition of the conservation area .....	34
Table 14	Distribution of wetlands within and outside of the conservation area .....	35
Table 15	List of municipal parks included in and excluded from the conservation area .....	37

## List of appendices

- Appendix A: Maps
- Appendix B: Planning Program (City of Hudson, 2009)

# 1. Introduction

## 1.1 Context

The Town of Hudson is a small country town with a population of around 5,100 inhabitants, located within the Vaudreuil-Soulanges RCM. The Town of Hudson is a part of the Montréal Metropolitan Community (CMM) and due to this is subject to comply with the Metropolitan Land Use and Development Plan (MLUDP) through the development scheme of the Vaudreuil-Soulanges RCM. As part of this compliance, the Town is required to produce a conservation plan for wetlands and natural areas within the urbanization perimeter.

Conscious of the development pressure on its territory and its impact on natural areas and wetlands in particular as well as its obligations with respect to current provincial regulations, the Town of Hudson has already carried out the first stage in the development of a management plan for natural areas, and namely the categorization of the natural areas within its territory. Now that it has precious data on natural areas, it must also ensure that it produces a management plan that is integrated into the CMM's MLUDP.

The Town of Hudson wishes to give itself the overall management tools needed to plan its future development while reducing impacts related to the fragmentation of its landscape and the environment. In this sense, it wishes to prevent the isolation of natural areas of ecological interest, all the while protecting the quality of its surface water. The implementation of a conservation strategy will subsequently allow to reconcile urban development with the protection of wetlands, woods and waterways.

In this context, the Town of Hudson has retained the services of CIMA+ to create a Conservation Plan for Wetlands and Natural Areas (CPWNA) within its urban perimeter. This plan must necessarily take into consideration the conservation objectives agreed upon with the MDDELCC and allow a mapping of the entire area that reflects these objectives.

## 1.2 Objective of the mandate

The global objectives of the development of a conservation strategy for natural areas consist of:

- + facilitating the integrated urban planning of the Town of Hudson;
- + conserving lands with a real ecological value;
- + connecting existing conservation zones using ecological corridors to consolidate the network of wetlands and wooded areas of interest;
- + strategically planning the protection of wetlands and wooded areas of interest, as well as the network of green spaces and parks, based on development forecasts for the area, the needs of the Town and the real value of natural areas;
- + protecting the surface water quality of the Town's territory by reducing impacts related to erosion and surface runoff.

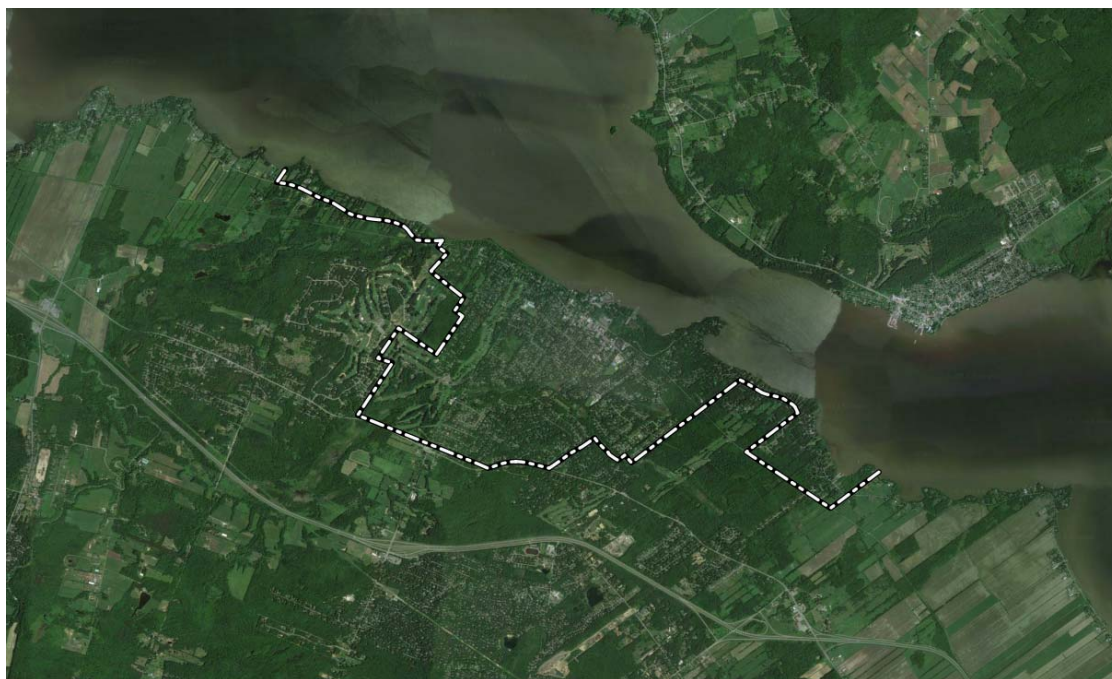
## 2. Methodology

The proposed approach is based on the experience acquired by the CIMA+ team in carrying out similar projects for different private and municipal clients, and whose plans were favourably received upon submission to the MDDELCC. The following sections present the various work stages followed in developing the CPWNA. The stages are the following:

- + acquisition of reference data;
- + identification of development priorities;
- + identification of conservation priorities;
- + preliminary delineation of conservation areas;
- + public presentation of preliminary conservation plans;
- + consideration of public concerns.

### 2.1 Study area

The study area covers the territory included within the limits of the urbanization perimeter of the Town of Hudson (Figure 1).



**Figure 1 Study area (urbanization perimeter of the Town of Hudson)**

Note that the town is planning a second phase that is not included within the present mandate, which consists of extending the elaboration of its conservation plan across its entire territory.

## 2.2 Acquisition of reference data

### 2.2.1 Data collection

#### Vulnerable plants and wildlife

On October 7, 2015, a request for information was addressed to the Québec Natural History Data Centre (CDPNQ) of the MDDELCC as well as to the Ministry of Forests, Fauna, and Parks (MFFP), to obtain information available on the presence of plants and wildlife species that are threatened, vulnerable (TVS) or likely to be designated as such under the *Act Respecting Threatened or Vulnerable Species* (L.R.Q., c. E-12.01).

#### Forest stand

The data contained on the Eco-forestry maps of the Information System (SIEF, page 31G08-202), originating from the 4<sup>th</sup> eco-forestry inventory program of the MFFP (2014) were consulted. The SIEF was fine-tuned to ensure the integration and management of a large set of digitalized eco-forestry, geometric and descriptive data.

#### Authorization certificate

A request from the Town of Hudson was made to two developers to recover the location of spaces placed under conservation under their ownership as part of recent authorization certificates (AC) issued under Article 22 of the *Environment Quality Act* (EQA) by the MDDELCC. These are the Sandy Beach (Ref./no. 7430-16-01-0919301) and Como Gardens (Ref./no. 7470-16-01-0901303) development projects.

### 2.2.2 Reference documents

The main reference documents consulted as part of the development of the Town of Hudson's CPWNA are listed below. Complete references are presented in Section 0.

- + Guide for the development of a conservation plan for wetlands prepared by the MDDELCC (Joly et al., 2008);
- + Metropolitan Land Use and Development Plan (MLUDP) (CMM, 2012);
- + By-law no. 167-15-1 of the Vaudreuil-Soulanges RCM modifying the revised development scheme for compliance compliant with the CMM's MLUDP (Vaudreuil-Soulanges RCM, 2015);
- + Operational by-law no. 525 – Program Planning (Town of Hudson, 2009);
- + Characterization report of wetlands in natural areas across the territory of the Town of Hudson. (Teknika HBA Inc. 2008);
- + Study of biological components carried out to support an authorization certificate request for a housing development project on lot 1 834 015 (Enviro-Guide A. L. Inc., 2005);
- + Delimitation of the riparian strip for the Ellerbeck property in Hudson (André Lapointe, 2008);
- + Information booklet on the *least bittern* (Nature Action, 2015);
- + Information booklet on the *map turtle* (Nature Action, 2015).

### 2.2.3 Map database

One of the first stages of the mandate consisted in creating a map database containing the maximum information available and necessary for the development of the CPWNA. In this sense, a request was made to the Town of Hudson to obtain the following information:

- + land registry information (delineation of lots);
- + zoning plan and large allocations;
- + recent orthophotographs;
- + topographical curves and digital land model;
- + location of waterways and water plans;
- + location of floodplains;
- + location of the existing road and railway networks;
- + location of the properties of the Town;
- + location of the Town's known conservation easements;
- + location of parks and green spaces;
- + location of woods of metropolitan interest.

## 2.3 Evaluation of development potential

A request was made to the Town of Hudson to be informed of the main development principles of the Town originating in the development scheme of the Vaudreuil-Soulanges RCM (2015) and its planning program (2009). This stage helped locate the vacant sectors with the most development potential over the short and medium term. The sectors then became the focus of special attention, in particular, in terms of evaluating the impacts of conservation areas within these future developments.

## 2.4 Evaluation of the ecological value of wetlands

The elements proposed below describe the methodology used under this mandate to develop the Town of Hudson's conservation plan in the evaluation of conservation priorities for wetlands. This method was created according to the principles stated in the Guide for the development of a conservation plan for wetlands prepared by the Ministry (Joly et al., 2008), and was previously submitted to the MDDELCC's regional representative on November 10, 2015 for comments. The goal of this method is to gather and summarize within a geographic information system (GIS) offering complete and uniform spatial analyses, the information necessary to determine the ecological value of wetlands. To do so, a multi-criteria analysis was carried out taking into account six evaluation criteria for wetlands and updated data on the territory (occupation of the land and wetlands). The details of this analysis are presented in the following sections.

The results of this analysis enabled to compare wetland complexes with one another across the area of study and to establish priority rankings. All of the results superimposed onto the natural area fabric of the Town (wooded areas of interest, ecological corridors, waterways, etc.) will be used to determine the conservation priorities for natural areas within the territory of being studied.

## 2.4.1 Reference scope

The reference scope used for the calculation of the ecological value of wetlands is the same as the area of the study, namely the urban perimeter of the Town of Hudson.

## 2.4.2 Sources and available data

The four main sources of geomatic data used to determine the ecological value of wetlands are the delineations of wetlands carried out by Teknika HBA (2008) and Ducks Unlimited Canada (DUC-MDDEP, 2010) as well as the MFFP's eco-forestry maps (2014) and digital data on land use from the CMM (2014).

### Teknika HBA (2008)

In 2007, Teknika HBA was called upon by the Town of Hudson to carry out a characterization of wetlands and natural areas across its territory. However, this territory excluded surface areas in developed areas, cultivated agricultural land parcels, as well as uncultivated grass and shrub areas. In this study, wetlands were first identified based on information available and by photo-interpretation. This was followed by fieldwork carried out in summer of 2007. To summarize, the purpose of this study was not to cover the complete territory on foot. Therefore, it did not allow for the chance discovery of wetlands outside of the land preparation. Nine wetlands previously identified by Teknika HBA were not characterized in the field.

In total, 48 ha of wetlands were identified within the area of study and originating from this information source.

### DUC-MDDEP (2010)

Ducks Unlimited Canada (DUC), in conjunction with the Québec Ministry of Sustainable Development, the Environment and Parks (MDDEP), carried out the photo-interpretation of wetlands within the territory of the CMM (DUC-MDDEP, 2010). Humid areas are classified according to their type: marsh (MS), swamp (ME), wooded peatland (TB), fen (FN), bog (BG), humid prairie (PH), and shallow water (EP).

In total, 69 ha of wetlands were identified within the area of study by this information source. Wetland areas are therefore larger than in the results presented by Teknika HBA (2008). The limitations of the above-mentioned study partially explain this difference.

### MFFP (2014)

The data contained in the MFFP's SIEF maps, the result of an updated eco-forestry inventory program, were consulted (booklet 31G08-202). The SIEF was fine-tuned to ensure the integration and management of a large set of digitalized eco-forestry, geometric and descriptive data. The last update was published in 2014, but relates to the analysis of aerial photographs of the sector taken in 2007.

### CMM (2014)

The digital data for land use, compiled in 2014 and made available in January 2015 by the CMM, relate to available information, taken mainly from the renewed land registry prior to September 30, 2014, the real estate assessment rolls from 2014 provided by the Québec Ministry of Municipal Affairs and Land Occupation (MAMROT) in April 2014, and orthophotographs taken in April 2013.



### 2.4.3 Updating of reference data

To carry out the ecological assessment of wetlands, two layers of required information were updated, one for wetlands and the other for the occupation of the land within the territory being studied.

#### Wetlands

Considering the limits of Teknika HBA's land inventory discussed above, the layer of information on wetlands was updated conservatively by combining data from DUC-MDDEP (2010) and that of Teknika HBA (2008). The fieldwork carried out by Teknika HBA was used to update the typology of wetlands common to the two databases. The characterization data for wetlands carried out for private developers on lot 1 834 015 and as a part of the Sandy Beach project were also used for this update. To summarize, the layer of wetlands presented to the Town corresponds to:

- + The combination of Teknika HBA (2008) and DUC-MDDEP (2010) data;
- + Adjustment in the typology of areas according to field information from Teknika HBA (2008);
- + Adjustment in the borders of wetlands with the plan provided for Sandy Beach (accepted by the MDDELCC);
- + Removal of wetlands within the Como Gardens sector having received AC from the MDDELCC;
- + Adjustment in the borders of wetlands on lot 1 834 015 with the plan provided by Mr. Ellerbeck (André Lapointe 2008; Enviro-Guide A. L. Inc., 2005).

#### Land occupation

Information on land occupation was created based using updated information on wetlands, eco-forestry map data from the MFFP (2014), and data on land occupation from the CMM. The six main categories of land occupation retained for the territory are: anthropogenic, agricultural, golf, wild land, plantation, and natural (Table 1). The whole of the study area was verified by photo-interpretation to ensure that the natural areas were still present. In fact, the eco-forestry data used correspond to the fourth forestry inventory carried out in 2007 and it was necessary to update it. For example, portions of the territory classified as "natural" (Table 1) and which have been modified by human activities entirely or in part (housing development, backfilling, etc.), were divided once again and the type of land occupation was revised to reflect the occupation of the area as interpreted using Google's aerial imaging system (2015). Finally, all wetland areas updated as part of this study were added to the "natural" land occupation classification.





**Table 1 Allocation of types of land occupation**

Type of land occupation	Source	Selection code
Anthropogenic	CMM, 2014	UTIL_SOL = 100, 101, 102, 112, 103, 113, 104, 114, 200, 300, 400, 500, 510, 520, 700, 710, 720, 725, 750, 760
	MFFP, 2012	"GR_ESS" IS NULL
Agricultural	MFFP, 2012	"GR_ESS" IS NULL AND "CO_TER" = A
Wild land	MFFP, 2012	"TERCO" = FR OR "ORIGINE" = FR OR "PERTURB" = FR
Golf	MFFP, 2012	"GR_ESS" IS NULL
	CMM, 2014	"UTIL_SOL" = 1100
Plantation	MFFP, 2012	"ORIGINE"=P
Natural	MFFP, 2012	"GR_ESS" IS NOT NULL AND "CO_TER" = EAU AND "ORIGINE" IS NULL
	CMM, 2014	"UTIL_SOL" = 900
	CIMA, 2016	Addition of wetlands

#### 2.4.4 Choice of general criteria for the evaluation of the ecological value of wetlands

The approach proposed by CIMA+ consists in developing a multi-criteria analysis based on quantitative criteria and a mapped representation of more qualitative parameters. The reliability of the method is based on the objectivity of numerical data used in statistical processing. These two combined results will be used for the analysis of conservation priorities over the territory of the study and in the end, the division of the CPWNA. The evaluation of criteria according to the MDDELCC's detailed process (Joly et al., 2008) and the information sources available are presented in Table 2.

The quantitative criteria used by CIMA+ for the multi-criteria analysis of the ecological value of wetlands and Hudson are the following:

- + Surface area of wetlands and indirectly, their retention capacity;
- + Connectivity to other natural areas;
- + Diversity;
- + Relative rarity of the type of wetland;
- + Occupation of adjacent higher land;
- + Fragmentation of the area.

Table 2 Assessment of criteria that can be documented as a part of the wetlands conservation plan (Joly et al., 2008)

Criteria	Known data sources	Information complete/partial/unknown	Type of information	Criteria retained (yes/no)	Multi-criteria analysis (MCA) or thematic map	Comments
Spatial dimension of natural areas						
Surface area	DUC-MDDEP; Teknika-HBA	Complete	Quantitative	yes	MCA	
Connectivity of the natural environment	SIEF; Teknika-HBA; photo-interpretation	Complete	Quantitative	yes	MCA	
Type of wetland	DUC-MDDEP; Teknika-HBA	Complete	Qualitative	no	Thematic map	We do not consider this criterion to be a distinguishing factor. However, forms of wetlands will be illustrated on thematic maps.
Exceptional nature						
Presence of TVS (threatened or vulnerable species)	CDPNQ; Teknika HBA	Partial	Qualitative	yes	Thematic map	
Uniqueness of the wildlife or plant habitat	Teknika-HBA	Complete	Qualitative	yes	Thematic map	
Relative rarity	DUC-MDDEP; Teknika-HBA	Complete	Quantitative	yes	MCA	
Fragility of the environment						
Disturbances	Teknika-HBA	Partial	Qualitative	no		The elements of disturbance noted on-site were very rarely detailed in Teknika HBA's report and do not allow for an adequate analysis. Therefore, the latter is not retained within the analysis of ecological value and in the delimitation of the management plan. However, Teknika's notes will be analyzed as part of the development of restoration proposals for wetlands.
Occupation of adjacent high lands	SIEF; photo-interpretation; SAD; CMM	Complete	Quantitative	yes	MCA	
Fragmentation	SIEF, photo-interpretation, BDTQ, CMM	Complete	Quantitative	yes	MCA	
Invasive exotic species	Teknika-HBA	Partial	Qualitative	no		The elements of disturbance noted on-site were very rarely detailed in Teknika HBA's report and do not allow for an adequate analysis. Therefore, the latter is not retained within the analysis of ecological value and in the delimitation of the management plan. However, Teknika's notes will be analyzed as part of the development of restoration proposals for wetlands.
Biotic dimension						
Representativeness	Teknika-HBA	Partial	Qualitative	no		This criteria is related to that of relative rarity. In fact, anything that is not rare is by definition representative of its territory. In addition, we do not consider this criterion to be a distinguishing factor.
Specific or relative wealth (diversity)	Teknika-HBA	Complete	Quantitative	yes	MCA	
Hydrological dimension						
Hydrological connectivity	BDTQ,	Complete	Qualitative	yes	Thematic map	
Retention capacity	?	Unknown	Quantitative	yes		We suggest that this criterion be indirectly evaluated based on the surface area of wetland complexes.
Position within the hydric network	BDTQ,	Complete	Qualitative	yes	Thematic map	We do not consider this criterion to be a distinguishing factor. However, it allows to understand the functional role of wetlands within the hydric network. This information will be useful during the delimitation and justification of the management plan.
Abiotic dimension						
Drainage	SIEF	Partial	Qualitative	no		We do not consider these two criteria to be distinguishing factors. They are more indicative of the probability of the presence of a wetland at a given site.
Ground texture (sandy, clay-bearing, etc.)	SIEF	Partial	Qualitative	no		
Social dimension						
Aesthetic value	SAD, Town	Partial	Qualitative	yes	Thematic map	
Recreational activities	SAD, Town	Partial	Qualitative	yes	Thematic map	
Conservation projects	SAD, Town	Partial	Qualitative	yes	Thematic map	

## 2.4.5 Details of the multi-criteria analysis

The unit of analysis is the wetland complex. The latter brings together all of the adjacent wetland polygons and those located less than 30 m away resulting from the updated layer of information (Teknika HBA, 2008; DUC-MDDEP, 2010). Isolated wetlands composed of a single type of wetland are also considered as complex units. When the limits of a wetland complex continued outside of the area of study, the entire area (total surface area) was taken into consideration in the analysis. The summary of the multi-criteria analysis carried out as a part of this mandate is presented in Table 3.

Table 3            Details of the multi-criteria analysis

Criterion	Description	Wetland/Complex	Necessary data	Geomatic manipulation		Indicator for multi-criteria analysis	DB attribute
Surface area of wetlands and retention capacity	Surface area of wetland complexes	complex	SHP of wetlands	Based on information layer on wetlands, connect adjacent wetlands to define complexes, number them and calculate their surface area in ha		Surface area in ha, calculated	zsupMH
Connectivity to other natural environments	Connectivity is evaluated based on the percentage of the natural environment within a defined strip of land adjacent to the wetland	complex	SHP of land occupation, SHP of wetlands.	SHP natural environments, make three buffers around wetland complexes (0-100, 100-200, 200-300 m) and calculate the percentage of the surface area occupied by natural areas in each of these buffers, and establish the weighted average of the three buffers. The weighting of the buffers is 3 for the 0-100 m buffer, 2 for the 100-200 buffer and 1 for the 200-300 buffer.		Weighted average percentage of surface area occupied by natural areas intercepted and z score	zmilnat
Diversity;	The diversity of wetlands has a direct relation to their specific or relative wealth of species or habitats. The greater the number of habitats, the more ecological niches are present and the more capable the environment is of supporting multiple species. In this case, diversity is based on the type of wetland	complex and sub-categories	SHP of wetland complexes and subcategories of wetlands (7 subcategories: Marsh (MS), Swamp (ME), Wooded peatland (TB), Fen (FN), Bog (BG), Humid prairie (PH), Shallow water (EP))	Calculate the Shannon Index based on the surface areas of wetland subcategories. $H' = - \sum_{i=1}^S p_i \log_2 p_i$ pi=ni/N                      where ni= the surface area occupied by category i and N= the surface area of the complex		Shannon Index, z score	zdivers
Relative rarity of the type of wetland	Refers to the type of wetland and its presence within a given area. Development of criteria based on wetland data to date	complex and sub-categories	Wetland SHP and limits of the reference framework, and ensure that you have the information necessary on wetlands throughout the territory covered by the reference framework. The reference framework may be the ecological district, the study zone of the catchment area, the urbanization perimeter, the agricultural zone, etc. In this case, it will be the urbanization perimeter.	In the reference framework, determine the percentage of surface area occupied by each type.	Classify types of wetlands in reverse order of importance (e.g. 100 %), determine the type of wetland of the study zone, associate the classification of the type of wetland with the reference framework for each corresponding wetland within the study zone (in this case, the urbanization perimeter)	Classification of types of wetlands, association of the classification and z score	zrarsup
Occupation of high adjacent lands or the integrity of the ecotone	Assessment of development pressure: Percentage of surface area occupied by the different types of land occupation weighted by intensity categories	complex	SHP land occupation, SHP wetlands	100 m buffer, calculate the percentages of surface area occupied by each land occupation category; weight according to the corresponding intensity category, calculate the average and then the z score		Weighted average based on anthropogenic activity and z score	zterhte
Fragmentation	refers to the division of the natural environment into different fragments created by infrastructure, modifying the biological and hydrological functioning of the environment. In the present analysis, roads and railways are included within sources of fragmentation. The more an area is fragmented, the more significant the impact on the integrity of the area, and the lower the value presented by the indicator.	complex	SHP land occupation, SHP wetlands	calculate the integrity Index based on the number of fragments and their size $\text{Indice d'intégrité} = \sum_{i=0}^n \left( \frac{\text{Superficie du fragment } i}{\text{Superficie totale du milieu}} \right)^2$		integrity index, z score	zfragsup

Note:  
A wetland complex represents the border of wetlands, the distance of which is less than 30 m from one another.

### Surface area of wetlands and retention capacity

This criterion implies that the ecological role of a wetland is larger when its surface area is larger. The extent of a wetland differentiates large wetlands from small ones. Also, the larger a wetland, the greater its surface water retention capacity, which represents an advantage for the surrounding natural area.

### Connectivity to other natural areas

The ecological value of a wetland depends on the connection of this wetland to other natural areas. Therefore, a wetland that is connected to other natural areas will have a greater ecological role than an isolated wetland surrounded by developed areas. This criterion is based on land occupation data. Three successive rings, measuring 100 m, 200 m and 300 m in radius, were drawn around each wetland; in such a way that the closer a ring is to the wetland, the greater the weight given to its wetlands percentage.

### Diversity

The diversity of wetlands is directly related to the specific or relative wealth of species or habitats within these areas. The greater the number of habitats, the greater the number of ecological niches, and the more capable the area is of supporting a greater number of species. Diversity here is based on the type of wetland, and specifically: marsh (MS), swamp (ME), wooded peatland (TB), fen (FN), bog (BG), humid prairie (PH), and shallow water (EP).

### Relative rarity of the type of wetland

This criterion refers to the type of wetland and its abundance within a given territory. A type of wetland that has become rare within a given territory will be given priority in terms of conservation. It is preferable to preserve the largest diversity of functions offered by wetlands.

### Occupation of adjacent higher lands

This criterion is an assessment of the development pressure exerted on wetlands. In this sense, the hypothesis is that wetlands with less development pressure will have a greater ecological role. The surface area of each type of land occupation is weighted according to the intensity classification of the corresponding development (Table 5).

**Table 4 Intensity classification based on land occupation**

Type of land occupation	Intensity classification
Anthropogenic	0
Agricultural	0.25
Wild land	0.75
Golf	0.25
Plantation	0.75

Type of land occupation	Intensity classification
Natural	1

## Fragmentation

Fragmentation refers to the division of the natural area into multiple fragments following disturbances or the establishment of infrastructure. This disturbance of the area thus modifies its biological function as well as the hydrology of the site. In the present analysis, roads and railways are included in the sources of fragmentation. Therefore, the more the area is fragmented, the greater the impact on the integrity of the area and the lower the value of the indicator.

### 2.4.6 Transformation of quantitative data

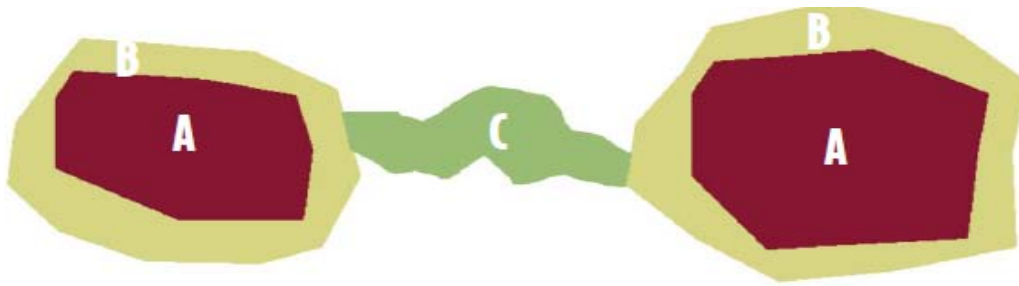
Numerical data for each of the quantitative criteria must undergo transformation to be converted into quantities that are comparable with one another. The transformation method retained is that of the standard measure (Z-score). The Z-score corresponds to the standard deviations separating a result from the average.

### 2.4.7 Ecological value classification method

The ecological value of each wetland was calculated by adding together all of the transformed numerical values associated with the six criteria retained. For the purposes of classification and illustration, the natural breaks method will be used to group wetlands within the area of study into five ecological value categories (very low, low, medium, high, very high). This statistical data classification method, which was developed by Mr. Georges Jenks and Mr. Fred Caspall in 1971, allows to reduce intra-category variance and maximize inter-category variance.

## 2.5 Delimitation of the conservation area

Multiple criteria were used to define the borders of the conservation proposal to optimize its ecological qualities. To do so, these elements from the biological, physical and human environment were initially represented within thematic maps. Next, the goal consisted of delineating natural areas capable of maintaining, to the extent possible, the ecological functions and wildlife and plant diversity of the study areas; the end goal was to ensure the viability of the network of natural areas conserved over the long term and to protect the quality of the surface water within the territory studied. The general principle behind the delineation of the potential conservation area is presented in Figure 2, with zone A (in red) being conservation nuclei, zone B (in yellow) being buffer areas, and zone C (in green) ecological corridors. More specifically, these delineation criteria are described in the following sections.



**Figure 2** Graphic representation of the delineation principles of the conservation area

### 2.5.1 Special status species

Special status species present within the territory are considered to be vulnerable by the provincial and federal governments. In this sense, it is important to consider special status species present within the area of study during the delineation of the conservation area, as well as their habitat.

In Canada, a species at risk is considered to be a wild species “that has disappeared from the country, that is currently disappearing or threatened” or whose situation is “of concern” according to the *Species at Risk Act* (SRA). The designation of this status for a species is based on scientific evaluations carried out by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

In Québec, species that are “designated” are those whose status is that of “threatened” or “vulnerable” species, and are protected under the *Act respecting threatened or vulnerable species* (LRQ, c. E-12.01) and identified in the *Regulation respecting threatened or vulnerable plant species and their habitats* (RRQ, E-12.01, r.0.4) (MDDELCC, 2016). A species is “likely to be designated as threatened or vulnerable” when available information suggests that it is at risk and requires special attention. However, the general prohibitions established in Article 16 of the *Act respecting threatened or vulnerable species* do not apply to plant species “likely to be designated as threatened or vulnerable”.

As part of this study, the species listed in Article 5 of the above-mentioned Regulation were not taken into account due to their designation as species “vulnerable to harvest”. The only objective of this designation is to prevent the removal of the species from their natural environment for commercial purposes.

### 2.5.2 Wetlands

Wetlands are known to provide ecological goods and services to the whole of the population, in particular, by contributing to the good general state of water and the quality of the environment. Ecological goods and services represent benefits that human populations enjoy, whether directly or indirectly, from the healthy functioning of ecosystems including air, water, ground, and biodiversity (Boucher and Fontaine, 2010). Among these, the regulation of natural phenomena, as well as the filtration of water have partially motivated the delineation of wetlands within the conservation area. In fact, wetlands play an important role in the prevention of natural disasters. For example, the areas limit the effect of droughts by feeding groundwater routes and waterways, as well as the damage caused by floods by regulating the effect of

rainfall. By filtering sediments and nutrients (nitrogen and phosphorus), wetlands contribute to improving the quality of lakes and waterways and ensuring the supply of the population with quality water.

Generally, wetlands with a high or very high ecological value have a large surface area that is undisturbed, as well as sustainable, offering a diversity of habitats for plants and wildlife (Lavoie R., 2014). These environments are essential to maintaining ecological wealth and diversity, and have a high conservation value.

For all of the reasons mentioned above, wetlands with a high or very high ecological value, as well as those with a hydrological connection with a waterway were included to the extent possible within the potential conservation area.

### 2.5.3 Connectivity between natural areas

The first level of ecological connectivity sought for conservation is identified as “structural.” This is defined as *“the degree according to which the natural components of a landscape are physically linked with one another according to a given objective, without necessarily contributing to the displacement of species”* (CRECQ, 2014). More specifically, the purpose is to maintain and/or restore the ecological services provided by the ecological processes of natural areas, such as the conservation of riparian strips, the maintenance of the hydraulic connectivity of wetlands, the reduction of hydric erosion, the management of peak flows, the improvement of landscape aesthetics and of the ecosystem’s balance, etc.

Secondly, efforts were undertaken to also include aspects of connectivity considered to be functional to the extent possible, taking into account the urban portion of the study area. Functional connectivity is defined as follows: *“the degree according to which the landscape permits the displacement of a target species or the execution of an ecological process to the extent that all other conditions are met”* (CRECQ, 2014). According to the theory, the type, surface area and spatial layout of habitats have an influence on the displacement of species, and ultimately, on population dynamics and structure of communities (Taylor and coll. 2006). The common strategy for maintaining populations of species within a fragmented landscape is to connect isolated residual conservation nuclei to one another with the help of natural vegetation “corridors” (Chetkiewicz et al., 2006). These corridors play multiple roles on the ecological level, including that of a dispersion corridor (daily or seasonally) for certain species, thus promoting genetic exchange between plant and wildlife populations (Duchesne et al., 1999; Tewksbury et al., 2002). The choice of conservation corridors was determined based on multiple characteristics, namely: the habitats to interlink, the type of environment (land or aquatic), the vegetation cover (woods, brush or prairie) and the width.

#### Habitats to interlink

Corridors must link at least two habitats of ecological interest or conservation nuclei. The conservation area includes, to the extent possible, a buffer area around these conservation nuclei. The purpose of this terrestrial buffer area is to confine conserved natural areas in order to limit the impacts of urbanization and fragmentation of the landscape.



### Type of natural environment

The option of riparian corridors is very interesting. Riparian corridors refer to waterways and bodies of water with large riparian strips. These types of corridors would be more beneficial to multiple bird species, including many species of waterfowl (Whited et al., 2000) as well as medium-sized mammals. These corridors help maintain a permanent link with the water resource and provide a larger territory, because both banks of the waterway are protected.

### Vegetation cover

Vegetation cover serves as shelter and a source of food for wildlife. Mammals, such as the red fox and the white-tailed deer, commonly visit partially or totally wooded corridors (Schiller and Horn, 1997). Wooded cover offers visual protection and shade to the wildlife that use it.

### Width

The width of a corridor may vary from less than two metres up to one kilometre. The bigger the corridor, the more it allows for the displacement of specialized species which need large living areas, such as the grey wolf, black bear, moose and fisher. A width of 60 metres was therefore preferred to the extent that the space was available. This corridor dimension is adequate for the displacement of generalist mammals, such as the white-tailed deer and the red fox (Environment Canada, 2004; Schiller and Horn, 1997).

## 2.5.4 Natural recreation resources of the Town

Existing municipal parks, some of which have a conservation purpose (Town of Hudson, 2009), have been taken into consideration in the choice of spaces to conserve. Moreover, a large portion of the sites are the property of the Town of Hudson.

## 2.5.5 De facto protected area

All de facto natural protected areas, such as lands attached to an easement or conservation zoning, riparian strips and high risk floodplains (recurrence of 0 to 20 years) or areas with the natural constraints to development identified in the planning program, have been integrated into the conservation area. These elements are described in detail in Section 3.3.

## 2.6 Public presentation of the preliminary conservation plan

Through press releases and notices in local newspapers, the Town of Hudson invited its citizens to a public presentation evening for the preliminary Conservation Plan for Wetlands and Natural Areas within the urbanization perimeter of the Town of Hudson, which took place on August 23, 2016, at the Hudson Community Centre. During this evening, the public had the chance to meet the members of the Town's City Council, as well as a representative from the CIMA+ consulting firm team responsible for the development of the plan. Citizens were invited to view the preliminary map created, attend a visual presentation on the process for developing the plan and the preliminary conservation areas proposed,

and to take part in the question period that followed. At the end of this evening, the Town of Hudson invited its citizens to forward, within a two-week timeframe, any comments, additional questions or concerns they may have regarding the preliminary version of the conservation plan for wetlands and natural areas presented.

Following a review carried out by the Board of Trustees of the Town of Hudson of comments received from citizens, adjustments were made to the preliminary version of the plan proposed.

## **2.7 Presentation of the plan to the MDDELCC**

Communication with the MDDELCC's regional representative (Mr. Armel Joseph Seh) took place prior to the development of the Conservation Plan for Wetlands and Natural Areas. A work plan was sent and a conference call took place on October 15, 2015, to establish goals, agree on a methodology, communicate regarding the data available for the territory under study, identify orientations, and discuss the plan established by the Town and the MDDELCC for the management plan. During this call, the approach and criteria proposed by CIMA+ were presented and discussed with the representative from the MDDELCC.

The present modified version of the Conservation Plan for Wetlands and Natural Areas will also be presented to the MDDELCC for comments over the next few weeks.



### 3. Linking of the conservation plan to territorial planning tools

#### 3.1 Development principles of the Town's territory

In Québec, land development governed by the *Act Respecting Land Use Planning and Development*, is an important part of the responsibility of municipalities. Land development includes all actions and interventions aimed at organizing the development of the territory, while taking into account natural, human, technical, and political constraints (Vaudreuil-Soulanges RCM, 2016). The municipal orientations of the Town of Hudson respect the orientations of the government of Québec, the orientations of the CMM, and those of the Vaudreuil-Soulanges RCM, in this order.

Government orientations in terms of development and land use planning are mainly contained within the document *“For the joint development of the territory”* (Pour un aménagement concerté du territoire), published in 1994 (Government of Québec, 1994). Moreover, specific government orientations were produced for the territory of the CMM in 2001 (Government of Québec, 2001) and an addendum was produced by the MAMROT in 2011 (MAMROT, 2011).

The CMM adopted its MLUDP on March 12, 2012, date of its coming into force (CMM, 2012). This planning tool, which states the orientations meeting the government expectations listed above, also defines objectives and criteria to ensure the consistent and sustainable development of the CMM. To summarize, the CMM's MLUDP presents orientations aimed at ensuring the competitiveness and appeal of Greater Montreal, while supporting the sustainable development of the metropolitan area. The MLUDP has three main orientations, which are accompanied by a series of metropolitan development goals and criteria. The main orientations are:

- + Orientation 1: A Greater Montreal with sustainable living spaces;
- + Orientation 2: A Greater Montreal with an effective and structuring transportation network;
- + Orientation 3: A Greater Montreal with a protected and valued environment.

Coming into force on October 25, 2004, the Revised Development Scheme (SAR) of the Vaudreuil-Soulanges RCM emphasizes better management of urban planning according to the following main orientation: more effectively manage urban development (Vaudreuil-Soulanges RCM, 2016). Over the years, the Revised Development Scheme has been amended and modified multiple times following requests originating from municipalities. Finally, the RCM adopted by-law no. 167-15-1 modifying the Revised Development Scheme in 2015 to comply with the CMM's MLUDP. The RCM thus offers orientations, strategies and means that will contribute to the implementation of metropolitan orientations while respecting the planning, development and land use history of the Vaudreuil-Soulanges RCM.

On June 1, 2009, the Town of Hudson adopted its planning program through by-law no. 525. The Town of Hudson is presently in the process of revising its planning program or adopting new by-laws, in accordance with the RCM's development scheme recently revised in 2015.

## 3.2 Development forecast of the Town

### 3.2.1 Local context

The Town of Hudson belongs to the Vaudreuil-Soulanges RCM and the Montreal Metropolitan Community (CMM). Located approximately 60 km from downtown Montreal along the Ottawa River, the Town of Hudson constitutes a semi-rural municipality that combines, within an environment of vegetation, single-family dwellings, a town centre consisting of multiple small businesses and services, green spaces, and an agricultural area (Town of Hudson, 2009). With a surface area of 2,162 ha, more than 50% of which is included within the permanent agricultural area, the Town is bordered to the north by the Ottawa River, to the east by the town of Vaudreuil-Dorion, to the south by the towns of Vaudreuil-Dorion and Saint-Lazare, and to the west by the municipality of Rigaud (Town of Hudson, 2009).

### 3.2.2 Occupation of the lands within the urban perimeter

The urban perimeter of the study circumscribed by the development scheme of the Vaudreuil-Soulanges RCM covers a surface area of 812 ha. It is within this perimeter that urban development has taken place and may continue in the future. However, urban development can also take place within a peri-urban sector called Hudson Valley/Alstonvale, with a surface area of around 250 ha, and which was the subject of an authorization for purposes other than agricultural lands submitted to the Québec Commission for the protection of agricultural land (CPTAQ) in 1988.

The urbanization perimeter is filled up to a proportion of 93%. The largest portion of this territory is mainly occupied by single-family dwellings (Appendix B, Plan 7). Businesses are essentially located within the town core on Main Street and on a short portion of Cameron Street. The urbanization perimeter includes multiple recreational facilities, the largest of which in terms of surface area is the Whitlock Golf Club. In terms of parks, the Town of Hudson has 22 parks, some of which are outfitted playgrounds and others which are nature parks or conservation areas. No industrial zone is identified in the town's zoning plan.

### 3.2.3 Development forecast of the Town

Despite the significant occupation of the urban perimeter, a certain number of vacant lots are still available for residential construction along a few existing streets. The spaces available for residential development total 62 ha (Vaudreuil-Soulanges RCM, 2015). This surface area appears to be adequate with regards to the negative demographic growth forecasts evaluated for 2014-2024, consisting of a decrease in population assessed at 380 people for the next 20 years (Vaudreuil-Soulanges RCM, 2015). The Town of Hudson has identified, to its knowledge, six vacant sectors with a total surface area of 43.9 ha with the most probable development potential within the next few years (Appendix A, Map 1).

**Table 5 List of vacant sectors with a high development potential**

Identifier	Location	Surface area	Comment
1	Between Ridge Road, Oakland Street, Hillside Street, and Côte-Saint-Charles	6 ha	
2 and 3	Between Main, Royalview, and Wharf Streets	11.34 ha	Sandy Beach development having already received an AC from the MDDELCC to carry out work
4	Between Main, Daoust, and Mt Pleasant Streets	2.37 ha	
5	Between the railway and Main and Como Gardens Streets	3.4 ha	Como Gardens development having already received an AC from the MDDELCC to start phase I of work
6	Between the railway and Main, Léger and Parsons Streets	16.71 ha	Mr. Ellerbeck's property, which has been the subject of a natural environment classification (André Lapointe 2008; Enviro-Guide A. L. Inc., 2005)
7	Between the railway and Wilkinson and Parsons Streets	4.07 ha	

### 3.3 Protection principles for the Town's natural areas

The following sections describe the various government and municipal orientations regarding the protection of wetlands and natural areas in general. These orientations were taken into consideration during the identification of conservation priorities for natural areas within the urbanization perimeter of the study, which are described in Section 4.

#### 3.3.1 Government orientations regarding the protection of wetlands

As described in the document *"Wetlands and environmental authorization"* (Les milieux humides et l'autorisation environnementale, MDDEP, 2012): *"the taking into consideration of the importance of wetlands was acknowledged in 1993 with the entry into effect of paragraph 2 of Article 22 of the Environmental Quality Act (EQA). The government thus gives itself the right to oversee all interventions carried out in these environments. By this paragraph 2, the legislator seeks to protect the ecological balance of these ecosystems. It recognizes the importance of ponds, marshes, swamps, and peatlands across the territory of Québec, specifically subjecting projects affecting these ecosystems to the provided authorization regime."*

Twenty years later, the *Act Respecting Compensation Measures for the Carrying out of Projects Affecting Wetlands or Bodies of Water* was adopted by the National Assembly on May 23, 2012. This law allows the government, in the event that a project affecting a wetland or body of water is authorized, to require

compensation measures for the loss of these areas. These compensation measures are intended in particular for the restoration, creation, protection, or ecological development of a wetland, body of water, or area of land, in the latter case nearby (interpreted as adjacent) to a wetland or bodies of water.

### 3.3.2 Orientations of the CMM regarding the protection of natural areas

Among the three main orientations defined in the MLUDP, orientation 3 stipulates that Greater Montreal must protect and enhance its environment. This orientation defines five general goals, three of which are directly related to the development of the conservation plan for wetland or natural areas of the Town of Hudson. For each of these goals, criteria allowing to ensure that they are reached have been established and will be the subject of a follow-up over the following years.

**Table 6**                      **Goals and criteria of the CMM regarding the protection of wetlands**

Goals	Criteria for obtaining goals
Protection of 17% of the Greater Montreal territory	Identification of protected areas, metropolitan woods, forest corridors
	Identification and classification of wetlands
	Protection of woods and metropolitan forest corridors
	Adoption of a conservation plan for wetlands
Protection of river banks, shorelines and floodplains	Identification of floodplains
	Protection of river banks, shorelines and floodplains
Enhancement of the natural environment	Enhancement of components of the green and blue zones

### 3.3.3 Orientations of the RCM regarding the protection of natural environments

In its Revised Development Scheme, the Vaudreuil-Soulanges RCM also has several specific orientations whose goal is to set boundaries for the planning and development of the RCM's territory in accordance with the MLUDP (Vaudreuil-Soulanges RCM, 2015). As for subsequent strategies, these represent means that will be implemented more concretely to confirm planning and development orientations. These strategies specify how to proceed and the different tools that must be used to allow these orientations to materialize. Regarding environmental protection, three main orientations are related to the creation of the present CPWNA.

### Orientation 1:

*To protect riverbanks and the shorelines of lakes and waterways so as to ensure the conservation, quality, and biological diversity of these areas (Chapter 9).*

#### Implementation strategy:

- 1) *To comply with the objectives of the Policy regarding riverbanks, shorelines and floodplains (Politique des rives, du littoral et des plaines inondables) by integrating the provisions of this policy into their planning by-laws.*

### Orientations 2 and 3:

*To protect the natural environment in such a way as to ensure the best survival conditions for plants and wildlife and the maintenance of natural landscapes.*

*To contribute to the metropolitan goal of achieving a protected areas percentage of 17% for the Montreal region.*

#### Implementation strategies:

- 1) *To identify protected areas in planning programs, along with sites of natural interest, the surface area and distribution of forest cover, woods, and metropolitan forest corridors, as well as exceptional forest ecosystems.*
- 2) *To foresee within planning programs the mechanisms allowing to maintain protected areas, sites of natural interest, the surface area and distribution of forest cover, woods, and metropolitan forest corridors, as well as exceptional forest ecosystems.*
- 3) *To foresee, within planning by-laws, the rules that must be applied for any residential, commercial, institutional, industrial, agricultural project or project of public utility likely to encroach upon a protected area or site of natural interest.*
- 4) *To allocate for conservation purposes the non-developed islands of the Ottawa and St. Lawrence Rivers as well as the following sites:*
  - *the wildlife refuge at Hay Point in Saint-Zotique (lots 686 to 691);*
  - *a portion of the stream project in Charrette and for Brazeau Bay, in Pointe-Fortune and in Rigaud;*
  - *the Molson nature reserve in Île-Perrot;*
  - *the Clark-Sydenham property in Hudson;*
  - *the wetlands adjacent to the Ottawa and St. Lawrence Rivers.*
- 5) *To identify in planning programs remarkable viewpoints and landscape paths.*
- 6) *To include in planning programs by-law provisions allowing to preserve the whole of remarkable viewpoints and landscape paths.*
- 7) *To promote the consolidation of forest cover and to manage the growth of its surface area.*

- 8) *To include, in planning programs and by-laws, uses compatible with the protection of forest cover within woods and metropolitan forests as well as protective measures for trees as defined in the additional document.*
- 9) *For municipalities included within the CMM, to identify and classify wetlands of 0.3 ha and greater within planning programs.*
- 10) *For municipalities included within the CMM, to develop a conservation plan for wetlands of 0.3 ha and greater. Municipalities may refer to the “Guide for the creation of a conservation plan for wetlands” (Guide d’élaboration d’un plan de conservation des milieux humides) prepared by the MDDEFP. The RCM invites municipalities to create a conservation plan that also covers land areas (forest cover, etc.) and thus provide themselves with a conservation plan for natural areas. The RCM also invites municipalities to include the conclusions of this plan within planning programs and by-laws so as to ensure its implementation.*
- 11) *Following the development of municipal conservation plans (Strategy 12), the RCM intends to carry out an assessment of the situation of natural areas to determine the actions required to contribute to the metropolitan strategy of bringing to 17% the surface of protected areas for the metropolitan region.*

### 3.3.4 Orientations of the Town regarding the protection of natural areas

#### Planning program

As stated in its planning program (Town of Hudson, 2009), the natural environment of the Town of Hudson constitutes one of its strengths. Two orientations and five strategies were selected in 2009 by the Town as a part of its planning by-law to manage environmental protection across its territory:

#### **Orientations:**

- + To preserve the natural elements of the territory and particularly the forest, lakes, waterways, and wetlands;
- + To prohibit any new quarries or sand pits within the territory of the Town.

#### Implementation strategies:

- 1) *To require, under the by-law on permits and certificates, that a permit or certificate be obtained for any construction work, project, or any work carried out on the riverbank or shoreline.*
- 2) *To integrate into the zoning by-laws provisions aimed at protecting riverbanks, the shoreline of lakes and waterways, and wetlands to ensure the conservation, quality and biological diversity of these environments, and in particular, the protection of wildlife habitats.*
- 3) *To make the municipal by-law on tree cutting stricter.*
- 4) *To allocate the Clark-Sydenham property and wetlands for conservation purposes. An inventory ordered by the Town will allow to identify and characterize these wetlands.*



- 5) *To integrate into the zoning by-law provisions aimed at prohibiting any new quarries or sand pits within the territory.*

However, the town is presently drawing up its new planning program with a view to soon bringing it in line with the Vaudreuil-Soulanges RCM's recent SADR (2015). In preparation for this exercise, the Town of Hudson has undertaken the development of a management plan for wetlands and natural areas to address one of the strategies of the RCM, whose objective is: 1) to protect the natural environment so as to ensure the best survival conditions for plants and wildlife and the maintenance of natural landscapes and 2) to contribute to the metropolitan goal of making 17% of the surface area of the territory of the Montreal region protected areas.

### Zoning by-law

Currently, the planning program in effect (Town of Hudson, 2009) provides for the protection of natural areas within its zoning by-law, by allocating conservation zones within its territory (e.g., the Clark-Sydenham property), or by strictly or partially limiting urban development in areas identified as natural or anthropogenic constraints (Appendix B, Plan 6). Natural constraints of interest for the conservation of natural areas are waterways, wetlands and steep slopes.

The riparian strip of the urbanization perimeter, composed of a strip of land of varying width, is subject to spring floods reoccurring every 0-20 years and every 20-100 years on the Ottawa River (Appendix A, Map 1). According to the MDDELCC's policy on the protection of riverbanks, shorelines and floodplains (2015) adopted in the planning program in 2009, no construction or work can be carried out within the 0-20 year flood zone. Nevertheless, this sector, which was built upon long before the establishment of the MDDELCC's policy, includes several houses and buildings. Moreover, the MDDELCC's policy (2015) protects riparian strips over a minimum width of 10 m on both sides of the shoreline of waterways.

A certain number of wetlands have been documented by Teknika HBA (2008) or mapped by DUC-MDDEP (2010) within the urbanization perimeter. These areas are protected by the EQA and an authorization certificate must be issued by the MDDELCC in the event that activities or work could impact these sensitive areas (section 3.3.1). The Hudson planning program (2009) plans for the integration into the zoning by-law of specific provisions aimed at protecting wetlands based on their ecological services, such as the filtration of surface water and groundwater, as well as the wealth of their plant and wildlife biodiversity. The present study will no doubt address this goal and will allow the Town of Hudson to direct its next planning program toward an informed conservation of wetlands.

Finally, steep embankments are currently protected by the zoning by-law, which prohibits all new construction or any septic facility or tree cutting within sectors whose slope exceeds 20%. Some of these lots were even acquired by the Town to create a nature park, in particular, the Cameron/Fairhaven Park bounded by the two streets of the same name. The protection of steep slopes allows, among other things, to prevent ground erosion through the runoff of surface water and therefore the non-negligible runoff of fine particles into waterways, causing their sedimentation. To summarize, this protection measure for wooded natural environments promotes the maintenance of surface water quality across the territory of the Town, as well as the unobstructed passage of waterways.



## 4. Portrait of natural areas and enhanced landscapes

In accordance with government, metropolitan and local orientations regarding environmental protection described in section 3.3, conservation priorities for natural areas within the urbanization perimeter of the Town of Hudson are waterways, wetlands with a high or very high ecological value, plant and wildlife species habitats with special status, lands of aesthetic interest, certain large urban parks, and ecological corridors (Appendix A, Maps 1 and 2).

### 4.1 Physiographic units and topography

The topography of the Town of Hudson is dominated by a slightly rugged hill (Hudson slopes) topped by a plateau whose altitude is greater than 70 m (the Hudson Heights upper plateau) and located between two clay plains the level of which is around 30 m (the Como and Choisy plains). The Town of Hudson's planning program (2009) identifies the seven following physiographic units (Appendix B, see Plan 2):

- + The Choisy clay plain used for agricultural purposes;
- + The Alstonvale bank serving as a transition between the upper plateau and the plain, whose vertical drop is around 30 m;
- + The Hudson Heights upper plateau where the Falcon golf course and two residential developments are located (Hudson Valley and Alstonvale);
- + The Viviry Creek valley, at the base of which runs the creek and which contains green spaces and residential developments from the 1960s to the 1990s;
- + The Hudson slopes area, which contains the town centre and its rear extensions;
- + The Cameron bank, which corresponds to a vertical drop of around 30 m between the Viviry Creek valley and Route 342;
- + The Como clay plain used for agricultural purposes, as well as holiday and residential purposes. This plain generally encompasses the low-lying lands located to the north of the AMT railway.

Given the terrain, multiple steep slopes (greater than 20%) are present in the territory of the town, in particular within the urbanization perimeter. The slopes were identified with precision thanks to the digital land model made available by the Town (Appendix A, Map 1). The main sectors with steep slopes are located at the level of Cameron/Fairhaven Park and along Viviry Creek and its tributaries.

### 4.2 Waterways

The urban perimeter of the Town of Hudson follows the Ottawa River for approximately 8 km so that the floodplain (0-20 years) occupies 48 ha of this territory (Appendix A, Map 1). Other secondary waterways, the most important of which is the Viviry Creek, as well as unnamed waterways #1 and #2 cross the study area toward the Ottawa River.

## 4.3 Wetlands

In total 37 wetland complexes resulting from the update of data from Teknika HBA (2008) and DUC-MDDEP (2010) are mapped in the study area (Appendix A, Maps 1 and 2; Table 7). These wetlands, which occupy a total surface area of 154.6 ha including 70.2 within the study area, are composed of swamps (44%), wooded peatland (14.2%), marshes (34%), and ponds (6.8%). According to the evaluation method created as part of this study, one wetland has a very high ecological value, 5 have a high ecological value, 14 have a medium value, 14 have a low value, and 3 have a very low value.

**Table 7 Ecological value of wetlands**

Identifier/Order	Total surface area (ha)	Surface area of the study zone (ha)	Typology	Ecological value classification
MH1	49.44	9.82	pond, swamp, marsh, wooded peatland	Very high
MH2	35.97	14.67	pond, swamp, marsh, wooded peatland	High
MH3	1.11	0.42	pond, swamp	High
MH4	13.58	11.54	swamp, marsh, wooded peatland	High
MH5	4.93	3.35	swamp, marsh	High
MH6	9.35	8.50	pond, swamp, marsh	High
MH7	0.12	0.01	pond	Medium
MH8	1.11	0.17	swamp, marsh	Medium
MH9	2.15	1.58	swamp, marsh	Medium
MH10	0.51	0.04	swamp, marsh	Medium
MH11	1.18	0.81	swamp, marsh	Medium
MH12	13.37	4.43	pond, swamp, marsh	Medium
MH13	3.59	0.57	wooded peatland	Medium
MH14	0.68	0.04	marsh	Medium
MH15	1.14	0.70	swamp, marsh	Medium
MH16	0.38	0.38	swamp	Medium
MH17	2.64	2.04	swamp	Medium
MH18	0.54	0.54	wooded peatland	Medium
MH19	0.73	0.43	swamp	Medium
MH20	0.54	0.50	swamp	Medium
MH21	0.50	0.50	swamp	Low
MH22	0.18	0.01	marsh	Low
MH23	0.01	0.01	pond	Low
MH24	0.59	0.59	swamp	Low
MH25	0.42	0.42	swamp	Low

M03983A-ENV-R00

Identifier/Order	Total surface area (ha)	Surface area of the study zone (ha)	Typology	Ecological value classification
MH26	0.01	0.01	pond	Low
MH27	0.02	0.02	pond	Low
MH28	1.18	1.18	pond, swamp, marsh	Low
MH29	1.84	1.84	swamp, wooded peatland	Low
MH30	0.32	0.32	pond	Low
MH31	0.06	0.06	pond	Low
MH32	0.03	0.03	pond	Low
MH33	0.53	0.41	swamp	Low
MH34	0.03	0.03	pond	Low
MH35	4.60	3.36	swamp, marsh	Very low
MH36	0.35	0.35	swamp	Very low
MH37	0.87	0.53	swamp	Very low
<b>Total</b>	<b>154.6</b>	<b>70.2</b>	<b>n/a</b>	<b>n/a</b>

#### 4.4 Plant species with special status

According to the CDPNQ, four occurrences of plant species likely to be designated as threatened or vulnerable were observed within the territory of the study (Table 8). However, most of these are historical occurrences that are more than 60 years old and the plants have probably disappeared. Validation of the occurrence of the Normal Sedge on the banks of the Ottawa River dating from approximately 20 years ago should be determined according to the CDPNQ.

Moreover, the white walnut (*Juglans cinerea*) and the shagbark hickory (*Carya ovata*) have been recently observed on lot 1 834 015 (Enviro-Guide A.L. Inc. 2005, and Teknika HBA, 2008) on both sides of the unnamed waterway #2 (Appendix A, Map 1). These tree species, which are today likely to be designated as threatened or vulnerable, had not been reported, because they did not have special status at the time that these reports were submitted. In their study, the five special status species mentioned by the Teknika HBA study (2008), and namely the maidenhair fern (*Adiantum pedatum*), Canada wild ginger (*Asarum canadense*), white trillium (*Trillium grandiflorum*), two-leaved toothwort (*Cardamine diphylla*) and the ostrich fern (*Matteuccia struthiopteris*), are all species designated as vulnerable to commercial harvesting only. The latter were therefore not taken into consideration during the creation of the CPWNA because they are not endangered species in Québec.

**Table 8 List of wildlife species with special status likely to be observed in the study area**

English name	Latin name	Provincial status	Date of occurrence	Location of occurrence	Precision of occurrence	Source
Spring Cress	<i>Cardamine bulbosa</i>	Likely	1952	Shore of the Ottawa River	8 km	CDPNQ, 2015

Normal sedge	<i>Carex normalis</i>	Likely	1998	Shore of the Ottawa River	1.5 km	CDPNQ, 2015
Cat-tail Sedge	<i>Carex typhina</i>	Likely	1959	Como neighbourhood, Hudson	8 km	CDPNQ, 2015
Northern tubercled orchid	<i>Platanthera flava</i> var. <i>herbiola</i>	Likely	1926	Como neighbourhood, Hudson	1.5 km	CDPNQ, 2015
White walnut	<i>Juglans cinerea</i>	Likely	2005	Lot 1 834 015; Bi11	< 150 m	Enviro-Guide A.L. Inc., 2005
Shagbark hickory	<i>Carya ovata</i>	Likely	2005 and 2007	Lot 1 834 015; Bi11	< 150 m	Enviro-Guide A.L. Inc., 2005 and Teknika HBA 2008

## 4.5 Wildlife species with special status

According to the CDPNQ database, no occurrence of wildlife species with special status has been documented in the study area. However, potential habitats for three wildlife species with special status are located within the limits of the study area, which are the map turtle (*Graptemys geographica*), spiny softshell turtle (*Apalone spinifera*) and the least bittern (*Ixobrychus exilis*) (Appendix A, Map 1) (Nature Action Québec [2015a and 2015b]). In addition, according to the Québec Breeding Bird Atlas' computerized database consulted by Teknika HBA (2008), seven other species with vulnerable status are likely to use the territory under study (Table 9).

**Table 9 List of wildlife species with special status likely to be observed in the study area**

English name	Latin name	Federal status	Provincial status	Potential habitat identified
Map turtle	<i>Graptemys geographica</i>	Of concern	Vulnerable	Bank of the Ottawa River
Spiny softshell turtle	<i>Apalone spinifera</i>	Threatened	Threatened	Bank of the Ottawa River
Least bittern	<i>Ixobrychus exilis</i>	Threatened	Vulnerable	MH4 marsh
Bald eagle	<i>Haliaeetus leucocephalus</i>	-	Vulnerable	n-a
Loggerhead shrike	<i>Lanius ludovicianus</i>	Endangered	Threatened	n-a
Grasshopper sparrow	<i>savannarum</i>	-	Likely	n-a
Short-eared owl		Of concern	Likely	n-a
Sedge wren	<i>Cistothorus platensis</i>	-	Likely	n-a

M03983A-ENV-R00

English name	Latin name	Federal status	Provincial status	Potential habitat identified
Common nighthawk	<i>Chordeiles minor</i>	Threatened		n-a
Chimney swift	<i>Chaetura pelagica</i>	Threatened		n-a

## 4.6 Forest ecosystem

According to Teknika HBA, 15 forest stands have an ecological interest in the territory of the Town of Hudson, including 3 within the urbanization perimeter (Bi-6, Bi-11 and Bi-15) (Appendix A, Map 1). Out of these 15 forest stands, none of these presents the features of an exceptional forest stand, which according to the MFFP, are composed of rare or ancient forests, or those which are still forest sanctuaries. These three distinct categories are defined by the MFFP (2001) as follows:

*“Rare forests’ are forest ecosystems that are present at a limited number of sites and which cover a small surface area. Rarity is generally of a natural origin, but it may also be the result of human activity. In that case, we say that it is anthropogenic. Rarity is assessed not only across Québec but also across smaller territorial units. For example, stands of pitch pines are rare in all of Québec, whereas those of northern red oak are common in the southwest of the province but are rare in the Gaspé Peninsula.*

*As for the expression ‘ancient forests’, it designates stands that have not been modified by man, which have not undergone any recent major natural disruption, and in which we find very old trees. These forests have specific characteristics: they contain both living, senescent and dead trees, and the ground in them is scattered with large trunks at varying states of decomposition. There are very few ancient forests in Québec: in the south of the province, most stands were considerably affected by colonization and then by urbanization, and in the north, they were rarefied by insect epidemics and forest fires.*

*Finally, ‘sanctuary forests for threatened or vulnerable species’ are stands where we find either a significant concentration of threatened or vulnerable plant species or a population that is very significant for the conservation of one of the species.*

By compiling the new mentions of two plant species currently designated as special status in the Bi-11 wooded area of interest (white walnut and shagbark hickory), the latter has been classified in second place in terms of ecological value according to the assessment method used by Teknika HBA (2008). Moreover, this wooded area is remarkable for its level of rarity, its plant biodiversity and the presence of a permanent waterway.

Finally, no woods of metropolitan interest were identified by the CMM within the urban perimeter of the Town of Hudson (CMM, 2012). However, a concentration of woods of metropolitan interest borders the study area to the west, around the Hudson Valley/Alstonvale sector.

## 4.7 Lands of aesthetic interest

The lands of aesthetic interest identified in the planning program and of interest for the creation of the CPWNA are the “heritage strip” and remarkable viewpoints (Town of Hudson, 2009).

Main Street bordering the Ottawa River forms a heritage strip and/or landscape road along its entire length. Indeed, the presence of many old buildings, along with to the natural frame provided by the trees bordering it and glimpses of the river justify this recognition by the Town. Moreover, the geographic location of the urbanization perimeter bordering the Ottawa River has enabled the town to identify certain remarkable viewpoints of the waterway based on sites such as the Hudson/Oka ferry pier, the Willow Place Inn parking lot, the municipal quay, and Thompson Park.

## 4.8 Green spaces

In total, 16 municipal parks considered to be nature parks or conservation spaces are present within the urbanization perimeter (Table 10). Some of these have been developed and now offer hiking trails for recreational purposes.

**Table 10** List of municipal parks included within the study area

Name	Category	Facilities	Surface area (ha)
Appleglen/Woodcroft	Nature park	Hiking trails	8.86
Bellevue	Nature park	none	0.53
Brisbane	Nature park	Hiking trails	0.81
Cameron/Fairhaven	Nature park	none	4.23
Como Gardens	Nature park and conservation	none	0.92
Côte Saint-Charles	Nature park	none	0.44
Mullan	Conservation	none	2.86
Oakfield	Nature park and conservation	none	2.98
Saint-Thomas	Nature park	none	1.87
Sandy Beach	Conservation	Hiking trails	4.52
Stirling	Nature park	none	0.24
Taylor Bradbury	Nature park	Hiking trails	10
Wallace	Nature park	none	0.54
Wellesley	Nature park	none	0.29
Whitlock	Nature park	none	12.1
Jack Layton	Nature park	Hiking trails	4.13
<b>Total</b>			<b>55.32</b>

## 4.9 Private ecological area – the Clark-Sydenham property

The Clark-Sydenham property includes portions of lots P-1941 and P-1939 within the Town of Hudson. Bequeathed to the Nature Conservancy of Canada (NCC), the latter rents the site to the Town of Hudson, which uses it as a natural green space with trails (Vaudreuil-Soulanges RCM, 2015). This site is adjacent



to the Le Nichoir Centre, which is dedicated to the rehabilitation of birds. Because of this designation, the site must conserve its natural character (Vaudreuil-Soulanges RCM, 2015).

## 4.10 Conservation nuclei

Six main natural area groups of ecological interest were identified within the urbanization perimeter. These consist of MH1, MH2, and MH4 wetland complexes, as well as the Clark-Sydenham property, the riparian strip of the Ottawa River and wooded area of interest Bi11 (Table 11).

**Table 11 Conservation nuclei of the study area**

Name of the sector	Element of ecological interest	Interest for conservation
MH1 wetland complex and its tributaries	<p>Complex of wetlands with a very high ecological value (1<sup>st</sup> place in the wetlands classification).</p> <p>Wetlands complex with a large surface area, at the head of the basin pouring into Viviry Creek, for which it appears to be the source.</p> <p>Presence of multiple small tributaries of Viviry Creek located in a steep slopes sector.</p> <p>High biodiversity of the natural environment (MH-8, Teknika HBA 2008).</p>	<p>Protection of wetlands with a high ecological value and a large surface area.</p> <p>Ensure the supply of water to Viviry Creek.</p> <p>Regulation of the flow of Viviry Creek.</p> <p>Protection of water quality in general (water intake downstream).</p>
MH2 wetland complex	<p>Complex of wetlands with a high ecological value (2<sup>nd</sup> place in the wetlands classification).</p> <p>Concentration of wetlands positioned as a chain all along waterway #1 and tributary of Viviry Creek.</p> <p>High biodiversity of the natural environment (MH-14, Teknika HBA 2008)</p>	<p>Protection of wetlands with a high ecological value and a large surface area.</p> <p>Ensure the supply of water to Viviry Creek.</p> <p>Regulation of the flow of Viviry Creek.</p> <p>Protection of water quality in general (water intake downstream).</p>
MH4 wetland complex	<p>Complex of wetlands with a high ecological value (4<sup>th</sup> place in the wetlands classification).</p> <p>Wetland complex at the head of the basin pouring into unnamed waterway #2, for which it appears to be the source.</p> <p>Rare natural areas in the study area (wooded peatland).</p> <p>High biodiversity of the natural environment (MH-25, Teknika HBA 2008).</p> <p>Potential habitat recognized for wildlife species with special status.</p>	<p>Habitat protection of wildlife species with special status.</p> <p>Ensuring the supply of water to the water network (unnamed waterway #2).</p> <p>Regulation of the flow of unnamed waterway #2.</p> <p>Protection of water quality in general.</p>
Clark-Sydenham property	<p>Concentration of wildlife in an urban environment (sanctuary for avian wildlife).</p> <p>Private ecological reserve known locally.</p>	<p>Protection of wildlife habitats.</p>

Name of the sector	Element of ecological interest	Interest for conservation
Ottawa River – riparian zone	<p>Concentration of wetlands along the 0-20 year floodplain, including some with a high ecological value.</p> <p>Potential new habitat for two wildlife species with special status.</p> <p>Area of concentration of aquatic birds recognized by the MFFP.</p>	<p>Protection of wildlife habitats, including two wildlife species with special status.</p> <p>Protection of wetlands with a high ecological value and a large surface area.</p> <p>Protection of remarkable viewpoints and landscape attractions in the Town.</p> <p>Protection of the 0-20 year floodplain of the Ottawa River.</p>
Wooded area of interest Bi11	<p>Confirmed habitat for two wildlife species with special status (Enviro-Guide A.L. Inc. 2005, and Teknika HBA, 2008).</p> <p>High diversity of the natural environment and rarity of plant combinations (Teknika HBA 2008).</p> <p>Presence of unnamed waterway #2.</p>	<p>Protection of two plant species with special status (white walnut and shagbark hickory).</p> <p>Extended protection of riparian strips of unnamed waterway #2.</p> <p>Protection of water quality in general.</p>

## 4.11 Ecological corridors

Three ecological corridors were identified within the urbanization perimeter, totalling 7 km of riparian corridors (

Table 12). The latter allow to connect five of the six conservation nuclei previously identified.

**Table 12 Interlinking of ecological corridors in the study area**

Corridor	Characteristics	Interlinked habitats	
		Within the study area	Outside the study area
Viviry Creek	<p>Riparian corridor whose width varies from between 20 and 200 m.</p> <p>Primarily continuous corridor approximately 4 km in length, crossed by three roads and one railroad.</p>	<p>MH1 wetland complex</p> <p>MH2 wetland complex</p> <p>Ottawa River</p>	<p>MH1 wetland complex</p> <p>Wooded area of metropolitan interest</p> <p>Agricultural area (agro-forestry zone)</p>
Unnamed waterway #1	Riparian corridor whose width varies from between 30 and 100 m.	<p>MH2 wetland complex</p> <p>Viviry Creek</p>	<p>MH2 wetland complex</p> <p>Agricultural area (agro-forestry zone)</p>

M03983A-ENV-R00

	Primarily continuous corridor approximately 1 km in length, crossed by one road.		
Unnamed waterway #2	<p>Riparian corridor whose width varies from between 20 and 100 m.</p> <p>Primarily continuous corridor approximately 2 km in length, crossed by two roads and one railroad.</p>	<p>MH4 wetland complex</p> <p>Ottawa River</p> <p>Wooded area of interest</p> <p>Bi11</p>	Agricultural area (agro-forestry zone)

## 5. Proposed conservation plan

The conservation area, identified within the urbanization perimeter of the Town of Hudson based on conservation issues, criteria for maintaining biodiversity and the desire to protect the quality of surface water, is presented in map 3 (Appendix A). A summary of the areas conserved is presented in Table 13.

**Table 13 Detailed composition of the conservation area**

Sector	Area (ha)	Area (%)
<b>Constrained zone</b>	<b>140.9</b>	<b>88.2</b>
Details*: Wetland	65.7	
Riparian strip	48.7	
0-20 year floodplain	48.1	
20% slope	21.3	
Conservation easement	23.8	
<b>Unconstrained zone – public</b>	<b>12.2</b>	<b>7.6</b>
<b>Unconstrained zone – private</b>	<b>6.7</b>	<b>4.2</b>
Details: Land to be developed	3.9	
Land already developed	2.8	
<b>Total surface area</b>	<b>159.8</b>	<b>100.0</b>

**Note:** The sum of constrained zone area details is 207.6, ha, which is greater than the surface area of the zone (140.9 ha). This difference is explained by the fact that detailed surface areas, such as wetlands, riparian bands or floodplains, overlap most often, thus doubling the areas.

### 5.1 Wetlands

The delineation of the conservation area allowed to integrate 65.7 ha of wetlands, or 94% of the total surface area identified within the urbanization perimeter (Table 14). Conservation priorities for wetlands have all been respected, since wetlands with a very high ecological value are protected. Moreover, only the encroachment of 0.52 ha of wetlands, namely MH28 and MH37, with a low to very low value, is planned in the near future given their location in a potential development sector (Appendix A, Map 3). Finally, most wetlands (3.8 ha) that were not integrated into the conservation area are located in sectors that are already urbanized, and particularly in the backyards of single family homes or wooded areas of the Whitlock golf course. Currently, these humid areas are indirectly conserved due to the fact that no development pressure is foreseen for many years. Nevertheless, changes may take place in the future in the event that the use of these lots is modified by a review to the RCM's development scheme, thus modifying the status quo.

**Table 14 Distribution of wetlands within and outside of the conservation area**

MH identifier	Ecological value	Conservation area		Urbanized sector		Sector with development potential		Overall total (ha)
		ha	%	ha	%	ha	%	
MH1	Very high	9.82	100	-	-	-	-	9.82
MH2	High	14.67	100	-	-	-	-	14.67
MH3	High	0.42	100	-	-	-	-	0.42
MH4	High	11.54	100	-	-	-	-	11.54
MH5	High	3.35	100	-	-	-	-	3.35
MH6	High	8.5	100	-	-	-	-	8.50
MH7	Medium	0.01	100	-	-	-	-	0.01
MH8	Medium	0.08	47.4	0.09	52.6	-	-	0.17
MH9	Medium	1.08	68.6	0.50	31.4	-	-	1.58
MH10	Medium	0.04	100.0	-	-	-	-	0.04
MH11	Medium	0.81	97.7	0.02	2.3	-	-	0.81
MH12	Medium	4.40	99.3	0.03	0.7	-	-	4.43
MH13	Medium	0.22	38.4	0.35	61.6	-	-	0.57
MH14	Medium	0.04	100.0	-	-	-	-	0.04
MH15	Medium	0.70	100.0	-	-	-	-	0.70
MH16	Medium	-	-	0.38	100.0	-	-	0.38
MH17	Medium	1.99	97.9	0.04	2.1	-	-	2.04
MH18	Medium	0.54	100.0	-	-	-	-	0.54
MH19	Medium	0.29	66.7	0.14	33.3	-	-	0.43
MH20	Medium	-	-	0.50	100.0	-	-	0.50
MH21	Low	0.44	88.6	0.06	11.4	-	-	0.50
MH22	Low	0.01	100.0	-	-	-	-	0.01
MH23	Low	-	-	0.01	100.0	-	-	0.01
MH24	Low	0.59	99.5	-	-	-	-	0.59
MH25	Low	0.33	78.9	0.09	21.1	-	-	0.42
MH26	Low	0.01	100	-	-	-	-	0.01
MH27	Low	0.02	100	-	-	-	-	0.02
MH28	Low	0.54	45.3	0.40	34.0	0.24	20.76	1.18
MH29	Low	1.54	83.7	0.30	16.3	-	-	1.84
MH30	Low	-	-	0.32	100.0	-	-	0.32

M03983A-ENV-R00

MH identifier	Ecological value	Conservation area		Urbanized sector		Sector with development potential		Overall total (ha)
		ha	%	ha	%	ha	%	
MH31	Low	0.01	13.1	0.05	86.9	-	-	0.06
MH32	Low	0.03	100.0	-	-	-	-	0.03
MH33	Low	-	-	0.41	100.0	-	-	0.41
MH34	Low	0.015	50	0.015	50	-	-	0.03
MH35	Very low	3.36	100.0	-	-	-	-	3.36
MH36	Very low	0.35	100.0	-	-	-	-	0.35
MH37	Very low	0.18	33.7	0.07	12.9	0.28	53.41	0.53
Total		65.7	94%	3.8	6%	0.52	< 0.01%	70.2

## 5.2 Status species

The habitats of plant and wildlife species with special status were all included within the conservation area. The potential habitat of the least bittern, which is composed of a marsh (MH4 complex) is protected, as well as an additional 10 m protection strip when the land was natural. The potential habitat of the map turtle and the spiny softshell turtle, located along the Ottawa River, is de facto protected by the Town's policy for the protection of riverbanks and shorelines (10 m riparian strip and 0-20 year floodplain). Finally, wooded area of interest Bi11, including the confirmed habitats of the white walnut and shagbark hickory, was included in its entirety within the conservation area.

## 5.3 Natural constraints on development

Multiple natural constraints to development were included within the conservation area, such as all of the floodplains (48.1 ha) and riparian strips of waterways (48.7 ha) mapped. In addition, 21.3 ha of wooded areas with steep slopes (> 20%) help consolidate the network of natural areas identified for conservation and will thus ensure water quality protection for Viviry Creek, and limit the erosion of soils upstream and sediment transport.

## 5.4 Lands of aesthetic and landscape interest

The natural areas of aesthetic interest identified in the planning program are essentially those related to the presence of the Ottawa River and its viewpoints. This landscape quality is indirectly de facto protected by the Town's policy for the protection of riverbanks, shorelines and floodplains. All riparian strips for the waterways mapped and the 0-20 year floodplain of the Ottawa River were included within the conservation area.

## 5.5 Heterogeneity of habitats

The conservation area, as delineated and described in the previous sections, includes a large diversity of plant and wildlife habitats. In fact, multiple types of forest stands in different stages of vegetable succession are thus identifiable (MFFP, 2014; Teknika HBA, 2008). We note the presence of a mature forest bordering on wetland MH1 (70 years and more), highly diversified intermediate forests (Bi11) and shrub or grass strips (Clark-Sydenham property). As stated in the previous point, multiple wetlands (marshes, swamps and peatland) are protected.

The topography of the conservation area can be rugged and contain slopes that are greater than 20% (Appendix A, Map 1). This variable topography, associated with flat lands in the conservation area, multiplies the creation of microhabitats that again promote the maintenance of plant and wildlife biodiversity in the territory under study.

## 5.6 Green spaces

Out of the 16 municipal parks present within the urbanization perimeter and which are considered to be nature parks or conservation spaces, 11 of them were included within the conservation area, for a surface area of 53.3 ha (Table 15). The 5 other parks, which are Bellevue, Côte-Saint-Charles, Stirling, Wallace, and Wellesley Parks, were excluded from the conservation area because they have a very small surface area and constitute islands of natural areas isolated within the urban fabric. Nevertheless, these parks are owned by the Town and their recreational purpose in a natural environment will be retained.

**Table 15 List of municipal parks included in and excluded from the conservation area**

Name	Category	Included	Excluded	Surface area (ha)
Appleglen/Woodcroft	Nature park	included	-	8.86
Bellevue	Nature park	-	excluded	0.53
Brisbane	Nature park	included	-	0.81
Cameron/Fairhaven	Nature park	included	-	4.23
Como Gardens	Nature park and conservation	included	-	0.92
Côte Saint-Charles	Nature park	-	excluded	0.44
Mullan	Conservation	included	-	2.86
Oakfield	Nature park and conservation	included	-	2.98
Saint-Thomas	Nature park	included	-	1.87
Sandy Beach	Conservation	included	-	4.52
Stirling	Nature park	-	excluded	0.24

Name	Category	Included	Excluded	Surface area (ha)
Taylor Bradbury	Nature park	included	-	10
Wallace	Nature park	-	excluded	0.54
Wellesley	Nature park	-	excluded	0.29
Whitlock	Nature park	included	-	12.1
Jack Layton	Nature park	included	-	4.13

## 5.7 Conservation nuclei and ecological corridor

The six large natural area groups of ecological interest, namely wetland complexes MH1, MH2 and MH4 as well as the Clark-Sydenham property, the riparian strip of the Ottawa River and wooded area of interest Bi11 (Table 11), have all been included within the conservation area. The maintenance of these large surface area sectors in their natural state will allow to ensure:

- + the supply of water to the hydric network;
- + the regulation of the flow to Viviry Creek;
- + the protection of the confirmed habitat of two special status plant species;
- + the protection of the potential habitat of three special status wildlife species;
- + the protection of wetlands with a high and very high ecological value;
- + the protection of water quality in general;
- + the protection of the biodiversity of local plants and wildlife.

The three main ecological corridors, which are the riparian ecotones of the Viviry Creek and unnamed waterways #1 and #2, have also been included within the conservation area. The width of the latter has been maximized based on the space and natural areas available within the urban fabric, the development of which is almost entirely complete. Viviry Creek, including its expanded riparian strips, constitutes the spinal cord of this network of ecological corridors. Specifically, this riparian corridor allows to maintain primary ecological links in the north-south direction, namely between wooded areas of metropolitan interest and the Ottawa River; and secondary links in the east-west direction, namely between wooded areas of metropolitan interest and the agro-forestry area within the agricultural zone.

Wildlife species with a large living area, such as moose, black bear and fisher, are not targeted in the conservation plan, given the small size of the sector studied. Species considered to be generalists, such as the white-tailed deer and the red fox, will have the possibility of moving through the conservation area to feed, reproduce and take shelter. It is worth noting that multiple species of birds, small mammals, amphibians, and reptiles will also continue to frequent the area.

Finally, no reconciliation was carried out between the conservation of natural areas and potential development sectors over the short and medium term. In fact, all conservation priorities for the natural



areas identified according to the data available at the time of the writing of this report have been respected.

## **6. Proposal of additional measures**

### **6.1 Measures directed at the restoration, creation, protection, or ecological development of a wetland, body of water, or land environment**

In addition to conservation areas for wetlands and natural areas within their territory, it has been proposed that the Town of Hudson consider the implementation of one or many of the following measures:

#### **6.1.1 The creation of wetlands/natural areas**

This option allows to reproduce a wetland/natural area containing the same conditions as those destroyed within the territory, of an equal or greater surface area, all the while ensuring natural hydric conditions. The creation of a wetland/natural area must take place on lands with little ecological value or function.

#### **6.1.2 Restoration of existing wetlands/natural areas**

The restoration of a wetland/natural area aims to restore the function of an area that may have been negatively impacted by multiple elements, such as the invasion of exotic invasive species, recent deforesting or backfilling, or a modification to drainage. The restoration of an existing wetland/natural area must allow to achieve an ecological value and function similar to that of the destroyed or disrupted environment, or even one of better quality, with an equal or greater surface area.

#### **6.1.3 Protection adjacent to existing wetlands/natural areas**

This protection is directed at preserving the land riparian ecotone, around or near a natural area, wetland, or bodies of water, in such a way as to enable the sustainability of ecosystems. This measure ensures additional protection of sensitive areas against development pressure on the surrounding environment. The land zone targeted by protection can also help protect a land strip linking two wetlands to one another.

#### **6.1.4 Ecological development**

The ecological development of a wetland/natural area or its ecotone will help increase the ecological functions and value of the area. This measure differs from restoration in the sense that the environment to be developed is already recognized as having ecological functions and interest value. Ecological development will nonetheless allow for the qualitative improvement of the environment, which may be carried out by modifying the physical, chemical or biological characteristics of the ecosystem.

### **6.2 Voluntary conservation program**

The Town of Hudson may contemplate the implementation of a program aiming to encourage the voluntary conservation of its territory.

Voluntary conservation refers to the appropriation of natural heritage conservation measures on private land by those who own it, live on it and benefit from it. Derived from the American expression “Private

Stewardship”, voluntary conservation is based on the initiative and commitment of an individual or legal entity. This voluntary commitment consists of managing a property or a portion of it in such a way as to preserve nature along with undeniable heritage characteristics; in other words, those recognized as being beneficial to all (MDDELCC, 2016).

Moreover, if the property holds a mature forest, a marsh, a lake, peatland, rare species of plants and wildlife, or any other natural characteristics of interest that should be protected, various legal conservation options in which the MDDELCC may be involved are possible for owners of private lots. It is thus possible for an individual, company or municipality to participate in conservation efforts already undertaken by the MDDELCC and various conservation organizations operating in Québec, to preserve the ecological services provided by natural areas, protect biodiversity, contribute to the improvement of the network of protected areas in Québec, or to ensure that the preservation efforts of private property owners are pursued. The main voluntary conservation legal options available for private landowners are: natural reserve, conservation easement, gift or sale of the property, as well as the plant habitat designation (MDDEFP, 2014).

The goal of all these options is to preserve the natural appeal of the property independent of changes in ownership. One specific option, that of a humanized landscape, is intended for municipalities and RCMs, and is directed at the protection of inhabited territories for which the maintenance of biodiversity depends on the continuance of human activities, such as agriculture. We must emphasize that some of these options may also result in tax breaks or exemptions from municipal and school taxes, or even provide access to financial aid to cover some of the expenses associated with the protection of a property (MDDEFP, 2014).

### 6.3 Implementation of a Green Fund

A Green Fund available to the municipalities of the CMM for the acquisition and conservation of privately held wooded spaces already exists. This Green Fund financially supports purchase initiatives directed at contributing to the development of a network of wooded spaces with an ecological value across the metropolitan area.

The Town of Hudson may also contemplate the implementation of its own Green Fund with the goal of helping non-profit organizations (NPOs) and public agencies operating within its territory (such as community organizations, educational institutions, healthcare facilities, or social services) to finance structuring projects, projects to raise awareness and feasibility studies that help organize the environment, implement tools or elements to improve or protect the quality of the environment and the quality of life.

To do so, the Town must specify the types of initiatives that will significantly benefit from reaching conservation objectives for the wetlands and natural areas of Hudson. Allocation standards and criteria must be defined. In particular, it will be necessary to determine eligibility criteria for projects, to define the mechanisms and limits of the financing granted, to specify the procedure to follow to present a request for a grant, and to describe the assessment mechanisms of files; in other words, the criteria for analyzing projects and their weighting.

## **7. Collection of comments following presentations of the conservation plan for wetlands and natural areas**

### **7.1 Public concerns and comments**

Following the public presentation night for the preliminary Conservation Plan for Wetlands and Natural Areas within the urbanization perimeter of the Town of Hudson, the Town of Hudson received 14 comments, questions or concerns from its citizens regarding the proposed plan.

A review of these comments was carried out by the Town of Hudson's Board of Trustees, following which adjustments were made to the version of the proposed plan, in particular, to include increased protection of the wetlands located on land parcels identified as having "development potential".

### **7.2 Concerns and comments from the MDDELCC**

Forthcoming.



## 8. References

- André Lapointe, 2008. Délimitation de la bande riveraine pour la propriété Ellerbeck à Hudson. 5 p.
- Boucher, Isabelle, and Fontaine, Nicolas, 2010. La biodiversité et l'urbanisation. Guide de bonnes pratiques sur la planification territoriale et le développement durable, Québec, ministère des Affaires municipales, des Régions et de l'Occupation du territoire, coll. "Planification territoriale et développement durable", 178 p.
- Chetkiewicz C.-L. B., St. Clair, C. C. and Boyce, M. S., 2006. Corridors for Conservation: Integrating Pattern and Process. Annual Review of Ecology, Evolution, and Systematics, Volume 37 pp, 317-342.
- DUC-MDDEP. 2010. Cartographie des milieux humides de la Communauté métropolitaine de Montréal. Available online: <http://www.arccgis.com/home/webmap/viewer.html?webmap=e53987f046964a65bc8daeb9ef257b20>
- Communauté métropolitaine de Montréal (CMM), 2012. Le Plan métropolitain d'aménagement et de développement du territoire de la Communauté métropolitaine de Montréal. 209 p. + appendix.
- Communauté métropolitaine de Montréal (CMM), 2014. Données numériques d'utilisation du sol, compilées en 2014. Available online: <http://cmm.qc.ca/donnees-et-territoire/observatoire-grand-montreal/produits-cartographiques/donnees-georeferencees/>
- Conseil régional de l'Environnement du Centre-du-Québec (CRECQ) (2014) Principe d'élaboration des corridors naturels au Centre-du-Québec. 100 p
- Duchesne S., L. Bélanger, M. Grenier and F. Hone, 1999. Guide de conservation des corridors forestiers en milieu agricole. Fondation des oiseleurs du Québec, Environnement Canada, Canadian Wildlife Service, 60 pages. Environment Canada, 2004. Quand l'habitat est-il suffisant? 2<sup>e</sup> édition. Canadian Wildlife Service. 88 p.
- Enviro-Guide A. L. inc., 2005. Étude des composantes biologique réalisée en vue d'une demande de certificat d'autorisation pour un projet de développement domiciliaire sur le lot 1 834 015 Ptie à Hudson, Québec. Rapport déposé au propriétaire M. Georges Ellerbeck. 30 p.
- Environment Canada, 2004. Quand l'habitat est-il suffisant? 2<sup>e</sup> édition. Canadian Wildlife Service. 88 p.
- Government of Québec, 1994. Les orientations du gouvernement en matière d'aménagement – Pour un aménagement concerté du territoire. 70 p.
- Government of Québec, 2001. Une vision d'action commune. Cadre d'aménagement et orientations gouvernementales. Région métropolitaine de Montréal 2001-2021, 143 p.
- Government of Québec, 2001. Les écosystèmes forestiers exceptionnels du Québec, éléments clés de la biodiversité biologique. 13 p.
- Jenks G-C and F-C, Caspall. Error on choroplethic maps: definition, measurement, reduction. Annals of the Association of American Geographers, Vol. 61, No. 2 (Jun., 1971), pp. 217-244.

- Joly M., S. Primeau, M. Sager and A. Bazoge, 2008. Guide d'élaboration d'un plan de conservation des milieux humides. Première édition, Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. 68 p.
- Lavoie R., 2014. Processus d'analyse multicritère pour évaluer la valeur écologique des milieux humides sur le territoire de la Ville de Québec. 20 p. + annexes.
- Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT), 2011. ANNEXE A – Addenda modifiant les orientations gouvernementales en matière d'aménagement pour le territoire de la Communauté métropolitaine de Montréal en vue de l'élaboration d'un plan métropolitain d'aménagement et de développement. 34 p.
- Ministère du Développement durable, de l'Environnement, des Forêts et des Parcs du Québec (MDDEFP), 2014. La conservation volontaire : vous pouvez faire la différence. Online: <http://www.mddelcc.gouv.qc.ca/biodiversite/prive/brochure-conservation-volontaire.pdf>
- Ministère du Développement durable, de l'Environnement et des Parcs du Québec (MDDEP), 2012. Les milieux humides et l'autorisation environnementale, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs, Direction des politiques de l'eau et Pôle d'expertise hydrique et naturel. 41 pages + annexes.
- Ministère du Développement durable, de l'Environnement, de la Lutte contre les changements climatiques (MDDELCC), 2015. Politique de protection des rives, du littoral et des plaines inondables. Note explicative sur les lignes naturelles des hautes eaux : la méthode botanique experte, 8 pages + annexes. Updated in 2015.
- Ministère du Développement durable, de l'Environnement, de la Lutte contre les changements climatiques (MDDELCC), 2016. Liste des espèces menacées, vulnérables ou susceptibles de l'être au Québec. Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques. Online: <http://www.mddelcc.gouv.qc.ca/biodiversite/especes/>, updated in January 2016.
- Ministère du Développement durable, de l'Environnement, de la Lutte contre les changements climatiques (MDDELCC), 2016. Conservation volontaire. Online: <http://www.mddelcc.gouv.qc.ca/biodiversite/prive/conservation.htm>
- Ministère des Forêts, de la Faune et des Parcs (MFFP), 2014. Peuplement écoforestier. Government of Québec. Direction des inventaires forestiers. Booklets 31H12-0201 and 31H12-0202.
- RCM Vaudreuil-Soulanges, 2016. Principes d'aménagement du territoire de la MRC. Available on the website: <http://www.mrcdevaudreuil-soulanges.com/fr/amenagement-du-territoire>.
- RCM Vaudreuil-Soulanges, 2015. Règlement 167-15-1 modifiant le schéma d'aménagement révisé afin d'être en concordance avec le plan métropolitain d'aménagement et de développement de la Communauté métropolitaine de Montréal (CMM).
- Nature Action, 2015. Cahier d'information sur le petit Blongios. Report submitted to the Town of Hudson. 22 p.
- Nature Action, 2015. Cahier d'information sur la tortue géographique. Report submitted to the Town of Hudson. 22 p.

- Taylor, P.D., L. Fahrig and K.A. With, 2006. Landscape connectivity: a return to the basics. *Connectivity Conservation* (eds. K.R. Crooks & M. Sanjayan), pp. 29-43. Cambridge University Press, Cambridge.
- Teknika HBA, 2008. Caractérisation des milieux humides et naturels sur tout le territoire de la ville d'Hudson. Final report submitted to the Town of Hudson in June 2008, 43 p. + appendices.
- Tewksbury J.J., Levey D.J., Haddad N.M., Sargent S., Orrock J.L., Weldon A., Danielson B.J., Brinkerhoff J., Damschen E.I., Townsend P. 2002. Corridors Affect Plants, Animals, and Their Interactions in Fragmented Landscapes. *Ecology*, 99 (20):1223-1226.
- Schiller A. and S. P. Horn, 1997. Wildlife Conservation in Urban Greenways of the Mid-Southeastern United States. *Urban Ecosystems*, Volume 1 pp. 103-116.
- City of Hudson, 2009. Operational by-law no. 525 – Planning Program. 26 p.
- Whited D., S. Galatowitscha, J. R. Testerb, K. Schikb, R. Lehtinenb and J. Husvethc, 2000. The importance of local and regional factors in predicting effective conservation: Planning strategies for wetland bird communities in agricultural and urban landscapes. *Landscape and Urban Planning*, Volume 49 (1-2), pp. 49-65.





# APPENDIX A

## Maps





## APPENDIX B

### Planning Program 2009







