Transports Québec

Turcot Complex reconstruction project

Environmental Impact Study

Summary

Date: March 2009

DESSAU SM*i*

Project No.: 154-030636
File No.: 8505-06-AC01
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TURCOT COMPLEX RECONSTRUCTION PROJECT

Project No.: 154-030636
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INTRODUCTION

This report represents a summary of the environmental impact study conducted by the *Ministère des Transports du Québec* (MTQ) on the project to reconstruct the Turcot Complex on the Island of Montréal. It takes into account answers to questions and comments issued by the provincial and federal authorities responsible for this mandate during the eligibility analysis of the impact study, and the section "Impact study clarifications and changes" in Appendix 2.

The Turcot Complex is located on the Island of Montréal south-west of downtown Montréal, specifically in the cities of Ville de Montréal, Montréal-Ouest and Westmount (Figure 1). The project consists in reconstructing the Turcot Complex, over a distance of approximately seven kilometres along highways 20-720 and three kilometres along Highway 15, to redress the problems associated with the significant wear seen in infrastructures, including the Angrignon, De La Vérendrye, Montréal-Ouest and Turcot interchanges. Note that the Turcot Complex project also involves relocation of the Canadian National (CN) railway tracks over a distance of a little over four kilometres along the Saint-Jacques escarpment, relocation of a portion of the Domtar rail spur, and modification of the access route to the Lachine rail spur.

Factors other than infrastructure condition and user safety taken into consideration during the project design phase include the quality of life of neighbouring residents, improved access to various types of activities and possible future development of the presently underused land.

Given its scope, this project is subject to section 31.2 of the *Loi sur la qualité de l'environnement* (L.R.Q., c. Q-2), which stipulates that any project covered by the Regulation must be subject to an impact study in compliance with the directive issued by the *Ministère du Développement durable, de l'Environnement et des Parcs* (MDDEP). Specifically, the project meets the eligibility criteria stipulated in paragraph "e" of the *Règlement sur l'évaluation et l'examen des impacts sur l'environnement* (R.R.Q., c. Q-2, r.9), the English version of which reads as follows:

> "the construction, rebuilding or widening, along more than 1 kilometre, of a road or other public road network designed for 4 or more lanes of traffic or having a right-of-way whose average width is 35 metres or more, except for the rebuilding or widening of such a road or road network in a right-of-way that already belongs to the proponent of the project on 30 December 1980".

Accordingly, this project will require a certificate of authorization from the government pursuant to section 31.5 of the Act. Completion of a prior examination is also required pursuant to the *Canadian Environmental Assessment Act (*CEAA).

DRAWN BY:	Geneviève Carpentier
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APPROVED BY:	Sylvie Côté
DRAWING NO:	068-P013202-170-GM-0301-01
FILE NO:	068-P013202-170-GM-0301-01
MTQ PROJECT NO:	154-030636
MTQ DOSSIER NO:	8505-06-AC01
DATE:	December 2008
SCALE:	

DESSAU SM

CLIENT: Transports Québec

PROJECT: **Turcot Complex reconstruction project**

TITLE: **Figure 1 Localtion of the project study area**

1. THE PROPONENT AND ITS PROJECT

1.1 ENVIRONMENTAL UNDERTAKINGS

As specified in the MTQ **2005-2008 Strategic Plan,** the **mandate** of the *Ministère* is to ensure the mobility of people and goods throughout the region, by means of safe, effective transportation systems which contribute to the sustainable development of Quebec.

Being aware of the impact of transportation on the environment and land use, the *Ministère* has committed to taking these vitally important concerns into consideration as early as the project planning stage, develop the ecological and social heritage and promote public consultation and information exchange with the public, to meet the expectations of society.

Reconstruction of the Turcot Complex is not only one of the major projects selected by the MTQ in its **2005-2008 Strategic Plan,** but is also an integral part of the **Reorganizational plan for Quebec's highway networks** (2008) to improve the quality of the highway network and user safety.

In order to meet its safety/security and sustainable development commitments when planning and implementing highway projects, the MTQ has prepared guidance tools, specifically the: **Policy on the environment (1992), Policy on cycling (1995 and 2008), Policy on highway noise (1998)** and **Policy for transportation safety 2001-2005 – Highway section.**

In addition, the MTQ plays a leading role in the development and implementation of the various government policies, action plans and programs relating to the environment and sustainable development. The MTQ was involved in developing the **Government Strategy for Sustainable Development (2008-2013)**, which stems from the *Act governing sustainable development* that requires Quebec government departments and agencies to consider the principles of sustainable development in their decisions and actions. In regard to climate change, the MTQ is responsible for actions in the area of transportation identified in the **2006-2012 Action Plan** entitled *Québec and climate change, a challenge facing our future* and which motivated the new **Quebec public transit policy** *To offer a better range of choices to our citizens*.

1.2 PROJECT CONTEXT AND RATIONALE

The Turcot Complex is located on the Island of Montréal to the south-west of downtown Montréal, specifically within the limits of the Ville de Montréal and the cities of Montréal-Ouest and Westmount. The three municipalities affected by the project are part of the Montréal Metropolitan Community (MMC).

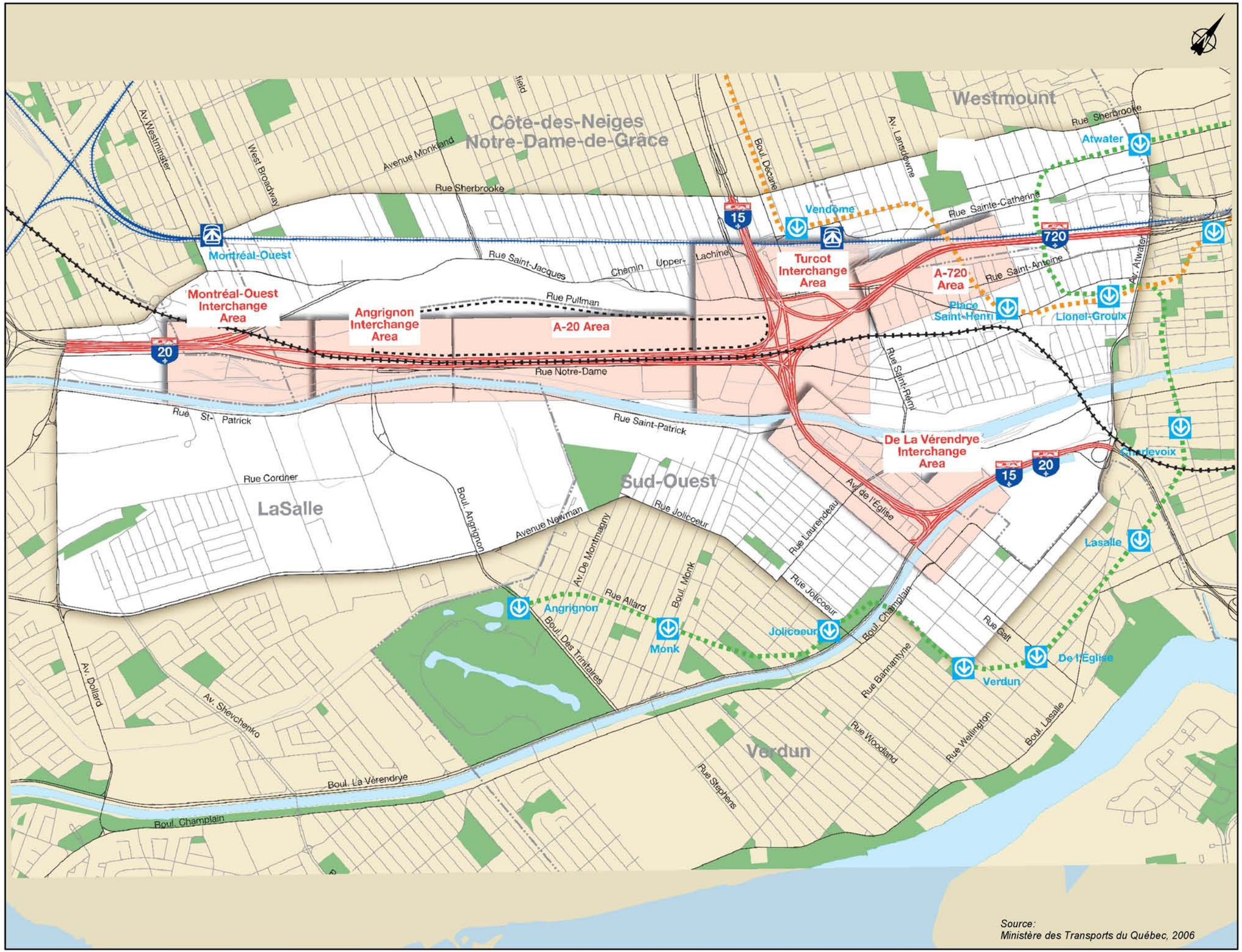
In addition to the Turcot interchange, which enables access between highways 15, 20 and 720, the Turcot Complex includes the De La Vérendrye, Angrignon and Montréal-Ouest interchanges, which enable access between the highway and local networks. It also includes certain stretches of highways 15, 20 and 720. The territory is also significant for the presence of CN's main east-west rail corridor (Figure 2).

Rationale for the project rests in the current condition and serviceable life of the highway infrastructures under study, and also the opportunities to improve not only the highway network, but also the setting in which the project is located.

Built in the mid-1960s, most of the Turcot Complex infrastructures have practically reached the end of their useful life. Due to the significantly heavy volumes of traffic, some of the structures are in poor condition and/or do not meet the seismic standards now in effect. This situation has led to an increasing number of partial or total lane closures, sometimes abruptly to conduct emergency repairs, causing disruption to users and increased traffic volumes in surrounding local road networks. With respect to road safety, many problems relating to poor road geometry (e.g. poor visibility, curve radii), signage issues (e.g. road markings, overcrowded roadside panels) and human issues (dangerous manoeuvres) can be observed in the Turcot Complex.

At the same time, various opportunities are presented to improve the quality of life of neighbouring residents (e.g. noise pollution, visual environment), access to various activity sectors (e.g. the Cabot industrial sector, the Turcot Yard and the proposed McGill University Health Centre (MUHC) in the Glen Yard) and develop currently underused lands (e.g. Turcot Yard).

Lastly, reconstruction of the Turcot Complex will promote new uses near the highway infrastructure, which would enable consolidation of the urban fabric, better public transit service and active means of transportation, as well as enhanced highway safety (e.g. modification of the geometry of the Turcot Complex).



DESSAU SM

CLIENT: Transports Québec

PROJECT: **Turcot Complex reconstruction project**

TITLE: **Figure 2 Components of the current highway network**

DRAWN BY:	Geneviève Carpentier
VERIFIED BY:	Natasha Messier
APPROVED BY:	Sylvie Côté
DRAWING NO:	068-P013202-170-GM-0302-01
FILE NO. :	068-P013202-170-GM-0302-01
MTQ PROJECT NO:	154-030636
MTQ DOSSIER NO:	8505-06-AC01
DATE:	December 2008

SCALE 0 200 400 600 800 m

1.3 SOLUTIONS AND SCENARIOS STUDIED

From the outset, the MTQ opted to forgo increasing the carrying capacity of the highway network in this sector in order to give preference to other modes of urban transportation. Two possibilities were analyzed by the MTQ in the search for a sustainable solution to the problem of aging and deterioration affecting the Turcot Complex, namely 1) repair of the highway infrastructures and 2) reconstruction of the highway infrastructures. The objectives of this initial analysis phase were to determine the best intervention solution to ensure the durability of structures, improve highway safety, minimize the impact on the setting and ensure adequate integration of the project into the urban location.

The MTQ opted for reconstruction of the Turcot Complex, since this would provide an opportunity to improve safety and upgrade the highway network, thereby supporting the economic development of the Montréal area, and resolving all of the problems identified.

The MTQ studied four (4) reconstruction scenarios. A multicriteria assessment was used to determine the solution that best met the various assessment criteria, grouped into three (3) broad families—technical feasibility, ease of construction and urban fabric. For the purposes of the multicriteria assessment, one of the scenarios studied was a reference scenario (status quo), defined as a major renovation to extend the serviceable life of the infrastructures by 20-30 years.

The results of the multicriteria assessment showed that scenario 4, i.e. reconstruction, that included lowering the height of the Turcot interchange and creating a highway and rail transportation corridor at the foot of the Saint-Jacques escarpment, would be the most beneficial, and also one of the least expensive to construct.

1.4 OPTIMIZATION AND JUSTIFICATION OF THE SELECTED SCENARIO

While resolving the problems and meeting the needs identified by the MTQ, the selected scenario was optimized to meet the needs expressed by the public and the *Ministère*'s partners (cities, *Société de transport de Montréal* (STM), *Agence métropolitaine de transport* (AMT), CN, Parks Canada, MUHC, etc.) in the consultations, the highway safety audit and the discussions held with the representatives of municipalities, boroughs and certain government and parapublic departments and agencies.

This process resulted in certain changes to the original proposed route. For example, in response to requests submitted by the public, the MTQ altered the route east of the Turcot interchange to preserve the Cazelais–Saint-Rémi intersection. The route was also changed to create a buffer zone between the Saint-Jacques escarpment and the transportation infrastructures.

The design of the Turcot Complex took into account the setting and not simply the issue of highway transportation efficiency. The MTQ ensured that the surrounding area was considered during selection and optimization of the selected solution.

1.5 PROJECT DESCRIPTION

The project consists in reconstructing the Turcot, De La Vérendrye, Angrignon and Montréal-Ouest interchanges, as well as certain segments of highways 15, 20 and 720. A central component of the complex, the Turcot interchange will be rebuilt in its current location, while the footprint of Highway 20 will be shifted to the foot of the Saint-Jacques escarpment between Angrignon and Turcot interchanges. Highway 15 will be reconstructed parallel to the existing infrastructure, between the Lachine Canal and the De La Vérendrye interchange, while Highway 720 will be shifted slightly to the south, between the Turcot interchange and avenue Greene.

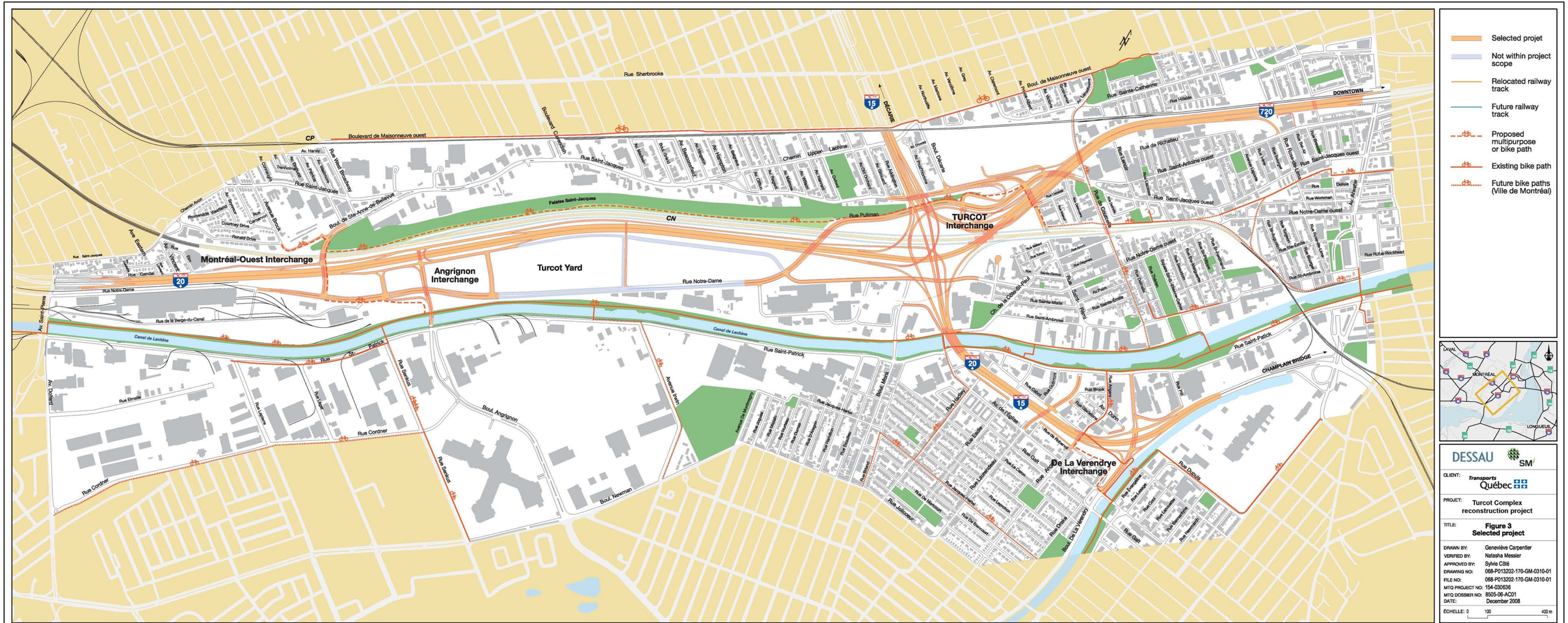
The project also involves constructing municipal roads. This is true of the new link (boulevard Pullman) to connect rue Notre-Dame Ouest with rue Saint-Jacques to facilitate access to future developments within the Turcot Yard and connection to the highway network, and from boulevard De La Vérendrye, which will be extended north from Highway 15 to meet rue Saint-Patrick and thus provide better access to the Cabot industrial sector. Some existing roads will also be reworked at their approach to the interchanges (e.g. rue Saint-Jacques and boulevard Saint-Anne-de-Bellevue).

Changes to the road network will improve accessibility for sectors currently underserved by the highway network. Moreover, the changes to the highway geometry, such as the addition of shoulders, will improve reliability and road safety.

Local infrastructures for pedestrians and cyclists will also be built or reorganized, and a multifunctional connection will be built at the foot of the Saint-Jacques escarpment between boulevard Saint-Anne-de-Bellevue and the Turcot interchange. The project also preserves the corridors for the installation of public transit service infrastructures, i.e. a corridor north of the CN railway tracks and another down the centre of Highway 20, and finally, the possibility of implementing preferential measures for public transit on rue Notre-Dame Ouest. The project also includes the relocation of the main CN tracks, which will be moved to the north of Highway 20 at the foot of the Saint-Jacques escarpment, between the Turcot and Montréal-Ouest interchanges, and the two rail spurs serving the industrial sectors along the Lachine Canal.

Figure 3 presents the route selected for reconstruction of the Turcot Complex. In general, the selected design proposes building new highway infrastructures below (e.g. Turcot interchange) or beside (e.g. Highway 15 in the De La Vérendrye sector) existing infrastructures. The new

infrastructures will be built at ground level and on embankments, and will be much lower than existing ones. The proposed design greatly reduces the number and dimension of suspended concrete structures. The majority of road crossovers (e.g. highway and local roads) will occur at regular structures (grade separation bridges) that will be lower and shorter than existing ones. Taking Highway 15 over the Lachine Canal will require construction of a bridge and work in the water. The slope and the residual spaces within the interchanges will be laid out (trees and shrubs planted, public spaces created, etc.) to harmoniously integrate into the surrounding urban fabric and help to improve quality of life for residents. The roads to be built or redesigned during this project will include sidewalks that are sufficiently wide for pedestrians to use them in complete safety. Special attention will be given to the use of pedestrian and cyclist underpasses beneath the grade separation bridges. An urban integration study and the development of the architectural designs of the structures is in progress.


Selected projet
Not within project scope
Relocated railway track
Future railway track
Proposed multipurpose or bike path
Existing bike path
Future bike paths (Ville de Montréal)
Montréal-Ouest Interchange
Angrignon Interchange
Turcot Yard
TURCOT Interchange
De La Verendrye Interchange
Falaise Saint-Jacques
CN
CP
Canal de Lachine
Rue Notre-Dame
Rue Saint-Patrick
Boulevard de Maisonneuve ouest
Rue Sherbrooke
Boulevard Champlain
Rue Saint-Jacques
Boul. Décarie
Rue Pullman
Boul. de Ste-Anne-de-Bellevue
Rue de la Berge-du-Canal
Rue Cordner
Boul. Angrignon
Boul. Newman
Rue Sanitas
Avenue Irwin
Boul. Monk
Rue Hickey
Rue Brock
Rue Saint-Antoine ouest
Rue Saint-Jacques ouest
Rue de Richelieu
Rue de Courcelle
Rue Notre-Dame ouest
Rue Workman
Rue Delisle
Rue Saint-Ambroise
Rue Saint-Rémi
Rue Saint-Patrick
CHAMPLAIN BRIDGE
DOWNTOWN
720
20
15
DESSAU
SM
CLIENT: Transports Québec
PROJET: Turcot Complex reconstruction project
TITLE: Figure 3 Selected project
DRAWN BY: Geneviève Carpentier
VERIFIED BY: Natasha Messier
APPROVED BY: Sylvie Côté
DRAWING NO: 068-P013202-170-GM-0310-01
FILE NO: 068-P013202-170-GM-0310-01
MTQ PROJECT NO: 154-030636
MTQ DOSSIER NO: 8505-06-AC01
DATE: December 2008
ÉCHELLE: 0 100 400 m

The following images show the current and planned situations in the sectors of rue Notre-Dame Ouest in the area of the Turcot interchange, rue Pullman and rue Roberval.

Rue Notre-Dame (current)

Rue Notre-Dame (proposed)

Foot of the Saint-Jacques escarpment (current)

Foot of the Saint-Jacques escarpment (proposed)

Rue de Roberval (current)

Rue de Roverval (proposed)

1.5.1 Land acquisition

The MTQ already owns about 92% of the land area where the new infrastructures are to be built, having acquired this land from the former Turcot rail yards in 2003. The proposed route will call for the acquisition of all or part of land comprising 25 residential properties, 36 commercial and industrial properties and 7 public properties, for a total of 68 properties. The *Ministère* will explore various avenues with the Société d'habitation du Québec and the Office municipal d'habitation de Montréal in the goal of retaining the existing stock of affordable housing.

1.5.2 Drainage

In general, it is assumed that rainwater runoff from the roads network (proposed roads) will be handled by catch basins connected to a collector pipeline. Perforated foundation drains were planned when the roads built in roadcuts. The foundations of the roads built on embankments

will be drained toward the slope and adjoining ditches. The grade separation bridges and elevated structures will be drained by catch basins connected to vertical downpipes, which in turn will be connected to the collectors on the adjoining roads. Rainwater runoff will be directed to the municipal collectors in the sector. Retention structures will enable control of runoff rates.

1.5.3 Implementation and work phases

According to the current plan, reconstruction of the Turcot Complex will be broken down into several batches of work, each corresponding to project segments. To ensure traffic flow on the highway at all times, each segment will be built following the general process described below:

1. construction of embankments;
2. completion of structures and installation of temporary support;
3. establishment of new traffic routes and demolition of existing structures; and
4. final placement of embankments, by recycling demolition materials, crushed on-site, and landscaping.

Contractors will be free to opt for the work methods that best suit them, but they must comply with the rules imposed by the MTQ as well as the conditions and requirements of the authorizations and permits granted by other government agencies.

The majority of the work associated with the new Turcot Complex will be completed without closure of services required by users of the road and rail networks, by maintaining traffic flow on the existing infrastructure or temporary structures. In the interest of public safety on the new infrastructure and adjoining local roads, the short-duration demolition work and some specific work (e.g. placement of beams and slabs) will be done at night when the underlying infrastructures will be closed to traffic. Note that some disruption is also expected (closure for approximately 3 days) during work to connect the new infrastructures.

1.5.4 Construction schedule

The construction and takedown work will be spread over a period of 7 years, from late 2009 to late 2016. However, the Turcot interchange structures should be operational in 2015, i.e. five years after the start of work.

1.5.5 Costs

The total cost of the project in current dollars, based on the selected route, is estimated at $1.5 billion. This estimate includes the costs of building new road infrastructures (including work on the railway infrastructures) and the costs relating to preparing the project, real estate operations and site decontamination.

2. CONSULTATION WITH LOCAL STAKEHOLDERS AND PARTNERS

Aware of the importance of quickly getting interested parties involved in the development of its road projects so as to be able to take into consideration the concerns, the *Ministère* initiated information and consultation activities in 2004 (e.g. technical study day on perception of needs, development of a participative process) with the public and local stakeholders. Public presentations of the project in 2007 were announced in local newspapers and attracted over 500 participants.

Also, starting in 2006, the *Ministère* began meeting with the municipalities, boroughs and partners affected by or interested in the project in order to listen to their needs and discuss the issues associated with implementation of the project. Working groups were also formed in cooperation with municipal representatives to discuss various aspects of the project (land use and urban integration, traffic and integration of the local road network, public infrastructures, etc.). In addition to the municipalities and boroughs directly affected by the project, meetings were held with several partners, including CN, Canadian Pacific (CP), Parks Canada, public utility companies, STM, AMT, Aéroports de Montréal and *The Jacques Cartier and Champlain Bridges Incorporated*.

3. DESCRIPTION OF THE SETTING

The study area is located west of downtown Montréal, straddling the Lachine Canal. It covers an area of approximately 17 km^2 (6.9 km by 2.5 km), with its central point being the Turcot interchange, located at the intersection of highways 15, 720 and 20.

The main components of the setting described in this section of the summary are shown on the "Inventory map of human, physical and biological settings", presented below (Figure 4).

CULTURAL RESOURCES AND SITES

13 - CÔTE SAINT-PAUL LOCK
13A - CÔTE SAINT-PAUL LOCK
41A - NOTRE-DAME INDUSTRIAL BUILDINGS (CANADIAN CAR AND FOUNDRY DOMINION PLANT)
41B - KRUGER INC. (CANADIAN CAR AND FOUNDRY TURCOT PLANT)
43 - MOLL-FLEX (MONTREAL LIGHT, HEAT AND POWER)
45 - ISPAD-SIDBEC (CANADIAN TUBE & IRON)
46 - DOMPARK (MOUNT ROYAL SPINNING WOOL)
47 - STANDARD CHEMICAL
48 - CANADA MALTING
50 - BARNSLEY ASHFIELD CORP. (HODGSON IRON AND TUBE) (STEEL CO. OF CANADA LTD)
51 - SAINT-AMBROISE COMPLEX (MERCHANTS MANUFACTURING CO.)
52 - SMALL COLGATE AND CO. COMPLEX LTD (DOMINION CARTRIDGE)
54 - FROTHINGHAM AND WORKMAN
55 - (LIQUID CARBONIC)
56 - ORDINO DPT (CLARK BELL FACTORY)
59 - ALBERTON TEXTILES (ST. PATRICK WAREHOUSE LTD) (CONGOLEUM CANADA LTD)
60 - STANLEY BUMEDA LTE (SUN OIL SUNOCO)
61 - ESSOTECH
87 - LASALLE-COKE CRANE
99 - CÔTE SAINT-PAUL BRIDGE

HERITAGE BUILDINGS

1 - BENNY FARM (HOUSE)
2 - PEACOCK BROTHERS - 8800 RUE ST-PATRICK (WEST LACHINE CANAL INDUSTRIES)
3 - MONSANTO (EAST LACHINE CANAL INDUSTRIES)
4 - AQUEDUCT - AQUEDUCT CANAL
5 - SAINT-HENRI PLACE; SAINT-JACQUES
6 - SIR-GEORGE-ETIENNE-CARTIER SQUARE; SAINTE-MARGUERITE
7 - SAINT-AMBROISE
8 - SAINT-PAUL HERITAGE SITE (SAINT-PAUL CHURCH)
9 - ATWATER MARKET
10 - SAINT-AUGUSTIN VILLAGE
11 - DE COURCELLE
12 - SAINT-PAUL PARK
13 - WESTMOUNT AND DE MAISONNEUVE PARK
14 - SOMMERVILLE
15 - GROSVENOR AVENUE
16 - LANSDOWNE ET ROSLYN, SOUTH OF SHERBROOKE
17 - BLENHEIM PLACE
18 - HALLOWELL - WEREDALE
19 - GLEN YARD AND VICINITY
20 - WESTMOUNT HIGH AND VICINITY

RESIDENTIAL DEVELOPMENT PROJECTS

1 - RESIDENTIAL DEVELOPMENT PROJECT – ZONE C
2 - L'AMBIANCE DU MARCHÉ PHASE II PROJECT
3 - LE SAINT-PHILIPPE PROJECT
4 - PHASE IV OF THE LOFTS DU QUAI DES ÉCLUSIERS PROJECT
5 - COMPLEXE DOMPARK PROJECT
6 - LES COURS OXFORD PROJECT
7 - LES COURS HARVARD PROJECT
8 - LES JARDINS WESTMOUNT PROJECT
9 - CLAREMONT PROJECT

OTHER DEVELOPMENT PROJECTS

10 - MCGILL UNIVERSITY HEALTH CENTRE (MUHC)
11 - FUTURE ECOCENTRE

DESSAU — SMi

CLIENT:	Transports Québec
PROJECT:	**Turcot Complex reconstruction project**
TITLE:	**Figure 4: Inventory of human, physical and biological settings**
DRAWN BY:	Geneviève Carpentier
VERIFIED BY:	Chantal Dancose
APPROVED BY:	Sylvie Côté
DRAWING NO:	068-P013202-170-GM-0314-01
FILE NO:	068-P013202-170-GM-0314-01
MTQ PROJECT NO:	154-030636
MTQ DOSSIER NO:	8505-06-AC01
DATE:	December 2008
SCALE:	0 – 50 – 100 – 150 – 200 – 250 m

3.1 HUMAN SETTING

3.1.1 Administrative context

The Turcot Complex is situated in Ville de Montréal, specifically in the boroughs of Sud-Ouest, Verdun, LaSalle, Lachine and Côte-des-Neiges–Notre-Dame-de-Grâce as well as the cities of Montréal-Ouest and Westmount (southern portion). Note that the cities of Montréal, Montréal-Ouest and Westmount form part of the MMC. The Turcot Complex falls entirely under the governance of the administrative region of Montréal, i.e. region 06 (Figure 5).

3.1.2 Demographic context

Overall, the population of the Montréal agglomeration increased slightly (2.3%) between 2001 and 2006. Cities included in the study zone are Westmount, which had the greatest population increase during that period (3.9%), followed by Montréal (2.3%) and Montréal-Ouest (0.2%).

According to 2001 statistical data, occupation density is greatest in Westmount (4,921.9 people/km^2), followed by City of Montréal (4,323.9 people/km^2) and Montréal-Ouest (3,670.7 people/km^2), while the mean for the Montreal agglomeration is 3,628.0 people/km^2.

The borough of Côte-des-Neiges–Notre-Dame-de-Grâce has the highest population, followed by LaSalle, Sud-Ouest, Verdun and finally, Lachine. The boroughs of Verdun and Sud-Ouest had the greatest increase in population between 2001 and 2006, respectively 9.1% and 4.7%.

3.1.3 Transportation

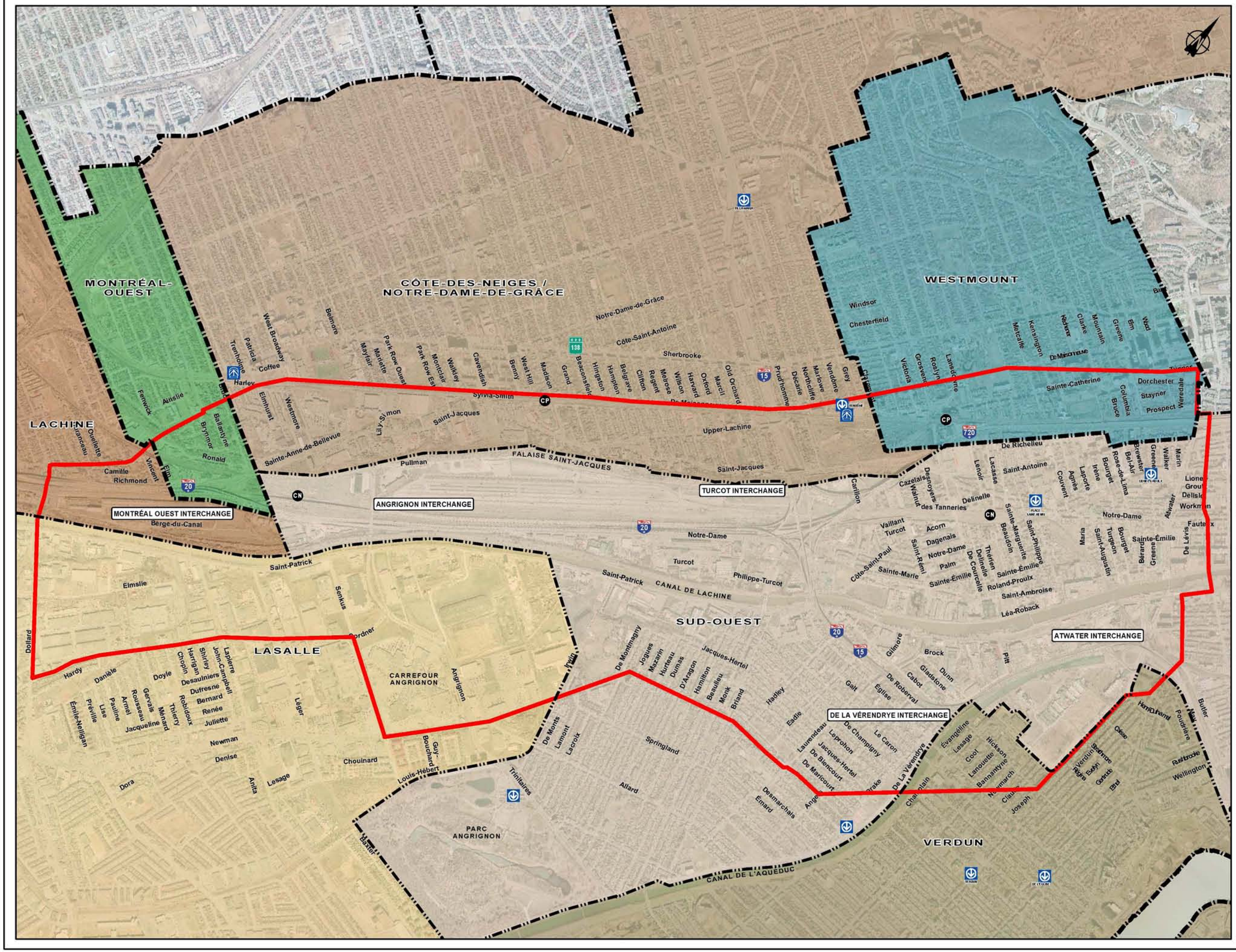
For the majority of territorial units within the study area, the automobile represents the most popular mode of transportation for home-work travel, ranging from 49.6% to 69.4%. However, in the boroughs of Sud-Ouest and Côte-des-Neiges–Notre-Dame-de-Grâce, the most popular mode of transportation for getting to work is public transit, with rates of 42.2% and 42.9%, respectively, which are above the overall percentage of the Montreal population using public transit (34.8%).

3.1.4 Current land use

As shown on the inventory map of human, physical and biological settings (Figure 4), residential, commercial and industrial uses dominate within the study area.

3.1.4.1 Built-up environment

Nearly the entire surface of the study area may be considered urbanized, with few vacant lots present, with the exception of the Turcot Yard, located north of Highway 20 between the Turcot and Angrignon interchanges and the Glen Yard, located to the north-east of the Turcot interchange, that will accommodate the MUHC. Several urbanized sectors are seen, representing various types of dwellings (single-family, duplex, triplex) as well as vast commercial and industrial sectors along the length of boulevard Maisonneuve Ouest, rue Saint-Jacques, rue Notre-Dame Ouest and rue Saint-Patrick.



ADMINISTRATIVE BOUNDARIES

CITIES

- MONTREAL-OUEST
- WESTMOUNT

BOROUGH OF THE VILLE DE MONTRÉAL

- CÔTE-DES-NEIGES - NOTRE-DAME-DE-GRÂCE
- LASALLE
- LACHINE
- SUD-OUEST
- VERDUN

- STUDY AREA
- CITY LIMITS
- BOROUGH LIMITS
- TRAIN STATION
- MÉTRO STATION

DESSAU SM

CLIENT: Transports Québec

PROJECT: **Turcot Complex reconstruction project**

TITLE: **Figure 5 Study area borough and municipality boundaries**

DRAWN BY:	Geneviève Carpentier
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DRAWING NO:	068-P013202-170-GM-0305-01
FILE NO:	068-P013202-170-GM-0305-01
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DATE:	December 2008

SCALE: 0 200 400 600 800 m

There are four (4) main types of commercial land use in the study area, including shopping malls, big box developments, markets and small retail businesses.

Finally, there is a significant industrial zone presence (e.g. manufacturing and service industries) extending along the banks of the Lachine Canal in the boroughs of Sud-Ouest and LaSalle, as well as the Cabot industrial sector, with the latter bounded by Highway 15, the Lachine Canal and avenue Atwater, and bordering the Lachine Canal for a distance of about 2 km.

3.1.4.2 Recreational equipment and other public materiel

The Lachine Canal, which crosses the study area from east to west, is an historic site managed by Parks Canada that presents a linear structure in the landscape where a range of recreational activities are practiced (e.g. cycling, recreational fishing, pleasure boating).

The study area is crossed by several bike paths, mainly along the banks of the Lachine Canal and the Aqueduct. In total, the study area comprises forty-seven (47) parks, three (3) recreational or leisure centres, three (3) golden-age centres and two (2) community centres. Note also the presence of the Gadbois recreation centre, second largest in the Montreal area, located on the north bank of the Lachine Canal and east of the Turcot interchange, a large portion of whose parking lot was situated beneath the current structure of the Turcot Complex. The parking lot was closed in 2008 for safety reasons.

Note also the presence of one (1) hospital in the study area, the Montreal Children's Hospital (W wing, Gilman Building).

The area includes 22 schools (primary, secondary and other teaching institutions) as well as eleven (11) daycare centres (CPE) and three (3) nursery schools.

3.1.4.3 Archeological, historic and cultural heritage

According to the *Inventaire des sites archéologiques du Québec* (ISAQ) produced by the Ministère de la Culture, des Communications et de la Condition féminine du Québec (MCCCFQ), no prehistoric archeological site is currently known in the study area or the immediate proximity. The study on prehistoric archeological potential conducted during the impact study allowed us to identify three (3) possible sectors of interest.

According to the ISAQ produced by the MCCFQ and the Parks Canada directory, four (4) historic archeological sites are known in the study area, mainly in the Sud-Ouest borough. Additionally, seven (7) sectors of potential historic archeological interest were identified (Saint-Henri tanneries, Highway 720, the eastern portion of the Turcot Yard, the Turcot interchange, the Lachine Canal, the village of Côte-Saint-Paul and boulevard Angrignon). Note that the water intake of the Aqueduct also represents a high-potential sector for archeological interest.

The heritage policy of Ville de Montréal has inventoried several municipal properties within the study area, including some public works structures such as the Aqueduct. Ville de Montréal has identified one (1) existing heritage site (Côte Saint-Paul) and three (3) potential heritage sites located mainly in the Sud-Ouest borough, namely the Lachine Canal, square Georges-Étienne-Cartier and square Saint-Henri.

The urban heritage assessment conducted by Ville de Montréal identifies two (2) historic village areas in the territory falling within the Sud-Ouest borough, i.e. Saint-Henri-des-Tanneries and Sainte-Marguerite. Also, there is a building of heritage interest located on rue Cabot near rue Saint-Patrick. In addition to the above, the Glen Yard (Côte-des-Neiges–Notre-Dame-de-Grâce borough) is considered a heritage component, the canal industries in Lachine East (LaSalle borough) comprise a grouping of industrial historic interest, the landscape between Trinitaires bridge and rue Irwin is of heritage interest (LaSalle borough) and the Sikh temple Gurdwara Nanak Darbar is considered a site of heritage interest (LaSalle borough). The City of Westmount contains a heritage railway station and Westmount Square is recognized as a site of historic interest.

Identified as of national historic significance since 1929, the Lachine Canal and more specifically, the engineering works such as the navigable waterway, the walls, sluice gates, spillways, basins, islands, jetties, moorings, haulage path, period lighting fixtures and the original banks represent archeological and built heritage resources. Furthermore, the water intakes and outlets, the road and railway bridges and the service and maintenance buildings, especially the Lachine Canal workshops located on rue Mill are witnesses to history, and are to be preserved.

3.1.4.4 Extraction

There are no mining or quarry works identified in the study area. Note, however, the presence of a cement factory, the Saint-Laurent cement plant located in the LaSalle borough.

3.1.4.5 Infrastructures

The study area's infrastructures comprise road and railway infrastructures, public transit (metro and bus), public utility services and municipal infrastructures.

The east-west axis contains mainly highways 20 and 720, Highway 138, boulevard de Maisonneuve Ouest and rue Notre-Dame Ouest. The north-south axis consists mainly of Highway 15 and boulevards Décarie and Angrignon. Four (4) interchanges are also located in this area, namely Montréal-Ouest, Angrignon, Turcot and De La Vérendrye interchanges. Oriented north-south, avenue Atwater and rue Charlevoix mark the eastern boundary of the study area, and avenue Dollard, also oriented north-south, corresponds to the western

boundary of the study area. Many other roads cross the study area from east to west, such as rue Saint-Jacques, to the north of the Saint-Jacques escarpment, rue Notre-Dame Ouest, located just to the south of Highway 20 and rue Saint-Patrick, running alongside the Lachine Canal. Rue de Courcelle crosses the study area from north to south, and rue Saint-Rémi crosses the Lachine Canal to the east of Highway 15 in the north-south axis.

Two (2) CP railway tracks cross the study area from east to west, one near boulevard de Maisonneuve Ouest above the Saint-Jacques escarpment and the other to the south of the Lachine Canal near rue Saint-Patrick. The CN railway tracks that represent the main CN corridor cross the study area east-west, mainly north of Highway 20. To the extreme east of the study area, the CN railway tracks bifurcate to the south, running over the Lachine Canal.

Several commuter trains (three lines), under the AMT, pass through the study area. The sole railway station in the area is Gare Vendôme, in the Côte-des-Neiges–Notre-Dame-de-Grâce borough.

Two (2) metro lines, i.e. Montmorency-Côte-Vertu and Angrignon-Honoré-Beaugrand, and three (3) metro stations, i.e. Vendôme, Lionel-Groulx and Place-Saint-Henri, lie within the study area

Several STM bus routes use the existing road network in the study area. Only boulevard Newman in the LaSalle borough has priority lanes for public transit. Other roads within the study area (boulevard Cavendish, rue Saint-Jacques, A-20) are identified on the Ville de Montréal transportation plan as potential axes for the implementation of similar measures.

Two (2) overhead power lines (315 kV and 120 kV) and one (1) subterranean line (120 kV) run close to and along the length of the Aqueduct. There is also one (1) overhead line (69 kV), currently in disuse, that runs along the length of the Lachine Canal. There is one (1) electrical substation belonging to Hydro-Québec (Verdun borough), Atwater station.

There are no gas or oil pipelines inventoried in the study area. Note, however, the presence of the Gaz Métro distribution network in the boroughs of Côte-des-Neiges–Notre-Dame-de-Grâce, Lachine, LaSalle, Sud-Ouest, Verdun and the cites of Montréal-Ouest and Westmount. Eleven (11) telecommunications masts were inventoried in the study area.

The Ville de Montréal water filtration plant is located in the Sud-Ouest borough in an area downstream from the planned works.

Note also two (2) snow dumps, three (3) snow chute sites near the Gadbois complex, one (1) hazardous waste burial site (LaSalle borough), two (2) separate landfill sites for contaminated soils, one (1) ecocentre (Sud-Ouest borough) and eleven (11) small, isolated plots of land and islands.

3.1.5 Development projects

Within the study area, there are several development projects either underway or announced, including significant residential construction projects (e.g. L'Ambiance du Marché, Complexe Dompark) and conversion of existing buildings for residential purposes, particularly in the Sud-Ouest borough. Note that the MUHC will be built on the Glen Yard site.

3.1.6 Current traffic conditions

A traffic study was conducted over the entire road network under consideration based on traffic counts taken on the network. This study made it possible to establish daily mean traffic volumes and traffic conditions for each sector of the complex.

3.1.6.1 Mean daily traffic volumes in 2002-2003

The Turcot interchange is one of the largest highway interchanges in the Montréal area. On a daily basis, the total traffic volume that enters the interchange is 280,000 vehicles. In comparison, the Décarie interchange (A-15 and A-40) carries a daily volume of over 305,000 vehicles and the Anjou interchange nearly 250,000 vehicles.

On the A-20, to the west of the Turcot interchange, the daily volume can reach 141,040 vehicles. To the west of the Angrignon exit, this drops to 127,690 vehicles and to the west of the access ramp from the Angrignon overpass, nearly 118,000 vehicles. The Angrignon off-ramp carries nearly 13,350 vehicles and the access to the eastbound A-20 from the Angrignon overpass carries nearly 9,590 vehicles.

The mean daily volume carried by the Angrignon overpass is nearly 25,100 vehicles. For its part, rue Notre-Dame carries volumes ranging from 8,500 vehicles west of boulevard Angrignon to 18,440 vehicles east of it, and 5,000 vehicles east of the Angrignon exit ramp on the westbound A-20.

The daily volumes characterizing the A-720 vary from 143,200 vehicles at the eastern exit of the Turcot interchange to 158,130 vehicles east of the rue Saint-Jacques ramp. Volumes decrease gradually to the east, dropping from 147,200 vehicles east of the Atwater exit to 114,890 vehicles east of the Lucien-L'Allier on-ramp.

Finally, the daily traffic volumes reach nearly 115,830 vehicles in the sector of the A-15 and De La Vérendrye interchange, between the Turcot interchange and the ramps of the De La Vérendrye interchange.

3.1.6.2 Traffic conditions in 2002-2003

Analysis of each of the segments of the road network indicates that 2002-2003 traffic conditions during the morning and evening peak periods over several segments correspond to service levels E and F (e.g. A-720 eastbound during the morning rush hour). Certain sectors, such as the exit from the De La Vérendrye interchange southbound during the morning rush hour, enjoy better conditions. The lowest service levels (E and F) correspond to conditions where significant volumes occur, and which can result from an insufficient number of lanes, the presence of traffic lights at the interchange exit or deficient geometric configurations.

3.1.6.3 Road safety

An analysis of several aspects, including geometry, safety barriers, signalling (vertical and horizontal), driver behaviour and accidents, has enabled identification of certain road safety issues on the highway network.

Weak points in geometry design

Weak points were identified in the geometry design of several ramps of the Turcot interchange. Current visibility distances at several on-ramps and off-ramps were inadequate, which could lead to perception problems by drivers and encourage them to make manoeuvres that could be potentially hazardous to other drivers and the environment. Also, to the west, the fact of highway on-ramps being located on the left is unexpected, which can cause problems in understanding for drivers and put their safety at risk. Moreover, since the left lane is the lane generally known as the fast lane, the fact of entrances and exits being located in this lane could be hazardous to drivers' safety.

Signage

The information provided to drivers by means of vertical and horizontal signage is in some cases insufficient to provide safe, satisfactory directions on navigating the existing infrastructures. Certain missing (e.g. advance warning of exits, directional arrows on mandatory exit lanes) or misleading (e.g. cross-over lanes taken to be additional lanes, lack of consistency between horizontal and vertical signage) components do not allow us to consider the existing signage to be compliant with current signage standards.

Driver behaviour and accident rate

Based on empirical observations at critical locations such as curves, convergence and divergence areas, an analysis of driver behaviour was conducted to check their perception of the level of safety offered by the infrastructure and the environment.

Several hazardous manoeuvres were observed, such as difficult cross-overs, exaggerated deceleration and sudden braking, hurried entries and exits, difficult merges (no available gap) and multiple lane changes.

Based on a compilation and analysis of accidents for 1997 to 1999, compared with reports for 1994 to 1996, certain highway segments present critically high accident rates. The De La Vérendrye sector is the one with the highest number of accidents, particularly southbound, which indicates a safety issue. There does not appear to be a general issue with safety in the Turcot interchange.

3.2 PHYSICAL SETTING

3.2.1 Physiography

The study area belongs to the physiographic unit known as the St. Lawrence Lowlands, characterized by a generally flat profile, consisting of a vast clay plain overlying a sedimentary bedrock.

North of the Turcot Yard, the Saint-Jacques escarpment is a 20-30 m high geological feature, oriented SW-NE. According to a summary of geotechnical studies conducted by the Ville de Montréal, it is impossible, given the nature and strength of the soils forming the Saint-Jacques escarpment, that a major landslip of the escarpment could occur under static, saturated and dynamic conditions. Landslips involving only small areas are the most critical. This summary confirms that the upper half of the slope characterized by inclines greater than 30 degrees would be the most susceptible to failure.

3.2.2 Hydrography

The study area is part of the vast catchment area of the St. Lawrence River, located about 3 km east of the study area. In general, the study area represents a flat topography with a low incline, perpendicular to the Lachine Canal, which flows into the river at the Old Port of Montréal.

The study area contains two (2) main watercourses, both of anthropogenic origin, i.e. the Lachine Canal and the Aqueduct. According to 2007 data from the Réseau de suivi du milieu aquatique, the overall quality of the water in the Lachine Canal is generally excellent. Note that the presence of the municipal overflow for mixed waters connected to the combined storm drain networks which discharges gray water after rainfall into the canal, two-six times per year, depending upon weather conditions, has an effect on the bacteriological status of the canal's surface water.

According to the hydrogeological information system (SIH) maintained by the MDDEP, no wells have been inventoried within the study area. The direction of groundwater flow is from north to south, i.e. toward the Lachine Canal. The groundwater table is located at a depth of 2-4 m.

3.2.3 Air quality

3.2.3.1 Weather data

The calculations performed to assess the impact of reconstruction of the Turcot Complex were conducted taking into consideration the weather in the study area, which was qualified using data from the Environment Canada weather office at Montreal-Trudeau International Airport, located about a dozen kilometres away.

3.2.3.2 Current air quality in Montréal

In general, the air quality in Montréal is acceptable. Over the course of the past five years, a downward trend has been observed in the concentration of most pollutants measured by the Montréal air quality-monitoring network. Specifically, this trend was noted for carbon monoxide (CO) and sulphur dioxide (SO_2) levels, due to reduced vehicle emissions and a reduction in fuel sulphur content. Consequently, the number of days when the air quality was deemed poor dropped from 75 days in 2004 to 44 days in 2007. For 2007, the majority of days affected by poor air quality occurred between January and March, May and July and in December. The air quality in Montréal is mainly affected by the high concentration of fine particulates, less than 2.5 microns ($PM_{2.5}$) in size, whose specific property is its ability to penetrate deep into the respiratory tract, and which affects young children, the elderly and people with respiratory disease. There are many sources that can produce fine particulates. In residential areas, the problem stems from burning wood as a heating fuel in the winter. The high traffic volume in Montréal is the other main source of fine particulates.

Since there is not an ambient air sampling station within the study area where the Turcot Complex reconstruction work will take place, the air quality in this sector was determined on the basis of stations located in similar settings. The Montreal air quality-monitoring network station closest to the study area is in Verdun (No. 68), but it only measures ozone and nitrogen oxide levels. Data from the Drummond (No. 13), Décarie interchange (No. 28), Maisonneuve (No. 61) and Aéroports de Montréal (No. 66) stations were used to qualify the actual air quality of the study area, while that of the Sainte-Anne-de-Bellevue station (No. 99) was used to determine the background levels of the sector, since it is located in an environment not as affected as the others by high traffic volumes. The majority of the stations selected are located near major traffic routes. Data from these stations was examined going back over the last five years available (2003 to 2007).

In general, the highest levels in concentration of fine particulates ($PM_{2.5}$) were observed at all stations in February and during the summer months. The highest means observed occurred during weekdays and the highest concentrations were measured at rush hours, indicating the effect of highway traffic.

Carbon monoxide (CO) levels were higher during winter months. This may be attributable to three factors: the use of oil or wood as heating sources, low combustion efficiencies and higher levels of fuel consumption by highway vehicles in the winter. As with $PM_{2.5}$, the highest concentrations were observed during weekday rush hours.

The same phenomenon was observed in the case of sulphur dioxide (SO_2), with the levels highest in the morning rush hour and during winter months. Maisonneuve (No. 61) is the only station near the study area that measures this pollutant.

The levels of nitrous oxides (NO and NO_2), mainly attributable to highway transportation, were also higher during winter months and rush hours than at other times. However, in this case, there is a strong correlation between measured levels of nitrous oxides and ozone, the latter being lower when levels of nitrous oxides are higher, and vice versa.

3.2.4 Meteorological conditions

The mean annual daily temperature is 7.4°C, with a mean annual daily maximum of 11.1°C and a mean annual daily minimum of 3.6°C. Annual precipitation of a little over 1 m of water is comparable to that seen throughout the majority of the St. Lawrence Lowlands. The coldest temperatures are recorded in January, with a mean minimum of –12.4°C. The warmest temperatures occur in July, with a mean maximum of 26.6°C. Total annual precipitation is on average 1,062.6 mm. Maximum precipitation occurs in July with 106.2 mm, and minimum in February with 70.9 mm.

Because of its geographic location, the study area is frequently subject to episodes of freezing rain.

Over the course of a year, the dominant winds are from the south-west. In general, wind speed is lowest from July to September and highest from January to April.

3.2.5 Nature of banks, flood zones and ground movement

In the study area, the banks are those of the Lachine Canal and the Aqueduct, and are man-made (concrete). Since the flow of the Lachine Canal is regulated by the presence of sluice gates, the study area has no flood zones.

The Island of Montréal is part of the seismic area known as "Western Québec." The civil protection centre for the Ville de Montréal identifies earthquakes as a major risk, given ongoing seismic activity in the St. Lawrence valley, and specifies that much of the built-up urban environment of Montréal rests on fill materials, considered mobile soils, from the geological point of view. Damage from an earthquake could therefore be considerable, particularly to essential infrastructures, bridges, vulnerable industrial facilities and elevated transportation infrastructures.

3.2.6 Quality of soil and groundwater

Phase 1 environmental site assessments conducted during the pre-project studies show that a significant number (33) of properties to be acquired for the purpose of this project present a risk of contamination resulting from past or current activities. In addition, some (23) of these properties are subject to the requirements of section IV.2.1 of the *Loi sur la qualité de l'environnement* (Bill 72) due to the nature of activities conducted there, which results in an obligation to conduct a soil and groundwater characterization study. A characterization survey of these properties has therefore been planned to determine the interventions that need to be performed before work begins, and the method for managing any possible contaminated soils, in accordance with current standards and regulations. Furthermore, buildings on lands acquired by the MTQ will have to be examined for materials likely to contain asbestos or PCBs in the event that demolition is required.

Other than these properties, the Turcot Yard is a site where quantities of contaminated soil, particularly hydrocarbon contamination, were identified during previous characterization studies. Since this location used to host an activity identified in Appendix III of the *Règlement sur la protection et la réhabilitation des terrains* (RPRT), and since the reconstruction project involves a change of use, a site rehabilitation plan must first be approved, as contaminants are present in concentrations that exceed regulatory limits.

3.3 BIOLOGICAL SETTING

As the overall study area represents a highly urbanized setting, the natural setting present comprises mainly the Lachine Canal and the Saint-Jacques escarpment, identified by the Ville de Montréal as part of the ecoterritory of the same name.

To the west of the study area, wooded bands and brush are present at the edges of the commercial lands. The rest of the vegetation present within the study area is mainly in the parks and green spaces of the urban setting, such as the Aqueduct which is bordered by trees.

3.3.1 Vegetation

3.3.1.1 Wooded areas

As the study area is highly urbanized, there are very few woods and the *Ministère des Ressources naturelles et de la Faune* (MRNF) has identified no outstanding forested ecosystem.

According to an inventory completed for the Ville de Montréal, the Saint-Jacques escarpment consists mainly of eastern cottonwoods, Manitoba maples and staghorn sumac. In total, 99 separate plant species have been identified, 45 of which are non-native introductions.

Additionally, located between rue Saint-Rémi and rue de Courcelle, the allée des Tanneries contains a plantation of 2,280 shrub cuttings (provided by the Montréal Botanical Garden) running the length of the CN railway track and forming a green footpath that is in fact an extension of the Premier-Chemin-de-Fer park. A community garden has also been created by residents.

3.3.1.2 Wetlands and aquatic areas

There are no wetlands in the study area. According to the information available, the aquatic vegetation of the Lachine Canal includes several seagrasses.

3.3.1.3 Endangered, threatened plants or those likely to become so

According to the data received from the *Centre de données sur le patrimoine naturel du Québec* (CDPNQ), there are no species of endangered or threatened plants, or plants likely to become so in the study area. However, a recent inventory of the vegetation on the Saint-Jacques escarpment identified two (2) rare species, namely the common hackberry and a species of fern. However, these species are not present at the foot of the escarpment where the work will be concentrated.

3.3.2 Fauna

The description of the fauna takes into account those species that enjoy protection (endangered, threatened or likely to become so) and other species identified in the study area including land, air and water species that have no special status.

3.3.2.1 Fauna without special status

No legally designated fauna habitat has been identified in the study area. The inventories recently conducted for the Ville de Montréal and Parks Canada, indicate that at least eight (8) species of mammal, common in urban settings, are present in the Saint-Jacques escarpment territory (e.g. groundhog). A few other species can also be found on the banks of the Lachine Canal (e.g. beaver, eastern cottontail).

No amphibian species were seen during the fauna inventories conducted on the Saint-Jacques escarpment, or a potential reproduction site, such as the drainage ditch at the foot of the slope, which is fed by the runoff water from the escarpment. The ornithological survey resulted in the observation of 65 bird species.

At the sector bordering Lac Saint-Louis and the banks of the Lachine Canal, the presence of the common garter snake and the painted turtle was confirmed by the *Réseau de suivi du milieu aquatique de la Ville de Montréal* and Parks Canada, respectively. Although no specific inventory of amphibians and reptiles of the Lachine Canal is available, exotic species such as the red-eared slider and other specimens non-indigenous to the natural setting have been observed and reported on many occasions. However, given the strong human influence on the environment (e.g. concrete banks), there is a low probability of finding many more species of amphibians and reptiles that might normally be found on such a site.

The *Réseau de suivi du milieu aquatique de la Ville de Montréal* and Parks Canada mention the presence of twelve (12) species of amphibians on the banks of the Lachine Canal, in addition to several species of fish (e.g. rainbow trout, brown trout, and rarer species such as the yellow walleye and the northern pike). During inventories conducted on the Saint-Jacques escarpment, a brook stickleback was found in the drainage ditch.

Given navigation on the canal, the variation in water levels and the concrete banks, spawning activities of certain species of fish in the Lachine Canal are unlikely or not extensive. There has been no confirmation of recognized spawning grounds in the Lachine Canal.

3.3.2.2 Fauna species with special status

Herpetofauna with special status

Of the five (5) species with special status mentioned in the CDPNQ directory as potentially occurring in the study area, only the brown snake and the milk snake are likely to be seen in the sectors of the Saint-Jacques escarpment and the Lachine Canal, given the presence of their potential habitats.

The brown snake has also been seen during recent inventories of the Saint-Jacques escarpment conducted on behalf of the Ville de Montréal but the milk snake has not been seen. Note that specimens of the brown snake have been seen on the flanks of the escarpment and not in those sectors where interventions are planned as part of the project.

Avifauna with special status

According to data provided by the CDPNQ, two (2) bird species with special status may potentially occur within the study area, namely the redheaded woodpecker and the peregrine falcon.

The study area is not a potentially interesting habitat for the peregrine falcon and this species was not observed during the recent inventory of avifauna of the Saint-Jacques escarpment. Accordingly, it is unlikely that this species nests or is present in the study area.

The redheaded woodpecker has a low likelihood of being seen in the sector of the Saint-Jacques escarpment due to the lack of swampy terrain sought by this species. No species or nests were inventoried during the survey completed in 2007.

Note that the chimney swift, a species recently identified as rare-to-endangered by the Committee on the Status of Endangered Wildlife in Canada, was observed during its migratory and nesting periods during a 2007 survey in the Saint-Jacques escarpment.

Fish with special status

Of the five (5) species of fish with special status mentioned in the CDPNQ directory as possibly occurring in the study area, only the American shad (a species considered as threatened) could potentially be present in the Lachine Canal, considered a potential habitat for this species. However, this species was not observed during a recent inventory.

3.4 NOISE ENVIRONMENT

Noise-sensitive areas are those sectors adjoining the road infrastructures of the Turcot Complex used for residential, public and recreational purposes. There are five (5) such areas and they are limited to a maximum width of about 300 m from the closest road infrastructure (Figure 6).

According to noise surveys conducted by the MTQ within these sensitive areas, the presence of different sources of noise can, to some extent, affect the current noise level.

Within noise-sensitive area **No. 1** (De La Vérendrye), noise levels at 1.5 m above ground level coming mainly from the highway were recorded at the closest residential buildings to highway 15/20. Noise levels drop on moving further away from the highway.

The main sources of noise within noise-sensitive area **No. 2** (Côte-Saint-Paul), in which the Gadbois recreational complex is located, are:

- Western portion: the closest residences can hear the fast lanes of the interchange as background noise. The main proximity noise stems from local traffic, in particular along rue Notre-Dame, rue de Carillon, rue Côte-Saint-Paul, rue Saint-Rémi and rue Saint-Ambroise.
- North-western portion (rue Cazelais): noise is mainly due to Highway 720 and rue Saint-Jacques.
- Eastern portion (rue de Richelieu): noise is generated almost exclusively by the fast lanes of Highway 720.

Within noise-sensitive area **No. 3** (Westmount, north of the Turcot interchange), the railway traffic between the residences and Highway 720 represent a significant but occasional noise source, and the closest residences can hear significant noise generated mainly by highway traffic that is above the MTQ intervention threshold.

Noise surveys conducted in noise-sensitive area **No. 4** (Décarie, north-west of the Turcot interchange), in which the old Glen Yard is located, showed that the noise generated by the highway is perceptible only on land located along the escarpment and that the noise comes mainly from rue Saint-Jacques, with Highway 20 as background noise. Residents in the Décarie corridor live in a very noisy environment. Levels decrease significantly in adjacent streets. Along the corridor, the highway is by far the main source of noise.

With respect to **sensitive area No. 5** (Montréal-Ouest, west of the Turcot interchange), a noise survey conducted east of the area showed a noise level coming mainly from boulevard Sainte-Anne-de-Bellevue, with Highway 20 providing background noise.

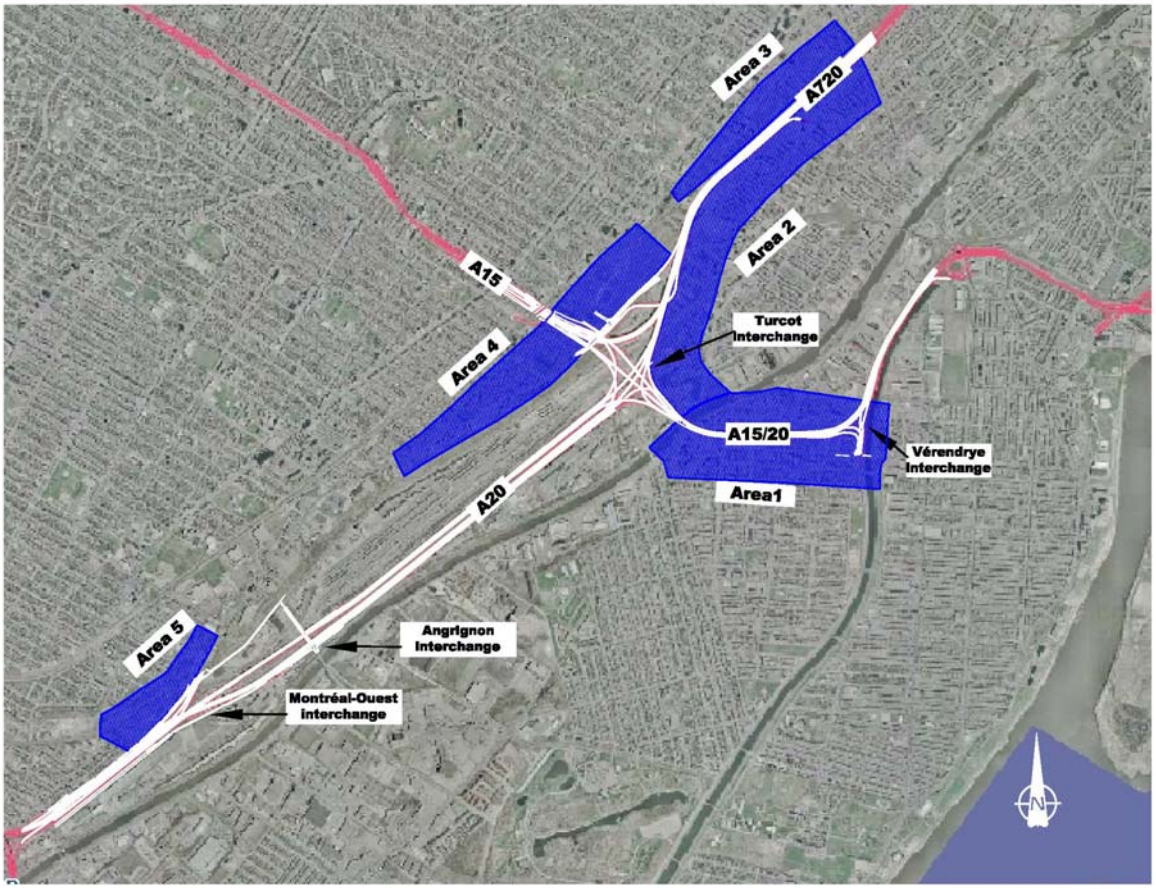

Figure 6: Location of various noise-sensitive areas

3.5 VISUAL SETTING

Although the visual setting is characterized by many human interventions, the mapping of the road network in which the Turcot Complex was constructed was greatly influenced by the geomorphology of the territory, especially by the presence of hills and the river. The Saint-Jacques escarpment overlooks the entire Highway 20 territory and required the A-15, which crosses the territory in a north-south direction to be built on raised structures. The Saint-Jacques escarpment acts as a physical limit between neighbourhoods at the top of the escarpment and those below.

The highway network, comprising highways 20, 720 and 15, is the main visual feature in the study area. The highway passes through the central section of this broad area of land, and forms an east-west transportation corridor parallel to the Lachine canal.

The territory is divided into four (4) landscape units, i.e. residential, Lachine Canal, commercial and Turcot. Assessment of the visual strength of the landscape units according to visual accessibility, visual interest and the value assigned to the landscape, mainly revealed areas of low and medium strength. The units with historical and heritage value present the greatest visual strength, while the units of an industrial character present the least. The visual strength of the residential unit is located somewhere between the two.

For its symbolic and historic value as it relates not only to the territory under examination, but to the city itself, the Lachine Canal displays strong visual strength. Those units which comprise important visual links with the highway axis and presenting high strength in terms of assigned value generally have higher visual strength. This is the case of the Lachine Canal and the site of the future MUHC. While the unit that includes the Turcot interchange presents only medium visual strength, particular attention must still be given to its integration, as it has many of the qualities of a city entrance due to its central position in the project and because of its close proximity to sensitive elements (Lachine Canal, Gadbois centre, MUHC).

4. TRAFFIC ANALYSIS COMPARING THE REFERENCE SCENARIO (STATUS QUO) AND THE SCENARIO SELECTED FOR 2016

In terms of the functionality of the highway network, the selected scenario presents many improvements to the various highway components in each of the Turcot Complex interchanges. For three of those sectors (Turcot interchange, De La Vérendrye and Angrignon–Montréal-Ouest), traffic studies indicate that there should be no major capacity issues. Recall that traffic could still be affected by the presence of traffic tail-backs that can form downstream from various sectors (e.g. A-15 South to the Champlain Bridge, A-20 West to the Saint-Pierre interchange, Décarie expressway).

In the sector of the Turcot interchange, the selected scenario offers, overall, good levels of service, although certain ramps will be used to capacity, and the cross-over area formed by the A-20 eastbound ramp toward the A-15 northbound, and the exit to rue Sherbrooke will remain saturated. For sectors around De La Vérendrye interchange, traffic studies show no traffic problems associated with the design geometry. For the Angrignon–Montréal-Ouest interchange, the new configuration includes plans for service roads on either side of the A-20, which will assist transfers with the local network. In addition, the vertical separation of rue Notre-Dame and boulevard Angrignon will eliminate a significant source of congestion.

Regarding access, several improvements have been made to the three sectors of the Turcot Complex. Accordingly, in the Turcot interchange sector, a new east-west link (new boulevard Pullman), which enables access to the A-15 South, A-720 East and A-20 West, improves accessibility in the sector. Moreover, the addition of links to serve the future MUHC also helps to improve accessibility. In the De La Vérendrye sector, the planned new configuration will give vehicles coming from the Cabot sector direct access to the A-15 without having to use the local roads (west sector). Finally, in the Angrignon–Montréal-Ouest sector, the selected scenario enables direct access to the Turcot Yard and boulevard Angrignon.

It appears, therefore, that the selected scenario presents a better technical performance based on expected demand in 2016 than does the reference scenario.

5. IDENTIFICATION AND ASSESSMENT OF IMPACTS AND MITIGATION METHODS

This section presents the methodology used to assess impacts on various components of the natural and human settings in the study area, the potential impacts during the pre-construction, construction and operation phases, as well as any ongoing and specific mitigation measures to be taken into consideration or proposed during project design, in order to reduce if not eliminate potential impacts of concern, as well as any that may arise during construction.

5.1 METHOD FOR ASSESSING IMPACTS ON NATURAL AND HUMAN SETTINGS

The method for assessing impacts used for this project is based on the methodological approach developed by the MTQ and the federal approach recommended by the Canadian Environmental Assessment Agency (CEAA) for conducting preliminary examinations. The approach described in the *Guide d'évaluation environnementale en regard du poisson et de son habitat* (hydroelectric facilities and roads and access infrastructures) by Fisheries and Oceans Canada was also taken into consideration. Impact on the noise environment, air quality and traffic were covered by a special study in order to assess the projected effect (2016) of new land uses. The methodological approaches developed by the MTQ for the noise environment and traffic conditions were used, while the MDDEP approach was selected for assessing air quality.

In general, the potential impacts of the project were first identified and assessed while taking into consideration the interaction between planned activities and the components of the setting, and then mitigation measures were developed that would lessen these impacts. Residual impacts resulting from these project improvement efforts were then assessed, while taking into consideration the expected potential impact and the effectiveness of the proposed mitigation measures.

5.2 POTENTIAL IMPACTS

Impact sources are defined as all planned activities that are likely to directly or indirectly affect a component of the physical, biological or human setting. The project's potential impacts were assessed according to the activities inherent to the **preconstruction** (e.g. land acquisition, worksite installations), **construction** (e.g. land clearing, work in the water, building new road and railway infrastructures and demolition of existing infrastructures) and **operation** (e.g. highway, maintenance and repairs) phases of new infrastructures

The assessment of the **significance of the potential impact** is contingent on the integration of three (3) indicators, i.e. the intensity (I), scope (S) and duration (D) of the impact. Three (3) levels of significance are considered:

- **Major**: the impact results in serious repercussions on the component affected, leading to a major change in its character and use, and can even adversely affect its durability.
- **Moderate**: the impact results in appreciable repercussions on the component affected, leading to a partial change in its character and use, but without adversely affecting its durability within the study area.
- **Minor**: the impact results in minor repercussions on the component affected, leading to a minor change in its quality and use.

Among the potential impacts commonly associated with road construction sites and described in detail in the impact study, analysis of the project's potential impacts has brought into focus certain impacts on the human setting that require particular attention, such as psychosocial impacts, noise levels and air quality. Some of these impacts will require development of special mitigation measures, while others will be monitored or subject to environmental follow-up.

5.2.1 Impact on noise levels

The results of simulations of projected noise levels to be generated in 2016 by the reorganized Turcot Complex in the five (5) noise-sensitive areas identified above enable identification of certain sensitive sectors likely to be affected by the project, with a potential impact ranging from medium to major, according to the MTQ policy governing road noise, i.e. areas 1 (De La Vérendrye), 2 (Côte-Saint-Paul) and 5 (Montréal-Ouest, west of the Montréal-Ouest interchange).

5.2.2 Impact on air quality

Initially, the levels of carbon monoxide (CO), particulates under 2.5 microns ($PM_{2.5}$) and nitrogen dioxide (NO_2) were calculated for current conditions (2007) and compared with the expected conditions if the current configuration of traffic lanes were maintained in 2016. Traffic forecasts show that a slight increase is expected in the Turcot Complex by 2016. Since the vehicles in use in 2016, comprising vehicle models ranging from 1991 to 2016, will emit far fewer pollutants than the vehicles currently in use, there will be a proportional reduction in vehicle emissions. The slight increase in road traffic will be more than offset by this drop in emissions, such that the net effect will be a generalized reduction in levels for the study area.

Two scenarios were studied using 2016 traffic data: maintenance of the current configuration of the complex, and its reconstruction using lower road structures. When the results of the atmospheric emissions models were compared for these two scenarios, it was noted that the reconstruction of the Turcot Complex would result in a slight increase in the levels of certain contaminants (NO_2, $PM_{2.5}$, benzene and formaldehyde), mainly in the sector immediately adjacent to the proposed infrastructures, due to the lower height of the road structures. All of the expected levels in the ambient air of 2016 after completion of the project remain below the current standards.

5.3 MITIGATION MEASURES

Several mitigation measures were taken into consideration or proposed during the project design phase, to reduce if not eliminate any potential impacts on components of the natural and human settings during construction and the serviceable life of the new infrastructures. All current mitigation measures that the MTQ has included in the technical specifications (CCDG) will be applied on the worksite. In addition, special measures have been added, and are summarized here.

5.3.1 During the design phase

Psychosocial impact

In order to measure the psychosocial impact of the relocation and to identify the relocation potential and the appropriate mitigation or compensation measures, the MTQ plans to conduct a survey by meeting initially with each household affected to determine the socio-economic characteristics of the people to be relocated, identify their specific needs and establish the availability of residential units suited to these specific needs (e.g. cost of housing, availability of services, etc.) in the neighbourhoods affected and adjoining neighbourhoods.

In order to minimize the psychosocial impact associated with the involuntary relocation of homeowners and tenants following residential acquisition, the MTQ will pay rental compensation and moving costs to compensate the people being relocated. The legislation acknowledges the right of a tenant to receive compensation according to the harm suffered. Also, the MTQ has set up a committee with stakeholders in the setting affected by these issues so as to propose measures acceptable to all parties.

Soils

In order to minimize the impact of construction work on the new infrastructures and demolition of existing components, which will generate significant quantities of rubble and waste materials, mitigation measures are planned for handling non-contaminated and contaminated soils and waste materials. In all instances, the optimum solution will be re-use of the materials on the same site or other sites adjoining the Turcot Complex, insofar as these materials are acceptable in nature and composition, so as to minimize the impact of transportation.

Soil management will be done in compliance with MDDEP requirements, specifically those contained in the *Politique de protection des sols et de réhabilitation des terrains contaminés* for contaminated soils. Risk management measures relating to the recovery of contaminated soils are recommended so as to reduce the transportation of contaminants to potential receivers (e.g. the water of the Lachine Canal).

Surface water

Since the management of runoff water is significant, given the volume generated by the Turcot Complex and the possibility that it could be contaminated, the designers worked closely with all stakeholders involved to ensure that contaminants are now controlled at source using devices such as surface water retention basins, the design of which meets Ville de Montréal and MDDEP requirements.

Biological setting

During the detailed design of related works, such as retention basins to adequately manage surface water and during stabilization work (as applicable) at the base of the Saint-Jacques escarpment, improvements to the habitats of small fauna, herpetofauna and birds could be carried out.

For example, mitigation measures will be applied to minimize the cutting and stabilization activities, to maintain the integrity of the Saint-Jacques escarpment as far as possible, including installation of a buffer zone between the foot of the escarpment and the planned works, and bring in excess water by pumping the runoff water from the highway's drainage network to the foot of the escarpment (with the exception of the western portion close to boulevard Sainte-Anne-de-Bellevue) in order to create wetlands suitable for maintaining fauna habitats.

Additionally, coordination meetings were held with representatives of Ville de Montréal to propose mitigation measures that would enable preservation of the water quality in the Lachine Canal. For the moment, it is planned that runoff from the structure crossing the Lachine Canal will be discharged in the traditional manner by drains beneath the structure.

Public and active transportation

This project was developed with a constant concern for protecting a corridor for a future construction project of a railway link between the West Island, the Montreal-Trudeau International Airport and downtown. The project also enables implementation of public transit priority measures along rue Notre-Dame and the possibility of building a reserved lane to service future development in the Turcot Yard.

At the request of the STM, the shoulders of highways 20 and 720 were increased from 3.0 m and 3.5 m to allow for the future possibility of a reserved lane for public transit.

Furthermore, a multifunctional link will be developed in the buffer zone set aside at the foot of the Saint-Jacques escarpment, which will be connected to the bike paths planned to the west (boulevard Saint-Anne-de-Bellevue) and east of the project (rue Pullman and rue Saint-Rémi). These new links will connect with existing bike paths, in particular, the one that runs along the banks of the Lachine Canal. The majority of the sidewalks will be widened significantly.

In order to promote public transit and active transportation, several measures will be given priority during discussions with municipal stakeholders and at the detailed design phase of plans and specifications. As an example, the feasibility of installing a reserved lane for high-occupancy vehicles on Highway 20 is under evaluation.

A variety of measures relating to public transit to be completed before construction begins, and which could serve as mitigation measures during the project are also under evaluation.

Local road traffic

Connecting the new Turcot Complex road infrastructures to the local road network raised several problems, requiring close cooperation between the *Ministère* and the transportation authorities of each of the cities and boroughs affected, to find an optimal solution for residents, drivers and the MTQ. The *Ministère* is committed to continuing development of its project with complete transparency and to validate the acceptability of proposed solutions with both municipal stakeholders and over the public during the subsequent planning phases.

Landscape

Partners in the landscape bordering the Turcot Complex are even more sensitive to the changes to its geometry and profile. They are also affected by changes to the local road network. Mitigation measures must be developed to take into consideration the diversity of parties involved. These measures will be designed with a global approach, given the city entrance status held by the highway complex, but also, specifically, to reduce the impacts measured in each specific situation and local area (points of impact).

The general and specific recommendations must translate into proposals for the development and urban integration of the Turcot Complex, customized to each of the sectors crossed. A development and urban integration study is underway. These proposals will involve the cities and boroughs that the project will cross, as well as Parks Canada, which will have to approve works proposed on or bordering the Lachine Canal.

Based on the various points of impact, several examples of the specific mitigation measures to be recommended are given below:

- Mass plantings of residual spaces and embankments;
- Handling the infrastructure work above the Lachine Canal;
- Preservation and enhancement of landscape qualities of the Saint-Jacques escarpment.

Noise environment

The potential adverse impacts on noise levels following reconstruction of the Turcot Complex will require the installation of noise-protection walls in the following sectors:

De la Vérendrye sector (noise sensitive area No. 1):

- the length of the south shoulder of Highway 15/20 and boulevard De La Vérendrye off-ramp between rue Hadley and rue York;
- the length of the south shoulder of Highway 15/20, between rue Angers and boulevard De La Vérendrye.

Côte Saint-Paul sector (noise sensitive area No. 2):

- the length of the south shoulder of the on-ramp to Highway 720, between rue Bourassa and rue de Courcelle;
- the length of the south shoulder of Highway 720 (eastbound), between rue Lenoir and rue du Collège;
- the length of the south shoulder of Highway 720 (eastbound) and the Atwater off-ramp, between rue Collège and rue Bourget;
- the length of the south shoulder of Highway 720 (westbound), between rue Sainte-Marguerite and rue Rose-de-Lima.

Montréal-Ouest sector (noise sensitive area No. 5):

- to the north of Highway 20 east of the existing noise-protection wall;
- the length of the north shoulder of access ramps to Highway 20 and at rue Richmond;
- raising the height of a segment of an existing wall in the western portion of rue Elm (Montréal-Ouest).

Health and safety

During the detailed design of drawings and specifications and preparation of the worksite, a variety of measures will be planned to reduce the impact on the health and safety of workers and the public during the construction works and dismantling of existing structures, as well as during the serviceable life of the new road infrastructures.

Mitigation measures will focus specifically on planning suitable signage and a public information campaign regarding the scheduling of the work and planned activities; the application of a noise and dust control program; advance notice of work given to users of the Gadbois centre and the Lachine Canal, and the implementation of specific measures to minimize potential nuisances to the latter (site access, parking, etc.).

Archeological heritage and historic potential

The route selected for the reconstruction project, the surface areas required for the worksites and, as applicable, for dumping excess waste materials, must be systematically assessed by drilling and exploratory archeological digs where a potential has been identified. The purpose of this research is to check for the presence or absence of archeological sites in those spaces required for project construction. The archeological research will be conducted exclusively within the bounds of the routes that will be owned by or under the responsibility of the MTQ. The archeological survey will be submitted to the procedure in the *Loi sur les biens culturels du Québec* in order to obtain the archeological search permit.

The application of survey measures and possible archeological digs significantly reduces the likelihood of destroying sites of archeological interest. Notwithstanding the application of these measures, archeological sites could still be discovered by chance during the work, given that the site survey methods are based on sampling. In such an event, the discovery would be handled in compliance with the Act (L.R Q., ch. B-4, sect. 41 and 42), with temporary protection measures, assessment of the discovery and, as applicable, an archeological dig.

Historic and cultural heritage

Since the project requires work in the water and on the banks of the Lachine Canal, and since work will be necessary in the sector of the Tanneries village, which is of heritage and social interest, special measures to protect these sites will be taken during the detailed design of works planned for these sectors.

5.3.2 During construction

In general, the contractors must comply with all mitigation measures identified in the technical requirements and specification documents (CCDG) and those of the Ville de Montréal that relate to water management and dust control. In addition, special measures relating to certain interventions will be required to protect different components of the setting.

Physical setting

In general, the MTQ will take all necessary measures to ensure that no contamination reaches the federal property of the Lachine Canal and Aqueduct, be it from rainwater drainage, contaminated soil or its leachate, or any other type of contamination, whether during construction or operation of this complex.

In order to minimize the impact on the **soil,** specifically contamination and erosion, several standard measures will be applied that relate to soil stabilization, the movement of heavy equipment on the worksite, and the appropriate handling of hydrocarbons.

In addition, the potential adverse impact on the quality of the **surface water and groundwater** due to the addition of sediments and contaminants to the hydrologic setting will be minimized, indeed eliminated, by application of measures such as conservation of the protection strip, control of surface runoff and drainage from the site, general maintenance, and the controlled refuelling of equipment and construction vehicles, as well as handling and storage of hydrocarbon materials at a distance of more than 30 m from the canals, the application of emergency measures in case of an accidental spill, etc.

During implementation of **works in the water of the Lachine Canal and the Aqueduct**, special measures will be applied, specifically the dismantling of existing infrastructures within an enclosure, using sheet-pile curtains to keep the piling site dry, and doing the work during periods that would have the least impact on the aquatic setting

To minimize the impact of the **dismantling of existing works and during construction work** that could affect the quality of water in the Aqueduct, it is proposed that drainage water from the construction site and water potentially required during the dismantling operation be recovered and sent to an approved processing site. It is also planned that water from the sector bordering the canal affected by work be kept separate from the plant intake water so as to minimize the suspension of particles from the bottom of the Aqueduct.

Additionally, if the option of installing a temporary **bridge over the Lachine Canal** is selected, this will be subject to approval pursuant to the *Loi sur la protection des eaux navigables*.

The potential adverse impact on **air quality** associated with atmospheric pollutants emitted by construction equipment and the dust produced by the movement of heavy equipment will be minimized by application of standard mitigation measures, such as the use of dust-control, tarpaulins for transportation of materials containing fine materials, minimal running of engines, stripping by water jet, and the use of equipment and vehicles whose anti-pollution systems meet the standards. In addition, in order to compensate for the greenhouse gas emissions associated with the construction project, the MTQ is exploring the possibility of implementing measures to achieve "carbon neutrality" for the project.

Biological setting

The measures applicable to the biological setting are aimed at protecting existing plant-life (herbaceous fallow land and woods) and the inventoried fauna species. Special measures are also proposed for the protection of special status fauna species potentially present.

The potential adverse impact on the **vegetation** are mainly related to clearing activities. The application of standard mitigation measures, specifically the marking of clearing work limits, protection of trees to be conserved at the edges of the worksite, maintenance of a protection perimeter for the movement of heavy equipment, storage of materials, and all work involving excavation, cutting, filling and root-removal, will help minimize the negative environmental effects.

With respect to **fauna (terrestrial, avian and aquatic),** it is proposed to limit the duration of the work as far as possible, and to carry out the work outside of peak periods of fauna activity (e.g. spawning and fry production periods), specifically by:

- Clearing trees before the reproduction and brooding period, which runs from May 1 to July 31 for most forest-dwelling birds.
- Limiting the work zone as much as possible to avoid disturbing the habitat of the brown snake in the Saint-Jacques escarpment and checking for the presence in the intervention areas before beginning the work. As applicable, moving any individuals present in those areas before trees are cleared to a suitable escarpment location where brown snakes can find protection from freezing nights until warmer weather, and to a sufficiently extensive habitat so that a population of reasonable size can establish itself, with enough genetic diversity to ensure long-term survival of the species.
- Conducting a survey of the banks of the Lachine canal where the work is to be performed to check for the possible presence of turtles such as the Map turtle, and as applicable, ensure that no egg-laying area is damaged if work is scheduled for the laying to hatching period, i.e June to October.
- Proceed with the works in the water of the Lachine Canal outside of the main fish spawning or fry raising periods, which extend from March 15 to June 30.

Human setting

Mitigation measures applicable to the human setting during construction of the new infrastructures and demolition of existing structures affect the existing built-up setting, public and recreation/tourism facilities, including the Lachine Canal National Historic Site (pleasure boating, park with bike paths and walking trails along the canal) as well as the public transit, road and railway infrastructures. These mitigation measures are also aimed at reducing the impact on noise levels, the landscape and health and safety during the construction phase.

In addition to the application of standard measures (e.g. performing the work outside of peak traffic hours, repairing damage to properties, cleaning roads used by trucks) to minimize the impact on the **built-up setting**, the MTQ will establish an information program at the start of work that uses a variety of media (e.g. MTQ website, local newspapers) to address the public to inform it regularly and in advance of work progress, temporary lane closures or other obstacles. Residents will also be able to contact the MTQ via the service *Québec 511 – Info transports.* The MTQ will inform the MDDEP of the efficacy of these communication methods every six months.

The general MTQ requirements for signage will be applied. Special requirements will also be established to increase **user safety** and reduce the disruption caused by the work.

The MTQ agrees to install additional peripheral signage at 1.5 km, 2.0 km and 5.0 km from the Turcot Complex work area, on both sides of traffic lanes, to promote alternative measures to solo car use (car-pooling, active or public transportation), provide a drawing of the trucking network in the specifications sent to contractors and oversee its application.

Although in the project planning phase, the MTQ is unable to determine whether it will have to move the old **Côte-Saint-Paul bridge**, it undertakes to implement special protection measures should the need arise.

Regarding potential adverse impact on **tourism facilities and activities** during construction work, the MTQ agrees to:

- Maintain pleasure boating conditions throughout the nautical activities period, i.e. mid-May to mid-October.
- Validate the date of works with Lachine Canal and Transport Canada managers and notify them in advance of activities to be performed.
- Ensure that the Gadbois centre can continue its activities throughout the construction period.
- At the start of work, establish an information program with several key stakeholders, including Parks Canada, on progress of work affecting the Lachine Canal, using the MTQ website or another suitable means of communication .
- Place illuminated for use at night.

Regarding proposed measures for minimizing the **noise impact** associated with construction work, the contractor must comply with the requirements stipulated in the *Ministère's* special specifications covering noise control during roadwork. If authorized noise levels are exceeded, mitigation measures will be established.

Additionally, with the help of a specialized acoustics firm, the contractor must establish a noise control program before the start of work per area and per work phase, to anticipate noise issues and develop appropriate mitigation measures.

The MTQ will also have to conduct occasional acoustic monitoring during the work in noise-sensitive areas to ensure compliance with authorized levels and the efficacy of the mitigation measures in place. The MTQ will establish a communications procedure to inform residents about construction site noise controls and enable them to submit complaints or comments, as applicable.

Among the noise mitigation measures that could be implemented are variable intensity reversing alarms, equipment with mufflers or sound-proofing, temporary noise-protection screens, the use of acoustic tarps, etc. Restrictions will be imposed on heavy trucks with respect to the use of compression brakes and idling.

5.3.3 During the operation period

During the serviceable life of the new infrastructures, the MTQ will consider prevailing environmental protection measures in its operations and maintenance procedures. Maintenance activities mainly involve snow removal and de-icing of roads, controlling vegetation in the corridor and the maintenance of the bridges, overpasses and highway road surfaces. Measures relating to these maintenance activities in the operations phase will help minimize the potential adverse impact associated with the presence of the highway on water quality and vegetation.

Snow removal and the use of road salt

Snow removal will be done in part according to the method currently used throughout the MTQ network, i.e. pushing the snow off the highway platform, within the limits of the corridor, for those highway segments built at ground level or on embankments where there is sufficient space within the corridor to push the snow. Otherwise, as is current practice for a good portion of the highway network on the Island of Montréal, snow on portions of the structural network, and from all locations where there is insufficient space within the limits of the corridor to push snow aside will be loaded and transported to a snow dump.

Regarding the use of road salt, the proponent undertakes to comply with the Code of practice for the environmental management of road salt published by Environment Canada (2004). The main objective of this plan is to ensure environmental protection while providing the necessary conditions for safe driving.

Eco-management of vegetation

For all new Turcot Complex infrastructures, the *Ministère* will recommend a customized approach to ecological management of the vegetation in that land use proposals for the corridor will be developed to minimize grassed surfaces that require regular maintenance. The ecological approach to vegetation management which consists essentially in permitting local flora to take over and differs from the traditional maintenance approach, which favours systematic mowing of highway edges from the road surface to the ditch, and sometimes all the way to the limit of the right-of-way. The *Ministère* gives preference to a treatment of the corridor suited to each of the different settings.

Maintenance of road surfaces and structures

The structures (e.g. bridges and retaining walls) to be erected, will be maintained regularly, in compliance with the methods recommended for use throughout the MTQ network. Roads will be maintained regularly to maintain a satisfactory quality of the driving surface and ensure user safety.

5.4 SUMMARY OF RESIDUAL IMPACTS

The **assessment of residual impacts** provides an overall appreciation of the various project impacts, considering the mitigation measures used. The **residual impact** could be deemed significant or insignificant, depending upon the import of the potential impact and the efficacy of the mitigation measures established during the project. Note that a residual impact is deemed significant if it exceeds the quantitative thresholds established in the regulation, the standards and the recommendations of experts, or if detrimental aspects could have a lasting effect on the ecological or social values of the settings.

Tables 1 and 2, respectively, show a summary of the analysis of impacts associated with activities conducted in the preconstruction and construction phases, and then in the operations phase, for each component in the natural and human settings surveyed. Positive impacts are indicated by a gray background. Given the significance of the potential impact and the efficacy of the proposed mitigation measures, none of the other impacts described are deemed important. The impacts and the three (3) indicators used to define the potential impact are described, i.e. the intensity (I), the duration (D) and the scope (S).

Figure 7, which can be seen after the tables, summarizes the residual impacts of the project using a grid that shows the relationship of components of the natural and human settings surveyed and the activities likely to affect them. The VECs selected for the purposes of this project are indicated by a gray background.

Table 1: Summary of impacts in preconstruction and construction phase

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENT	INDICATORS			Significance of potential impact
	I	D	S	
RIGHT-OF-WAY ACQUISITION				
Existing built environment • 25 residential properties (174 dwellings) and 36 commercial and industrial properties are to be acquired, in whole or in part, for the infrastructure site, in addition to a building of heritage interest. Advertising panels will also be removed.	H	L	L	Major
• The owners and renters who will be involuntarily relocated following residential acquisitions are likely to suffer psychosocial impacts, in particular, financial impacts.	H	M	L	Major
Public infrastructures and facilities • Three (3) snow drops, the public works equipment yard, an ecocentre and an MTQ operations centre will have to be relocated. Two (2) rail antenna will have to be moved, one to the east of the Turcot interchange and the other to the western end of Highway 20. Ultimately, the existing railway tracks will be moved and new railway rights-of-way will be set aside in preparation for current and future requirements.	H	L	I	Moderate
Recreational tourism activities and facilities • Parking for the Gadbois centre will be reduced (portion located beneath the Turcot interchange; it has not been used since September 2008 due to safety concerns).	L	L	I	Moderate
Urban development potential • A portion of the lane acquired by the MTQ (Turcot Yard) in preparation for the project will be available for urban development after the new highway infrastructures (land remaining after construction) are built.	H	L	R	Major
Local and regional economy • The relocation of snow drops, the ecocentre and the public works equipment yards will require studies and construction work.	M	S	R	Moderate
PRECONSTRUCTION AND CONSTRUCTION **(Clearing, site organization and access layouts, heavy equipment and site machinery traffic, excavation and earthworks, work done in the water of the Canal, drainage work, new infrastructure construction, existing highway infrastructure demolition, demobilization and land reclamation)**				
Soil • Use of cutting equipment during clearing, heavy equipment and site machinery traffic, as well as the excavation and earthworks, present a risk of surface soil contamination due to potential petroleum product leakage. Removing the roots of cleared trees and shrubs and carrying out the excavation and earthworks risk disturbing the physical structure and stability of the soils.	M	S	I	Minor
• The use of machinery to lay out access routes, work areas and storage areas, and all other machinery traffic and work associated with demobilization will be the source of surface soil chemical (contaminant leaks) and physical disturbance (compaction).	L	S	I	Minor
• Various properties (33) within the study area to be acquired for the purposes of this project have been identified as posing a risk of contamination from prior activities. Poor management of contaminated soils represents a source of potential contamination of non-contaminated soils.	H	M	L	Major

I: Intensity (**H:** High **M:** Moderate **L:** Low) **D**: Duration (**L:** Long **M:** Medium **S:** Short) S: Scope (**R:** Regional **L:** Local **I:** Intermittent)

Table 1: Summary of impacts in preconstruction and construction phase

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENT	INDICATORS			Significance of potential impact
	I	D	S	
• Building road foundations and surfaces results in physical (compaction) and chemical (possible leaks from equipment) disturbances of underlying and adjacent soils.	L	M	L	Moderate
• Constructing new Complex components will generate significant amounts of potentially contaminated waste and residual material. Poor management of contaminated soils represents a source of potential contamination of non-contaminated soils.	H	M	L	Major
• Leaks from machinery and debris falling onto the soils underlying the structures to be demolished may lead to chemical and physical disturbance of surface soils.	M	S	L	Moderate
• Demolishing existing components will generate significant quantities of potentially contaminated waste and residual material.	M	M	I	Moderate
Surface water • Accidents or petroleum product leaks from machinery that deposit sediments and contaminants in the drainage ditches may lead to water contamination.	M	M	L	Moderate
• Refuelling with petroleum products, traffic and parking of site machinery and equipment as well as the work involved in land reclamation may be a source of contamination in case of leak or accident because of possible leaks from machinery or the presence of contaminated soils or materials and residue dropped on site.	M	S	L	Moderate
• The presence of potentially contaminated soil on certain properties within the study area may generate surface water contamination during excavation work and/or during temporary storage of these soils on adjacent land. Moreover, the flow of surface water may be disrupted.	H	M	L	Major
• Access to piles via a temporary bridge or by barge and the surface preparation and new structure construction could potentially impact water quality in the Lachine and Aqueduct Canals by re-suspending contaminated sediments. In the case of accidental spillage of oil or fuel used for machinery in a ditch or canal or nearby, surface water quality is likely to be altered. Sanding and concreting to prepare surfaces are likely to introduce foreign materials into the water. • Dismantling drydock structures and material placement may bring some sediments into suspension. Watercourse flow may be modified to a greater or lesser extent by the presence of a temporary bridge erected to access to the piles. The presence of drydock structures may also contribute to changes in flow patterns. • Concentration of suspended materials and surface water turbidity may increase due to contributions from the areas where work is being done in the water of the Canal and the building of ditches and pipelines channelizing rainwater.	H	S	L	Moderate
• Adding ground-covering surfaces less permeable than the ground will increase the volume of runoff water to be managed. Construction work could potentially contaminate the hydric setting.	M	M	L	Moderate
• Chunks, particles and dust may block the ditches or contaminate surface waters during demolition work.	H	S	I	Minor
Groundwater • Excavation and earthwork are likely to introduce contaminants to groundwater that comes into contact with any machinery leaks that may occur or by introducing contaminated soils from soil horizons that were not in contact with groundwater.	M	M	L	Moderate
Air • Cutting vegetation will result in dust suspension (wood particles) in the air.	M	S	I	Minor

I: Intensity (**H:** High **M:** Moderate **L:** Low) **D**: Duration (**L:** Long **M:** Medium **S:** Short) S: Scope (**R:** Regional **L:** Local **I:** Intermittent)

Table 1: Summary of impacts in preconstruction and construction phase

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENT	INDICATORS			Significance of potential impact
	I	D	S	
• Heavy machinery and site equipment traffic, excavation and earthwork and infrastructure demolition will be sources of atmospheric pollution due to engine operation and dust production.	H	S	L	Moderate
• Foundation work and road surfacing will generate dust and polluting emissions due to machinery operation. In addition, the asphaltic concrete applied to the surface produces vapours.	H	S	I	Minor
Vegetation • On the Saint-Jacques escarpment, a wooded or fallow surface (approx. 13,700 m2) will be lost (rue Pullman and boul. Saint-Anne-de-Bellevue sector as well as rue Saint-Jacques and rue Pullman in the Turcot interchange sector).	H	L	I	Moderate
• Heavy machinery and site equipment traffic as well as excavation and earthwork activities will lead to the loss of herbaceous vegetation in the work area in general, and more particularly, in the highway right-of-way.	L	S	I	Minor
• If the sectors of intervention are not clearly marked off during clearing, construction, demobilization and land reclamation, the heavy machinery and site equipment may damage or destroy trees and shrubs beyond the work area.	M	L	I	Moderate
• The roots and branches of trees located outside the work area may be damaged during excavation work. In addition, earthworks performed near trees may interfere with their development or lead to their death.	H	L	I	Moderate
• Fauna • Clearing work is likely to disturb the herpetofauna and small mammals that frequent the cleared sectors by changing their habitat.	M	S	I	Minor
• Clearing work is likely to temporarily disturb the birds that frequent the Saint-Jacques escarpment sectors.	L	S	I	Minor
• Fish species in the Lachine Canal, particularly those near the work, are likely to suffer physiological stress or behavioural modifications due to disturbance from the work, in particular the installation and dismantling of drydock structures, and the installation and dismantling of the temporary bridge (if this option is chosen). However, since the Lachine Canal will never be drained throughout its length, the ichthyological fauna will be able to relocate. • Ichthyological fauna may also be affected in the event of an accidental contaminant or sediment spill during construction or preparation activities and surface concreting or demolition. The products used and working methods also have the potential to impact fish. • Ultimately, fish habitats may also be affected by the modification of the physicochemical qualities of the water and the sediments, such as an increase in turbidity and sedimentation, a disturbance of the flow regime, addition of contaminants or an increase in noise level. Fish branchiae can be affected, as can their feeding grounds or any spawning grounds located downstream from discharge points.	H	S	L	Moderate
Built environment • Noise from machinery traffic and certain equipment will add to ambient noise levels. Furthermore, demolition work will occur at night which is likely to affect residents' quality of life.	M	S	L	Moderate
• Underground pipework, electrical lines and properties may be damaged during excavation work and earthwork.	H	S	L	Moderate
• During demolition work, chunks, particles and dust may fall on existing buildings and properties, damage properties, soil surfaces, and be deposited on plants (gardens and vegetable gardens).	H	S	I	Minor

I: Intensity (**H:** High **M:** Moderate **L:** Low) **D**: Duration (**L:** Long **M:** Medium **S:** Short) S: Scope (**R:** Regional **L:** Local **I:** Intermittent)

Table 1: Summary of impacts in preconstruction and construction phase

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENT	INDICATORS			Significance of potential impact
	I	D	S	
Public infrastructures and facilities • Users of the public spaces located near the work areas and bike path users will be affected by heavy machinery traffic during new infrastructure construction, demolition of existing infrastructures, demobilization work and land reclamation work • Site access arrangements and their organization will affect parking spaces and public use (ex: 3 snow drops) in the work sector.	M	S	I	Minor
• Underground pipelines, electrical lines, equipment, and infrastructures within and near the intervention areas (bike paths, allotments, street furniture) may be damaged during construction, demolition, demobilization and land reclamation.	M	S	L	Moderate
• Chunks, particles and dust may fall on existing public infrastructures and equipment, soil equipment and be deposited on plants.	H	S	I	Minor
Recreational tourism activities and facilities • The Gadbois centre will be disturbed by the traffic and the presence of machinery in the vicinity of its facilities and buildings.	L	S	I	Minor
• Classes held at Doorway High-School and Marie-de-L'incarnation, the Gadbois centre, as well as bike path and Lachine Canal users will be affected by the construction site and machinery and worker traffic.	M	S	I	Minor
• New infrastructure construction is likely to modify air quality within the Gadbois centre and therefore interfere with the regular holding of activities.	H	S	I	Minor
• Chunks, particles and dust may fall on existing equipment, soil it and be deposited on the surrounding plants.	H	S	I	
Lachine and Aqueduct Canals • Sport fishing activities, pleasure boating and the use of green spaces and active transportation paths that run along the Lachine Canal will be affected by the traffic and presence of machinery and site equipment during construction. • Demolishing existing infrastructures, demobilization and land reclamation required on the banks of the Canal, and dismantling drydock works may be a source of soil and surface water contamination. • The excavation work required on the banks of the Lachine Aqueduct and Canals may contaminate soils and surface water. • The water levels in the Lachine Canal and sluice gate management may be modified if the additional runoff water is sent there. If the waters are loaded with sediment or are discoloured, they can contribute to the visual degradation of the canal.	H	S	L	Moderate
• Lachine Canal recreational activities may be affected by excavation and earthwork in the sector.	M	S	L	Moderate
• Construction of a temporary bridge over the Lachine Canal is likely to interfere with pleasure boating. If the bridge option is chosen, it will be subject to an approval process as established by the *Loi sur la protection des eaux navigables*.	H	M	I	Moderate
Public transit and road transportation • Certain bus routes and local road transportation may be modified for some periods according to the sector of the work and the existing traffic throughways. In addition, travel by foot and bicycle near those sectors may be disrupted.	M	S	L	Moderate
• When excavation work must occur on or near roads where buses travel, constraints and temporary detours will affect the public transit network, which may lead to slowdowns or longer routes. • During demolition, chunks, particles and dust may fall on vehicles, lead to accidents and be hazardous to passengers.	H	S	L	Moderate

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Table 1: Summary of impacts in preconstruction and construction phase

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENT	INDICATORS			Significance of potential impact
	I	D	S	
• Site access may increase confusion in drivers and result in accidents on the road network.	M	S	R	Moderate
• During demolition work, chunks, particles and dust may fall on vehicles, lead to accidents, be hazardous to passengers or damage goods being transported.	H	S	R	Moderate
• When the work must occur on or near roads, temporary re-routing and slowdowns will affect the road network.	M	S	R	Moderate
Rail: • Rail transport may be affected if railway lines are temporarily blocked by machinery or if safe crossings are not clearly indicated. • When machinery is moving about on site, rail transport may be slowed intermittently. Likewise, when excavation work must occur near the railway tracks or is to be moved, rail transport will be halted for brief periods.	L	S	R	Minor
• During the demolition of existing infrastructures, chunks, particles and dust may fall on train cars, lead to accidents and be hazardous to passengers and transported goods. • When the work must be performed near railway tracks or is to be moved, rail transport will be halted for brief periods.	M	S	R	Moderate
Landscape • The loss of trees and shrubs is likely to result in a degradation in landscape quality.	L	M	L	Moderate
Sound environment • Heavy machinery and site equipment traffic during construction and demolition will disturb the sound environment.	M	S	L	Moderate
• The use of mechanical saws during clearing, excavation and earthworks, the work done in the water of the Canal, and operation of the machinery associated with the foundation work and surfacing the roads are sources of noise disturbance due to machinery operation.	M	S	I	Minor
• Construction site drainage is a source of noise disturbance when the pumps are used to evacuate surface water.	L	S	I	Minor
Health and Safety • The presence of new activities, new access and new signage are additional sources of information for drivers and the residents of the nearby residential sectors and increase the risk of traffic accidents. • Machinery traffic may have deleterious effects on drivers' vision and lead to accidents on the construction site or in adjacent public lanes.	M	S	R	Moderate
• If the aqueduct or sewer pipelines are broken during the work, the quality of potable water and wastewater management will be affected.	H	S	L	Moderate
• By sending sediment into suspension, work done in the Aqueduct Canal, which supplies potable water to the citizenry ofMontréal, may result in temporary degradation of the Canal's water quality.	H	S	R	Moderate
• Demolition presents a risk to the safety of pedestrians and residents living nearby.	H	L	I	Moderate

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Table 1: Summary of impacts in preconstruction and construction phase

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENT	INDICATORS			Significance of potential impact
	I	D	S	
Archeology and heritage • Historical or archeological remains may be exposed, damaged or destroyed during excavation work.	H	L	I	Moderate
Local and regional economy • Local business owners who own heavy equipment may obtain contracts that support the local economy. The purchase of local goods and services will also be required for equipment maintenance.	H	S	L	Moderate
• Local business owners may obtain contracts that support the local economy. The purchase of local goods and services will also be required for equipment maintenance.	M	S	L	Moderate
• Local businesses and industries may suffer a reduction in clientele if excavation works hinder their access.	H	S	L	Moderate
• Work done in the water of the Canal may reduce local economic activities involving the Lachine Canal (ex: biking, boating).	M	S	L	Moderate

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Table 2: Summary of operational phase impacts

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENTS	INDICATORS			Significance of potential impact
	I	D	S	
PRESENCE OF THE HIGHWAY				
Surface water • Since asphalt surfaces are less permeable than earth surfaces, they contribute to the increase in the volume of water requiring evacuation.	H	L	L	Major
Existing built environment • New highway infrastructures could impact the value of existing properties within the right-of-way.	M	M	L	Moderate
Public transit/safety • Since the road network capacity is not to be increased and since the project includes preserving existing rights-of-way for additional public transit infrastructures as well as infrastructures supporting active transportation, public transit will be the preferred way of getting downtown. • Note that the project has reserved rights-of-way for a future shuttle to the Montréal-Trudeau International Airport, and a lane to be used by multiple occupancy vehicles on Highway 20, in addition to improving public transit in the axis of rue Notre-Dame, thanks to prioritizing measures and the addition of new active transportation connections at the base of the Saint-Jacques escarpment, on the new rue Pullman to the east, and in the axis of boul. Saint-Anne-de-Bellevue to the west. • Ultimately, the project may contribute to greater pedestrian and cyclist safety.	H	M	R	Major
Road transportation • The selected project will improve functionality, accessibility and reliability by adding shoulders on the highway network. The chosen scenario presents several improvements to the functionality of the highway network in each interchange (staging, addition of service roads, etc.), and there are not expected to be major capacity issues. Several accessibility improvements have been made, including the addition of an east-west link (new boul. Pullman), the reconfiguration of De La Vérendrye interchange with direct access to the Cabot sector and the reconfiguration of the Angrignon-Montréal-Ouest sector with direct access to Turcot Yard and at boul. Angrignon.	H	M	R	Major
Landscape • Moving Highway 15/20 lanes towards the Cabot sector and De La Vérendrye interchange distances it from the residential areas to the south of the highway and opens up the possibility of improving the available space with landscaping.	M	L	L	Major
• Establishing super-elevated lanes 6.7 m above the Lachine Canal and enlarging the crossing structure will result in intermittent closure of the roads and a sense of confinement by Lachine Canal users.	M	L	I	Moderate
• Realigning boul. De La Vérendrye opens up the field of view for drivers and better integrates the bike path in the local urban landscape. • Bringing rue Laurendeau, currently located in low land beneath the highway, up to ground level opens up the field of view for pedestrians and reduces the sense of confinement due to the existing profile. • In the sector of the Montréal-Ouest interchange, relocating Highway 20 lanes to the north and eliminating the super-elevation of through and weave lanes opens up the field of view and improves users' assessment of their position.	L	L	L	Moderate

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Table 2: Summary of operational phase impacts

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENTS	INDICATORS			Significance of potential impact
	I	D	S	
• Removing most super-elevated lanes in the Turcot interchange allows views to be opened to the surrounding sectors, opens up the field of view for residents just behind the highway and improves the field of view from the top of the Saint-Jacques escarpment.	M	L	R	Major
• Increasing the number of local roads around the Turcot interchange reduces the structural nature of the Saint-Jacques escarpment within the sector and limits enhancement by vegetation.	M	L	R	Major
• The landscape around the highway in the Pullman/Saint-Jacques sector is rendered more complex and more impressive. Multiple lanes crowd the field of view for drivers and residents. The visible landscape, dominated by the highway, is not integrated into the structural landscape of the Saint-Jacques escarpment and limits the presence of vegetation.	H	L	L	Major
• Moving Highway 20 lanes closer to the Saint-Jacques escarpment in the current Turcot Yard improves the field of view for users, neighbourhood users of the Lachine Canal and rue Notre-Dame users.	M	L	R	Major
• Realigning boul. Sainte-Anne-de-Bellevue and its extension to rue Notre-Dame will allow new visual perspectives for boulevard users, and may create an urban landscape where the presence of highway axes will be less noticeable.	M	L	L	Major
• Constructing Highway 15 on engineered fill will create a visual barrier between the Cabot and Côte Saint-Paul sectors. The construction of boul. Angrignon on engineered fill will have a similar effect within the future Turcot Yards development.	H	L	L	Major
• Reconfiguring rue Notre-Dame so that it crosses the fast lanes in a tunnel will close off views for users and may create a sense of confinement in residents.	M	L	I	Moderate
• Building a retaining wall (north side) between the eastbound and westbound lanes of Highway 720 closes off the field of view on the left hand side for highway users.	L	L	I	Minor
• Overall, reconfiguring the axes makes it possible to re-parcel certain lands and offers the opportunity to integrate long-term, structural development projects. This will generate significant urban and landscape reworking.	H	L	R	Major
• Moving the railway lines nearer the Saint-Jacques escarpment will include them in the field of view of Saint-Jacques escarpment visitors.	L	L	L	Moderate
Local and regional economy • New access routes will affect the sector's businesses and industrial zones.	M	M	L	Moderate
HIGHWAY TRAFFIC				
Surface water • If an accident occurs, hazardous materials such as petroleum products may encounter surface waters and contaminate them.	M	S	I	Minor
Air • Slight increase in atmospheric pollutants caused by lowering the profile of the Turcot Complex's lanes (in comparison with maintaining the status quo for the year 2016). This increase should be compensated for by decreased vehicle emissions between now and the commissioning of the project.	M	L	I	Moderate

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Table 2: Summary of operational phase impacts

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENTS	INDICATORS			Significance of potential impact
	I	D	S	
Existing built environment • New infrastructures, built on engineered fill and at ground level rather than raised structures, will have an impact on the quality of life of residents. The perception of risk may even be less than it is now.	M	L	R	Major
Sound environment • Noise-sensitive zone no. 1 (De La Vérendrye) south of Highway 15/20 will see significant increase in noise levels for 5% of the computation points. • Noise-sensitive zone no. 2 (Côte-Saint-Paul) will see a significant increase in noise levels for 10% of the computation points. • Noise-sensitive zone no. 5 (Montréal-Ouest) will see a significant increase in noise levels for 47% of the computation points.	H	L	L	Major
• Noise-sensitive zone no. 1 north of Highway 15/20 will see little or no increase in noise levels for 9% of the computation points. • Noise-sensitive zone no. 1 north of Highway 15/20 will see significant increase in noise levels for 5% of the computation points.	M	L	I	Moderate
• Noise-sensitive zone no. 2 (Côte-Saint-Paul) will see a low reduction in noise levels for 58% of the computation points.	H	L	L	Major
• Noise-sensitive zone no. 1 (De La Vérendrye) south of Highway 15/20 will see a moderate reduction in noise levels for 48% of the computation points. • Noise-sensitive zone no. 3 (Westmount) will see a low to significant reduction in noise levels for 96% of the computation points. • Noise-sensitive zone no. 4 (Décarie) will see a moderate reduction in noise levels for 72% of the computation points.	H	L	L	Major
• Noise-sensitive zone no. 4 (Décarie) will see a low reduction in noise levels for 8% of the computation points (commercial and industrial sectors).	L	L	L	Moderate
• Noise-sensitive zone no. 1 south of Highway 15/20 will see little or no increase in noise levels for 32% of the computation points. • Noise-sensitive zone no. 2 will see little or no increase in noise levels for 32% of the computation points. • Noise-sensitive zone no. 3 (Westmount) will not see any variation in noise levels for 4% of the computation points. • Noise-sensitive zone no. 4 will see a low increase in noise levels for 8% of the computation points (commercial and industrial sectors). • Noise-sensitive zone no. 4 will see a significant increase in noise levels for 4% of the computation points (commercial and industrial sectors). • Noise-sensitive zone no. 4 will see little or no increase in noise levels for 8% of the computation points. • Noise-sensitive zone no. 5 will see little or no increase in noise levels for 42% of the computation points.	L	L	L	Moderate
• Noise-sensitive zone no. 5 (Montréal-Ouest) will see a minor reduction in noise levels for 11% of the computation points.	L	L	L	Moderate
Local and regional economy • Since highway infrastructure capacity is not being increased the project should have little effect on businesses. Improving existing industrial zones service should contribute value-added.	M	L	I	Moderate

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Table 2: Summary of operational phase impacts

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENTS	INDICATORS			Significance of potential impact
	I	D	S	
Gadbois Centre • Lowering structures will have an effect on air quality within the Gadbois Centre, judged poor to good.	L	L	I	Minor
Maintenance, snow removal, use of de-icing salts and repairs				
Surface water and groundwater • The use of de-icing salts or other abrasives during winter may be a source of contamination of surface or groundwater.	H	S	L	Moderate
Air • Maintenance work and repairs can result in air quality changes because of atmospheric pollutant emissions from machinery and dust generation.	M	S	L.	Minor
Public infrastructure and facilities • During maintenance work, public infrastructure and facilities may be temporarily affected (segments of roads may be closed, or highway access).	L	S	L	Minor
Recreational tourism activities and facilities • During maintenance work, public facilities may be temporarily affected (segments of bike paths may be closed, access to these infrastructures or facilities).	L	S	I.	Minor
Lachine Canal • During maintenance work on lanes over the Canal, contaminants could fall into the water, affecting its quality.	M	S	L	Moderate
Public transit • During maintenance work, bus routes may be temporarily affected (diverted or slowed).	H	S	L	Moderate
Road transportation • During maintenance work, road infrastructures may be temporarily affected (diverted or slowed).	H	S	L	Moderate
Rail • During maintenance work, railway transport may be temporarily affected.	L	S	R	Minor
Sound environment • Performing maintenance work and repairs will disturb the sound environment due to movement and operation of the machinery involved.	M	S	I	Minor
Health and Safety • Seismic risks will be greatly reduced, since existing raised structures will be dismantled and replaced by structures built in compliance with the most recent applicable seismic standards or by traffic lanes built on the ground or engineered fill, and therefore much less sensitive to earthquakes.	H	L	R	Major
MOVING THE MAIN CN LANES				

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Table 2: Summary of operational phase impacts

DESCRIPTION OF IMPACTS ACCORDING TO SETTING COMPONENTS	INDICATORS			Significance of potential impact
	I	D	S	
Local and regional economy • Contractors in the area who have the necessary equipment may be granted contracts, which will support the local and regional economy.	M	L	L	Major
St-Jacques Escarpment • Moving the railway tracks to the foot of the St-Jacques escarpment may lead to increased vibrations from passing trains and may affect the stability of the escarpment.	F	L	I	Moderate

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			PRE-CONSTRUCTION AND CONSTRUCTION PHASES											OPERATIONS PHASE		
			Acquisition of right-of-way	Clearing	Organization of the worksite and access	Heavy equipment and worksite plant movement	Excavation and levelling	Work in water	Drainage work	Construction of new infrastructures	Demolition of existing infrastructures	Demobilization and return to original condition	Relocation of railway tracks	Presence of the highway	Road traffic	Maintenance and repairs
NATURAL SETTING	Physical setting	Soil														
		Surface water														
		Groundwater														
		Air														
		Saint-Jacques escarpment														
	Biological setting	Herbaceous fallow land														
		Trees and shrubs														
		Terrestrial fauna														
		Avian fauna														
		Ichthyological fauna														
HUMAN SETTING	Land use	Existing built-up environment (including the Village des Tanneries)														
		Public infrastructure and facilities														
		Recreation/tourism activities and facilities														
		Lachine Canal														
		Urban development potential														
	Quality of life	Public transit														
		Road transportation														
		Railway transportation														
		Landscape														
		Noise environment														
		Health & Safety														
	Socio-economics	Archeology and heritage														
		Local and regional economy														

Significance of the residual impact

- Positive
- Insignificant
- Significant

Figure 7: Residual impacts assessment grid

Taking into account the application of the mitigation measures proposed during detailed project design and those used to monitor the impact during construction work and dismantling of the existing infrastructure, there is **no significant negative residual impact anticipated.**

Given the magnitude and duration of the construction site, the most marked residual impact is that associated with the work, such as the increased noise and airborne dust levels, affecting local residents and the temporary closures of certain traffic lanes.

In contrast, the benefits enjoyed over the serviceable life of the new infrastructures are significant: by replacing existing works that have reached the end of their useful lives, user safety is enhanced, there will be a lower risk from seismic activity since many of the elevated structures will be replaced with works at ground level that are less sensitive to earthquakes, and by new structures that meet the latest seismic standards. There will also be improved reliability of the highway infrastructures due to the addition of shoulders, and improved access to sectors serviced by the interchanges.

Improvements to the visual aspects by architectural treatment of the walls and structures, and landscaping within the corridor, the installation of noise-protection screens in sensitive areas, and rainfall runoff retention basins connected to the urban setting will enable a better integration of these new structures into the urban environment. In addition, there is a positive impact of the project on railway transportation, active transportation and public transit, since the highway project offers many opportunities for improvement. Recall that the carrying capacity of the new infrastructures has not been increased, so as to promote alternative methods of urban transportation.

5.5 SUMMARY OF CUMULATIVE EFFECTS

Pursuant to the CEAA requirements, the **cumulative effects** must be analyzed for **valued ecosystem components (VEC)** identified in this project. In total, six (6) VECs were identified, i.e. the Lachine Canal, fish habitat, the Saint-Jacques escarpment, the village des Tanneries, the noise levels, and air quality. Only those components suffering moderate potential impact were selected and were given a more in-depth, cumulative effects assessment. Cumulative effects refers to the interactions between effects produced by this project with other past, planned or present projects or activities. The method used to assess cumulative effects is drawn largely from that described in the CEAA document entitled *Cumulative Effects Assessment Practitioners' Guide.*

In general, new highway infrastructures are only minor contributors to the cumulative effects the on VECs, since they are a reconstruction of existing highway infrastructures and well-established in a highly urbanized setting. Rather, these new infrastructures will contribute to improving these VECs.

5.6 SUMMARY OF PROJECT IMPACTS AND SUSTAINABLE DEVELOPMENT

Stemming from the MTQ 2005-2008 Strategic Plan, the main approaches selected for the reconstruction of the Turcot Complex are to ensure users have safe transportation infrastructures that are functional and in good condition, avoid increasing the capacity of highways and improve the efficacy of transportation systems in a perspective of sustainable development. For the purposes of the reconstruction of the Turcot Complex, the MTQ developed several actions to comply with different principles of the *Loi sur le développement durable* and the main approaches selected by the MTQ.

6. ACCIDENTS AND FAILURES

All necessary precautions will be taken to prevent accidents and failures during all phases of the project and, as applicable, to minimize the possible effects on the environment. Accidents with the greatest potential impact on the environment include:

- spills of hydrocarbons or other hazardous materials;
- failure of measures taken to counter erosion and sedimentation;
- fires;
- disturbance of archeological and heritage resources.

It is difficult to accurately predict the nature and severity of possible incidents. However, there is a low probability of significant negative environmental effects resulting from serious accidents or incidents, given the emergency measures and intervention plans that will be in place. To this end, the MTQ developed a provincial safety plan in 2003 (operational process, emergency measures) that promotes rapid, coordinated and effective intervention by all internal and external players in the event of an emergency.

7. ENVIRONMENTAL MONITORING AND FOLLOW-UP PROGRAMS

7.1 ENVIRONMENTAL MONITORING PROGRAM

The environmental monitoring program describes the means that the MTQ will establish to ensure smooth implementation of the construction work and compliance with the legal requirements and the mitigation measures listed in the environmental study. This program includes all preconstruction, construction and post-construction activities associated with the project, and will be achieved in two (2) stages:

- the integration of standard and special mitigation measures and other special requirements, as applicable, linked to the authorizations issued by the authorities in the **construction drawings and specifications**;
- the full application, by the persons responsible for environmental monitoring of the worksite, of mitigation measures during **construction work** and for each work batch.

Note that the MTQ will delegate the task of environmental monitoring to a qualified independent professional, who will ensure that all mitigation measures appearing in the Environmental Impact Study, the environmental clauses of the contract (specifications) and all provisions of the MTQ's technical specifications and requirements relating to the environment, and the provisions of environmental authorizations, as applicable, are rigorously applied by the contractor and its sub-contractors.

Special attention will be given to the following aspects:

- ✓ informing residents and municipal representatives;
- ✓ informing the users of road, railway and public transit networks;
- ✓ informing users of the Lachine Canal and the Gadbois sports centre;
- ✓ managing sediments and protecting fish habitat;
- ✓ managing contaminated soil associated with excavation work and fill, specifically the impact of contaminated excavated soil on the quality of water in the Lachine Canal during construction and operational periods;
- ✓ noise and air quality (e.g. dust) during construction and dismantling operations, specifically the fresh air intakes of the Gadbois sports centre;
- ✓ traffic management.

Following approval by the Ville de Montréal authorities, a quality monitoring program for the water in the Aqueduct will be established for the duration of the work.

To ensure satisfactory communication of progress and the challenges encountered during implementation of mitigation measures, the MTQ will produce a quarterly activities report for submission to government authorities. This report will list the application of mitigation measures, their effectiveness and corrective measures applied, as applicable. Supplementary reports will be produced following specific incidents.

7.2 ENVIRONMENTAL FOLLOW-UP PROGRAM

The goal of the MTQ environmental follow-up program will be to check directly on the site, the accuracy of the assessment of certain impacts and the efficacy of certain planned mitigation measures for which a degree of uncertainty remains. The proposed follow-up programs are briefly described in Table 3 and focus mainly on the human setting.

Note that the detailed follow-up program will be submitted with the request for authorization certificates. The MTQ agrees to produce a sectoral report at the end of each follow-up mentioned above, as well as a summary document presenting the results of all follow-ups conducted, five years after commissioning of the new infrastructures. The MTQ undertakes to distribute the results of the environmental follow-ups to the affected public via its website. In addition, as with all major MTQ projects, a technical monitoring of the new infrastructures will supplement these environmental follow-up programs.

Table 3: Proposed follow-up programs

Proposed follow-up program	Characteristics
Biological setting	
Impact of commissioning the new infrastructures on the presence of the brown snake in the Saint-Jacques escarpment sector.	1 year after commissioning the new infrastructures.
Physical setting	
Impact of commissioning the new infrastructures on air quality	1 year and 5 years after commissioning the new infrastructures.
Human setting	
Impact of construction and dismantling on noise (ambient noise levels).	Duration of the construction and dismantling work.
Impact of commissioning the new infrastructures on noise (ambient noise levels).	2 years and 5 years after commissioning the new infrastructures, once per year, in the summer.
Visual impact (landscape) resulting from the presence of the new infrastructures.	1 year and 5 years after construction of the new infrastructures.
Economic impact on businesses and industries of the study area during the work and after commissioning the new infrastructures.	During the work and 1 year after commissioning the new infrastructures.
Psychosocial impacts (financial and psychological) stemming from the acquisition of residential properties and the resulting involuntary relocations.	1 year and 5 years after commissioning the new infrastructures.

8. EMERGENCY MEASURES PLAN

8.1 EMERGENCY SITUATIONS

The contractors responsible for work batches must prepare and present an environmental emergency plan and a prevention program.

The measures contained in this section refer mainly therefore to interventions in the case of emergency situations during project operations. However, in the event of an emergency situation described in this section occurring during the construction period which cannot be controlled by worksite personnel, the intervention methods described in Section 7.2 should be applied.

The main accidental incidents likely to occur in the new infrastructures of the Turcot Complex are spills of hazardous products on the road surface, an accident involving a loaded truck (whether tipped over or not), a severe weather (e.g. black ice) or seismic event.

8.2 CAPACITY TO RESPOND AND INTERVENTION METHODS

Within the framework of this project, the main authorities in the event of an emergency are the response teams of the three (3) cites at greatest risk, should the event require the intervention of emergency procedures, i.e. Montréal, Montréal-Ouest and Westmount.

These authorities work in cooperation with the MTQ to plan and, as applicable, intervene to protect the public and property against incidents. Civil protection planning includes a suite of measures aimed mainly at preventing disasters from occurring, or at least trying to reduce the impact on the community.

8.2.1 Ministère des Transports

In its emergency measures plan, the MTQ administration for the Island of Montréal presents the tools developed for planning, overseeing, intervention and management of emergency situations.

These tools include the ministerial civil protection plan, the civil protection operational plan, the specific interventions plans, the presence of a centre for overseeing and monitoring the road network using innovative telecommunications technology, supported by a network of surveillance cameras, and the participation of the MTQ in the provincial civil protection plan.

Under the heading of operational planning, the MTQ administration for the Island of Montréal specifies the provisions to be taken during work periods by developing, in partnership with various agencies, specific procedures for emergency situations on construction sites.

Finally, at the request of the coordinator for the *Organisation régionale de la sécurité civile* (ORSC), the MTQ is responsible for:

- providing available information on the status of infrastructures used for the transportation of people and goods;
- providing available information about all methods of transportation;
- maintaining, renovating or installing transportation infrastructures;
- providing the necessary human, materiel and IT resources.

8.2.2 Ville de Montréal and reconstituted cities of the Montréal agglomeration

The civil protection administration, which reports to the fire safety department of the Ville de Montréal, is responsible for the organization of municipal civil protection, the development and implementation of the civil protection plan and the measures aimed at accepting responsibility for the four major phases of civil protection: prevention, preparation, intervention and re-establishment of conditions after an event.

Note that the civil protection plan for the Montréal agglomeration (PSAM) covers all types of risks and involves all municipal entities and their partners. The management structure of the civil protection plan for the Montréal agglomeration rests on several decision-making centres, each of which represents a separate management level, specifically the **crisis management cell (CGC),** the **emergency measures coordination centre (CCMU),** the **on-site emergency operations centre (COUS),** the **borough emergency operations centre (COUA)** and the **downtown emergency operations centre (COUV).**

8.3 ROADS TO BE USED IN CASE OF AN EMERGENCY

The MTQ has staff trained specifically for rapid determination of the most effective alternative traffic routes in case of an emergency or during maintenance work, or reconstruction of a road infrastructure. Under the framework of the reconstruction of the Turcot Complex, the MTQ will develop a traffic management plan, specifying the detour routes to be taken in case of an emergency.

9. REFERENCES

Ministère des Transports du Québec 2008 *Projet de reconstruction du Complexe Turcot, Étude d'impact sur l'environnement, December 2008.* 435 p.

Ministère des Transports du Québec 2008 *Projet de reconstruction du Complexe Turcot, Étude d'impact sur l'environnement, Annexes, December 2008.*

Ministère des Transports du Québec 2008 *Projet de reconstruction du Complexe Turcot, Étude d'impact sur l'environnement, Addenda 1 – Réponses aux questions et commentaires du MDDEP et de l'ACÉE, December 2008.* 64 p. + appendices.

Ministère des Transports du Québec 2008 *Projet de reconstruction du Complexe Turcot, Étude d'impact sur l'environnement, Addenda 2 – Complément d'information, February 2009.* 64 p. + appendices.

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