

Climate Change Adaptation Case Study

CERIU's climate change adaptation case-study sheets aim to highlight inspiring municipal projects that deliver practical solutions to climate change.

Municipalities City of Québec City of L'Ancienne-Lorette		549,459 residents (2021 Census)	 VILLE DE QUÉBEC	
		16,970 residents (2021 Census)	 Ville de L'Ancienne-Lorette	
Geographical context	 Urban	Main hazard	 Flooding	
Adaptation concept studied: › Building resilient infrastructure				

Permanent works

Flood-protection works on the Lorette River

What does the project involve?

The project aims to protect a sector comprising nearly 400 properties in Québec City and L'Ancienne-Lorette from flooding by the Lorette River. The objective is to protect this area against a 1-in-100-year flood under future climate conditions. The project combines several approaches:

1. Construction of a floodwall to contain the water and prevent flooding;
2. Creation of three overflow floodplains to lower levels in pronounced meanders;
3. Creation of two relief channels to lower water levels in pronounced meanders;
4. Works on pipelines to prevent backflow through the stormwater network;
5. Stabilisation of embankments using vegetated riprap and bioengineering;
6. Planting of the riverbanks and municipal land in three layers (herbaceous, shrub and tree).

Who were the project stakeholders?

WSP Canada inc	Preparation of the impact assessment study to obtain the provincial decree.
Stantec	Production of the plans and specifications for the project, and construction supervision.
Lafontaine inc.	Construction of the works.
City of Québec	Project management as the representative of the Québec urban agglomeration. Contribution from several municipal departments (engineering, communications, environment).
City of L'Anceinne-Lorette	Identification of regulatory constraints. Identification of residents' communication needs.

What triggered the implementation of the project?

The study area experienced major flooding events, notably in 2005 and 2013, affecting more than 400 properties. These events highlighted the sector's vulnerability and led to the implementation of a large-scale flood-protection project designed to secure the area on a long-term basis. The project replaces the temporary works carried out in 2013.

How is the project's effectiveness assessed?

Several monitoring programmes, required by ministerial decree to obtain provincial ministerial authorisation, will make it possible to assess the effectiveness of the works carried out:

- › **Monitoring programme for the effectiveness of the relief channels, energy dissipation basins and overflow floodplains**, over 5 years;
- › **Monitoring programme for erosion and sedimentation**, over 75 years;
- › **Vegetation monitoring programme**: 1 year, 3 years and 5 years after completion of the works;
- › **Floodwall inspection programme**: during annual inspections and general inspections, the frequency of which varies according to the condition and age of the structures.

Find out more

about the City of Québec project



Lorette River flood-protection works

Before the works

What challenges were encountered? What good practices were put in place?

<p>Social acceptability</p> <p>Challenges: Because of the flooding experienced in the area, the file was highly sensitive for affected residents.</p> <p>Good practices: Several public and one-to-one meetings were held to provide updates on the project, explain the works, and gather owners' comments, concerns and requests for improvements.</p>	<p>Acquisition of easements</p> <p>Challenges: The City had to obtain temporary (work areas) and permanent easements to build works on private properties. More than 60 properties were concerned.</p> <p>Good practices: The City dedicated a full-time-chartered appraiser to manage this component. Strong involvement from the project management team and the consultant was also required.</p>
<p>Ministerial authorisations</p> <p>Challenges: The project involved works along a stretch of nearly 4 km of river, mostly within the riparian protection strip. The scale of the project in sensitive environments made obtaining provincial and federal authorisations complex. Securing the provincial decree required several years of work with the consultant and the MELCCFP.</p> <p>Good practices: Regular meetings with the ministries, the consultant and the City helped ensure that decisions met the requirements of the provincial and federal authorisations.</p>	<p>Urban technical networks (RTU)</p> <p>Challenges: Several conflicts between the planned works and existing urban technical networks could not be avoided.</p> <p>Good practices: Some networks had to be relocated before the works, or interventions carried out while keeping them in place. The sequencing of works was adjusted to take these constraints into account.</p>

After the works

What challenges were encountered during the works? What good practices were put in place?

<p>Communication with residents</p> <p>Challenges: As the works are largely carried out on private properties, they raise many questions and require coordination across the different stages.</p> <p>Good practices: The City informed residents through leaflets and mobilised an on-site public-liaison team (Info-Chantier), as well as site supervision staff, to provide ongoing follow-up on questions and comments.</p>	<p>Scale of the works</p> <p>Challenges: The works extend along a stretch of nearly 4 km of river, mostly in built-up areas. Such an elongated site is a challenge for both construction and supervision.</p> <p>Good practices: At peak times, the site involved nearly 150 workers, five on-site supervision resources (civil, environment, structures, etc.) and up to three technicians (excavation management, contaminated soils, etc.).</p>
<p>Management of contaminated soils</p> <p>Challenges: Although many boreholes were carried out along the planned works to characterise the soils, unexpected variations in quantities occurred during construction.</p> <p>Good practices: A laboratory resource was assigned full-time to track excavated soils, with frequent use of stockpiling and in-process characterisation.</p>	<p>Proximity of buildings and private landscaping</p> <p>Challenges: Limited space in built-up areas required solutions to reduce potential impacts on existing buildings and landscaping.</p> <p>Good practices: In residential areas, the floodwall was designed to limit excavation scope (shallower footing and the use of screw piles). The proximity of buildings required the creation of work platforms along the riverbank to install the crane and drive sheet piles.</p>