

VILLE DE  
MONT-ROYAL



TOWN OF  
MOUNT ROYAL

# Citizen presentation

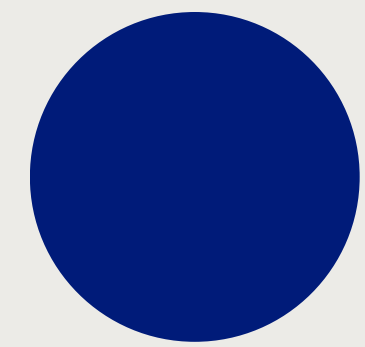
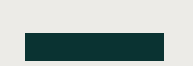
## Stormwater Management

September 19, 2024

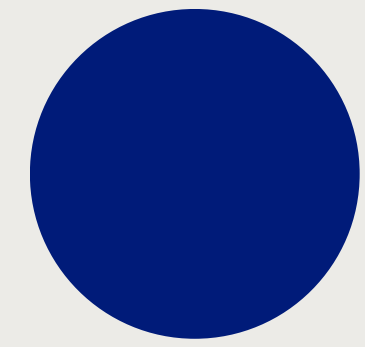




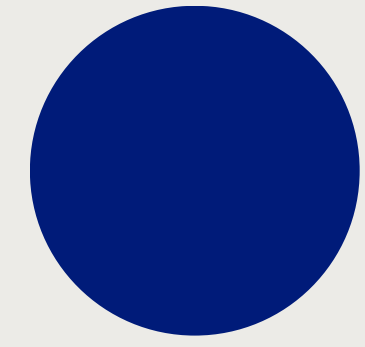
# Presenters



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# Introduction

## **OURANOS – web site 2024**

“Average annual precipitation has increased by 10.5% across Quebec over the last few decades.”

## **Études Mailhot et al., 2012; Mladjic et al., 2011**

“Recommendations on the increases to be considered for rainfall intensities, duration and frequency in southern Quebec are 20% by 2050.”

## **WSP Canada study for UMQ 2022**

“For infrastructure alone, all Quebec municipalities will have to spend \$2 billion a year until 2055 due to climate change.”

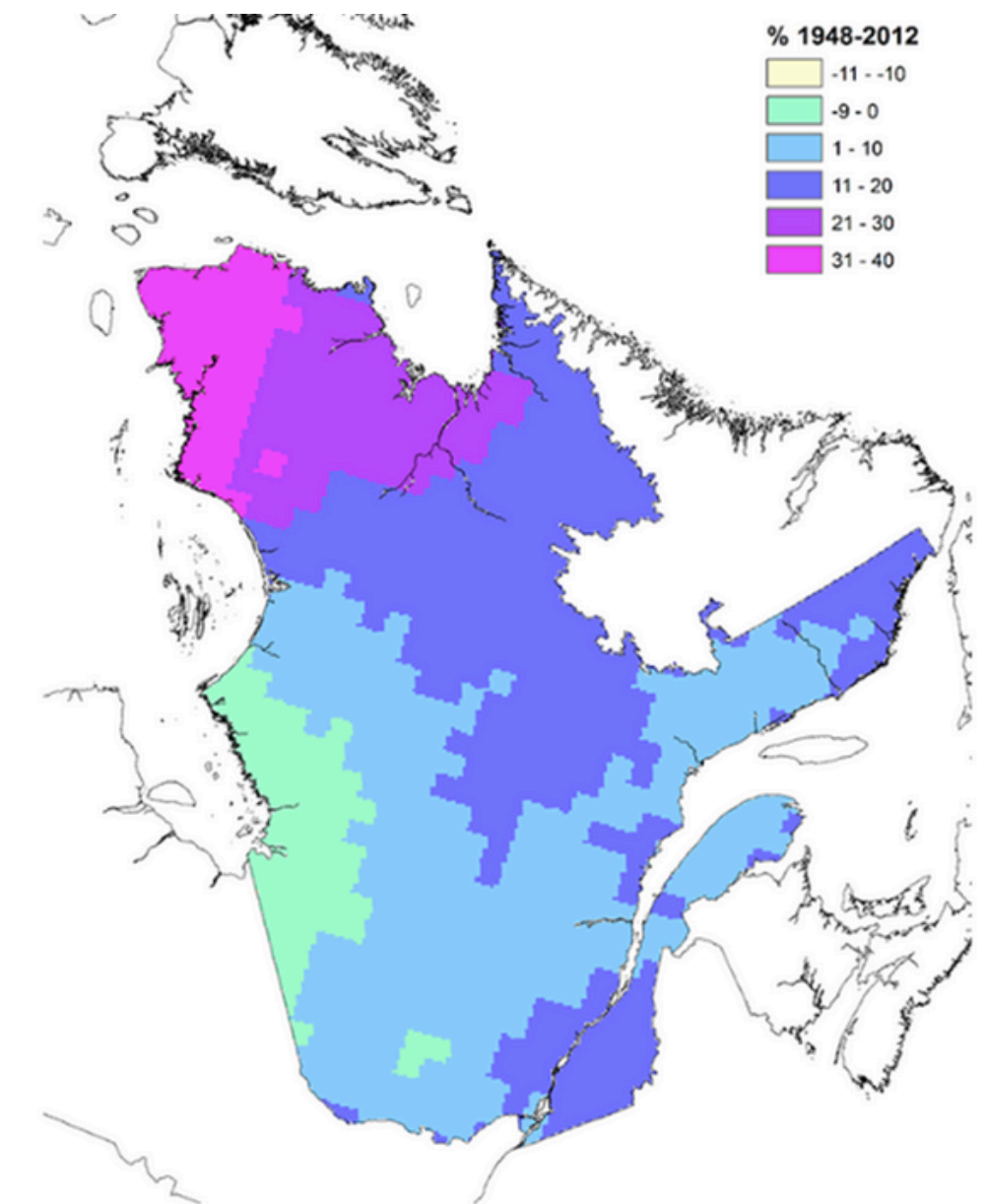


Figure 1 : Changements observés (%) dans les précipitations totales annuelles au Québec de 1948 à 2012 d'après les tendances linéaires. Source : adaptée de la figure 4 de Vincent et coll., 2015.

# GESTION OPTIMALE DES EAUX PLUVIALES

## INTRODUCTION

### 1. Sewer System

- 1.1 Types of sewer systems
- 1.2 Design concepts
- 1.3 Impact of climate change on rainfall

### 2. Stormwater Management Plan

- 2.1 Our action plan : what have we accomplished?
- 2.2 Our action plan
- 2.3 Review of the preliminary study on the hydraulic capacity of the network and potential solutions
- 2.4 Limitations

### 3. Self-Defense – Resilience and Individual Preparedness

- 3.1 Water flow
- 3.2 Plumbing notions
- 3.3 Runoff concepts

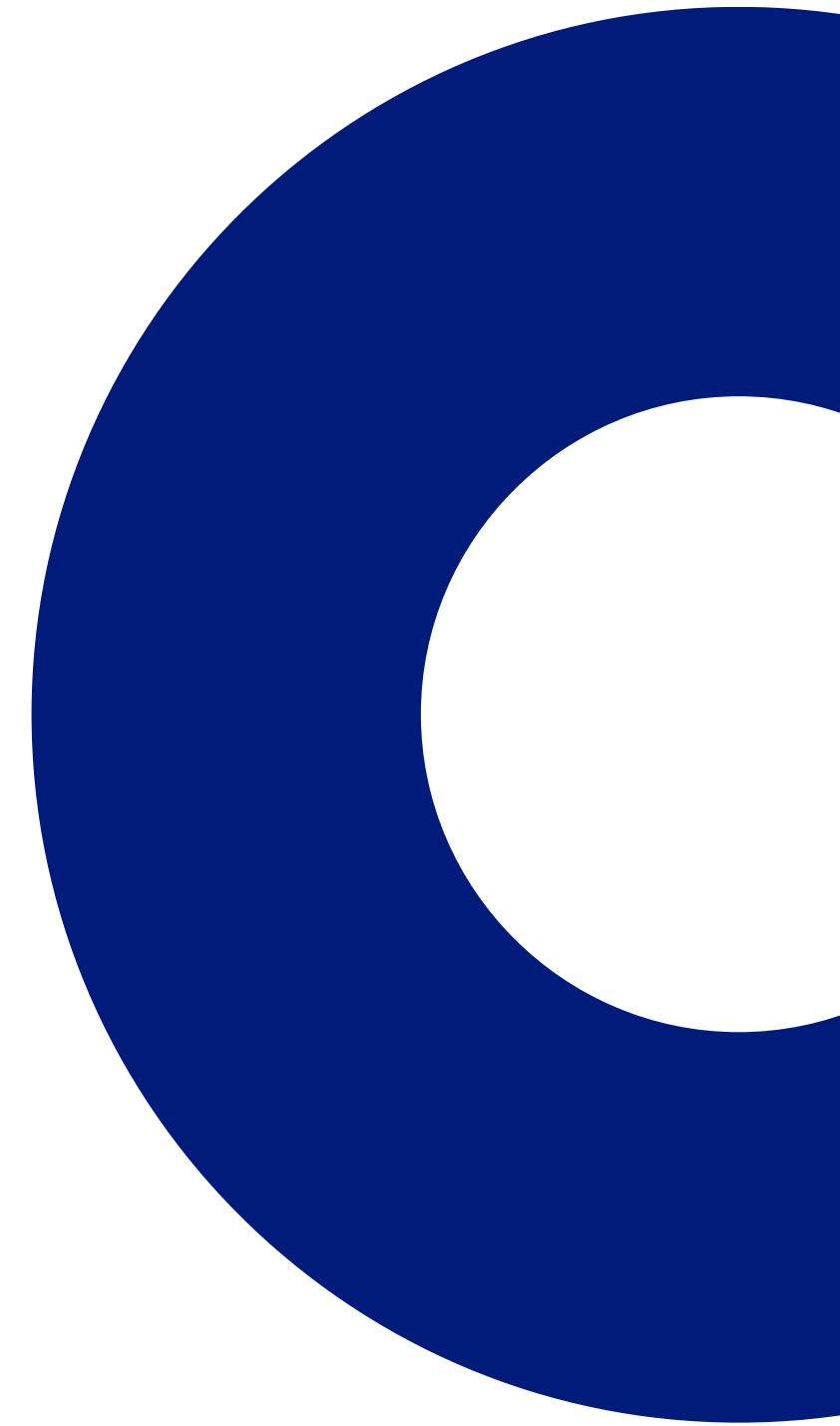
## CONCLUSION



# The Sewer System

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DISCUSSING THE SEWER SYSTEM



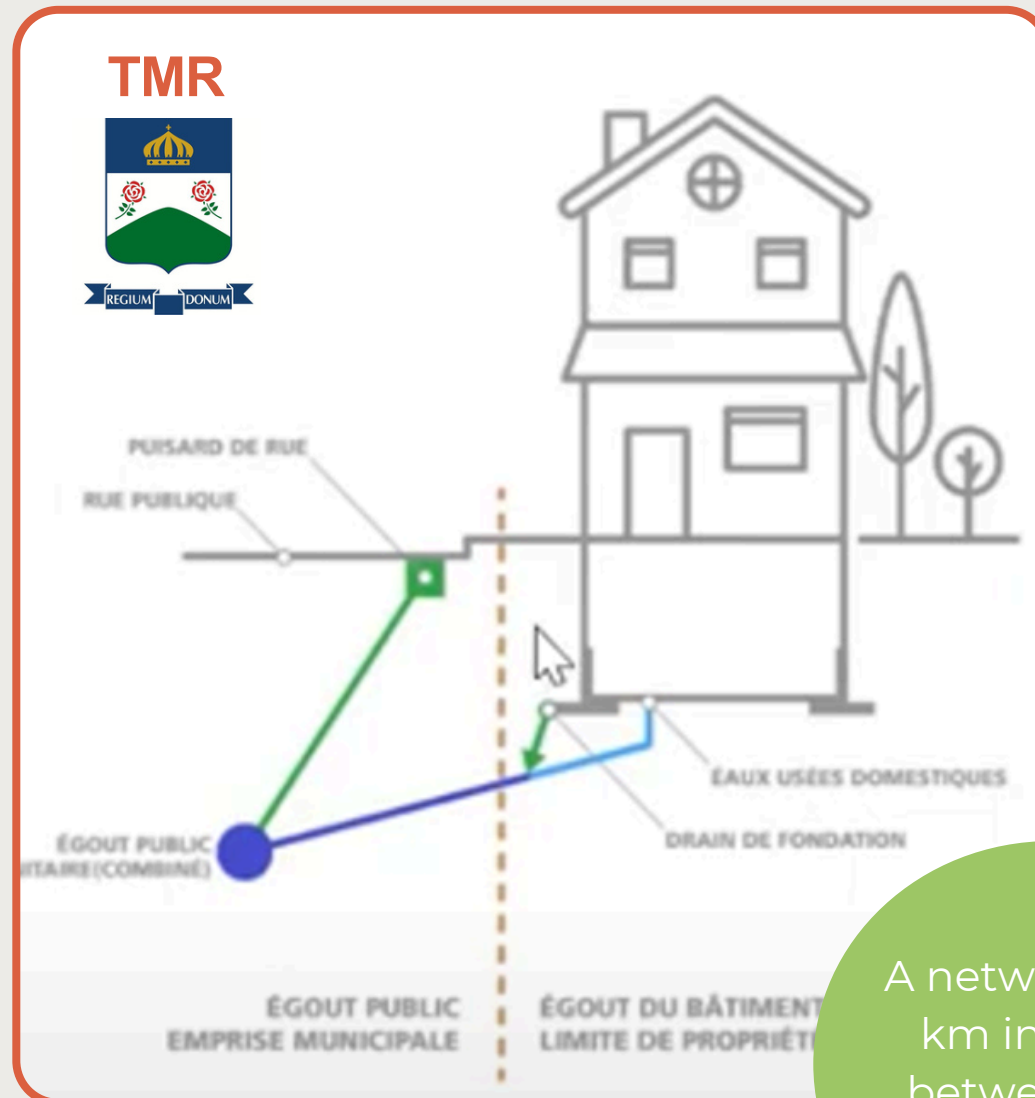


# 1. THE SEWER SYSTEM

## 1.1 Types of sewer systems

**UNITARY** before 1965

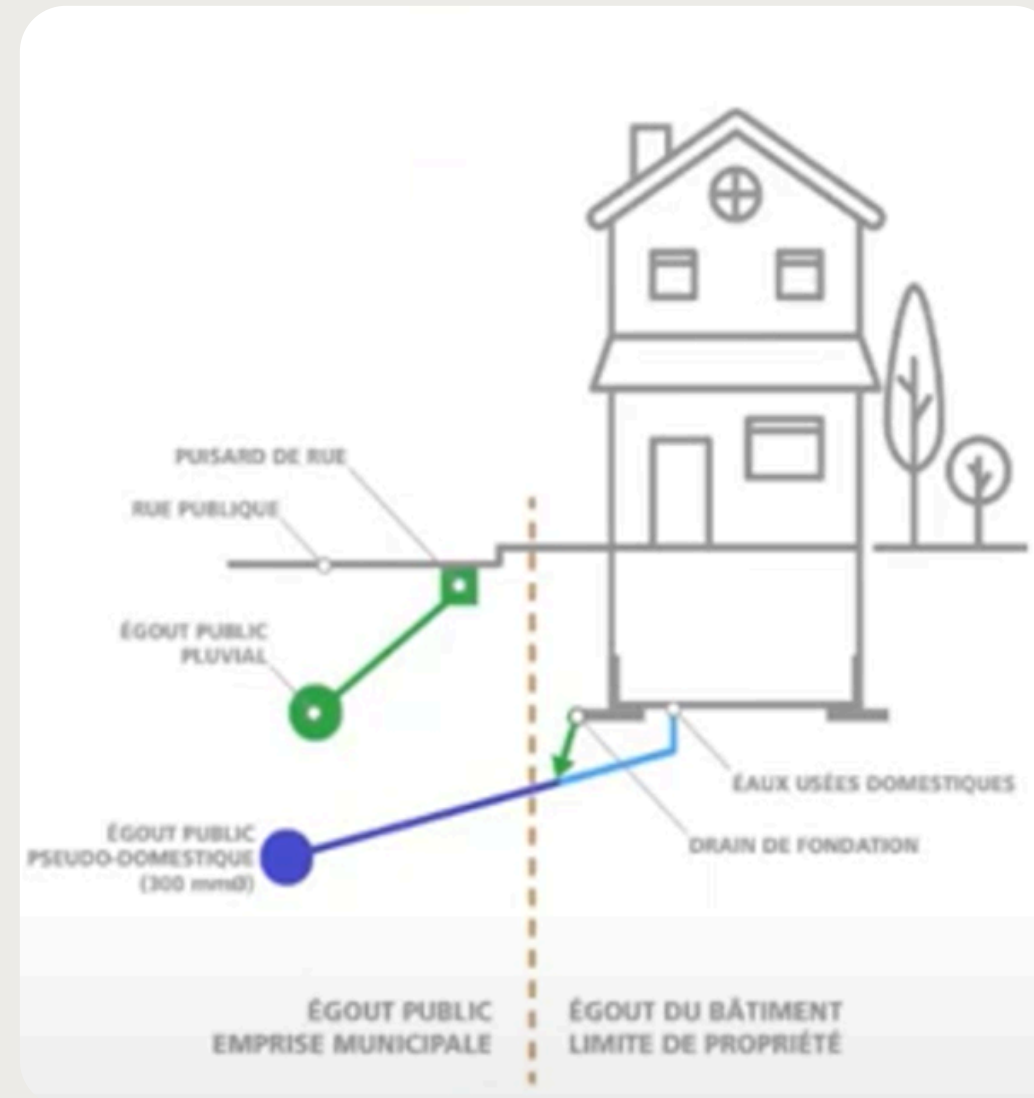
- More sensitive



A network of 85 km installed between 1925 and 1975

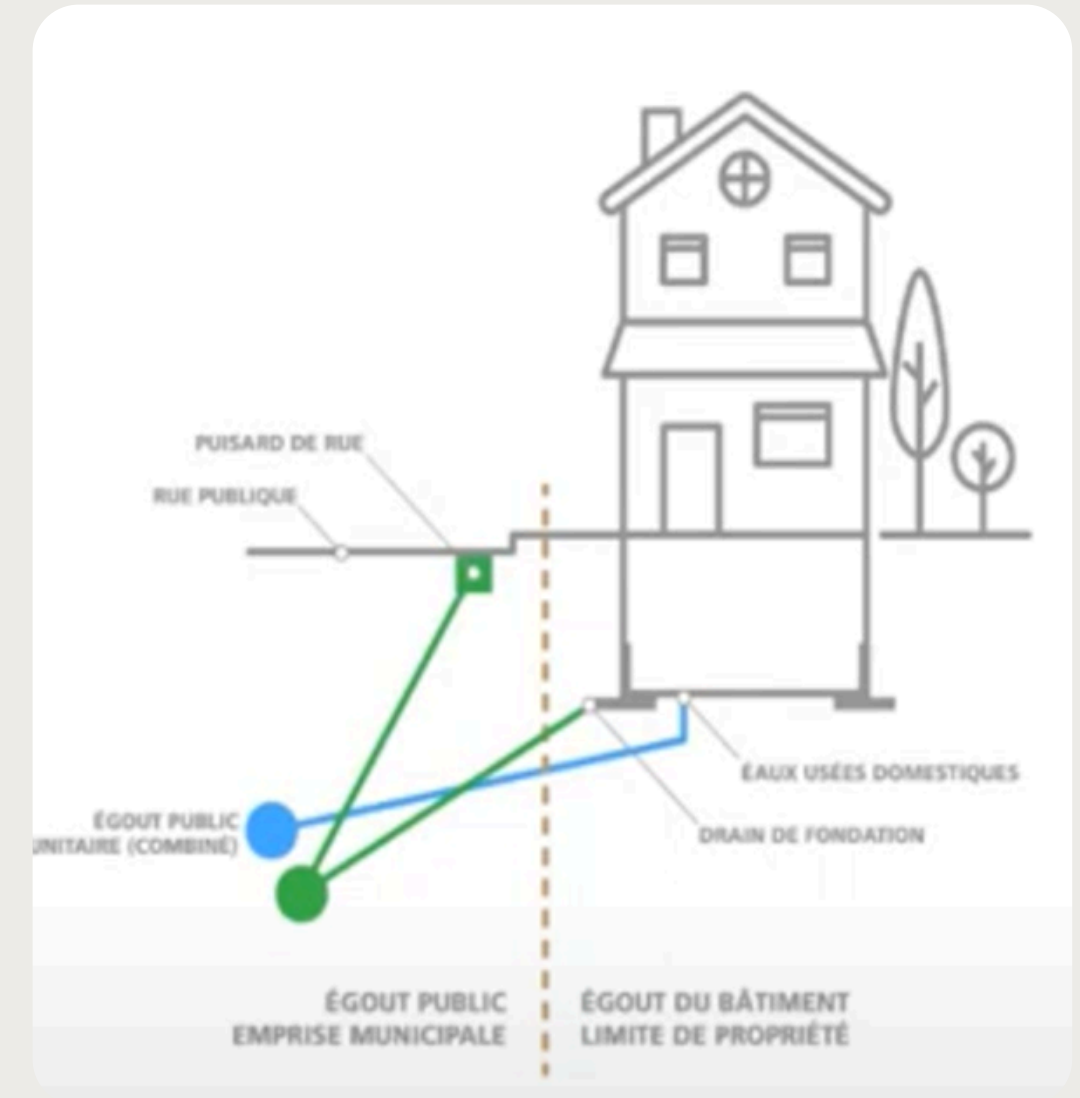
**PSEUDO-SEPARATE** 1965-1985

- Moderately sensitive



**SEPARATE** since 1980

- Less sensitive



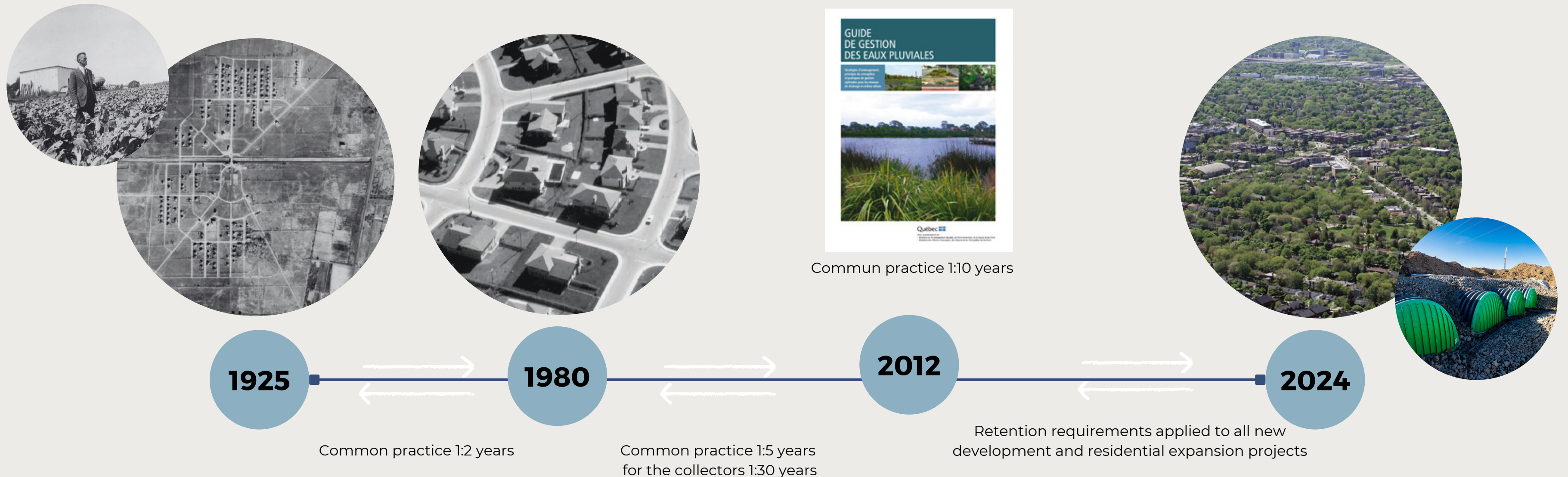
# 1. THE SEWER SYSTEM

## 1.2 Design concepts

### What is a recurrence period?

Recurrence period 1:1000 years (0.1%) or Recurrence period 1:100 years (1%)

Recurrence period 1:5 years (20%) or Recurrence period 1:2 years (50%)



**By applying this guide, prepared by the Ministry, will our network be able to catch all rainfall?**

No, not totally.

# 1. THE SEWER SYSTEM

## 1.3 The Impact of Climate Change on Rainfall

Global climate issues due to greenhouse gas (GHG) emissions have a direct impact on precipitation by increasing their intensity and frequency, leading to:

- Summer Storms: Intense rainfall of short duration
- Tropical Storms (Hurricane Tails): Sustained intensity over longer duration

**Recent heavy rains have been classified as more than '100-year storms' for one or more occasions, including:**

- **July 14, 1987**
- **June 16, 2022**
- **Various heavy rains in the summer of 2023, similar to June 24, 2023**
- **Hurricane Beryl on July 10, 2024**
- **Hurricane Debby on August 9, 2024**

**+50**

MUNICIPALITIES AFFECTED  
BY HURRICANE DEBBY

Town of Mount-Royal is  
not the only city impacted

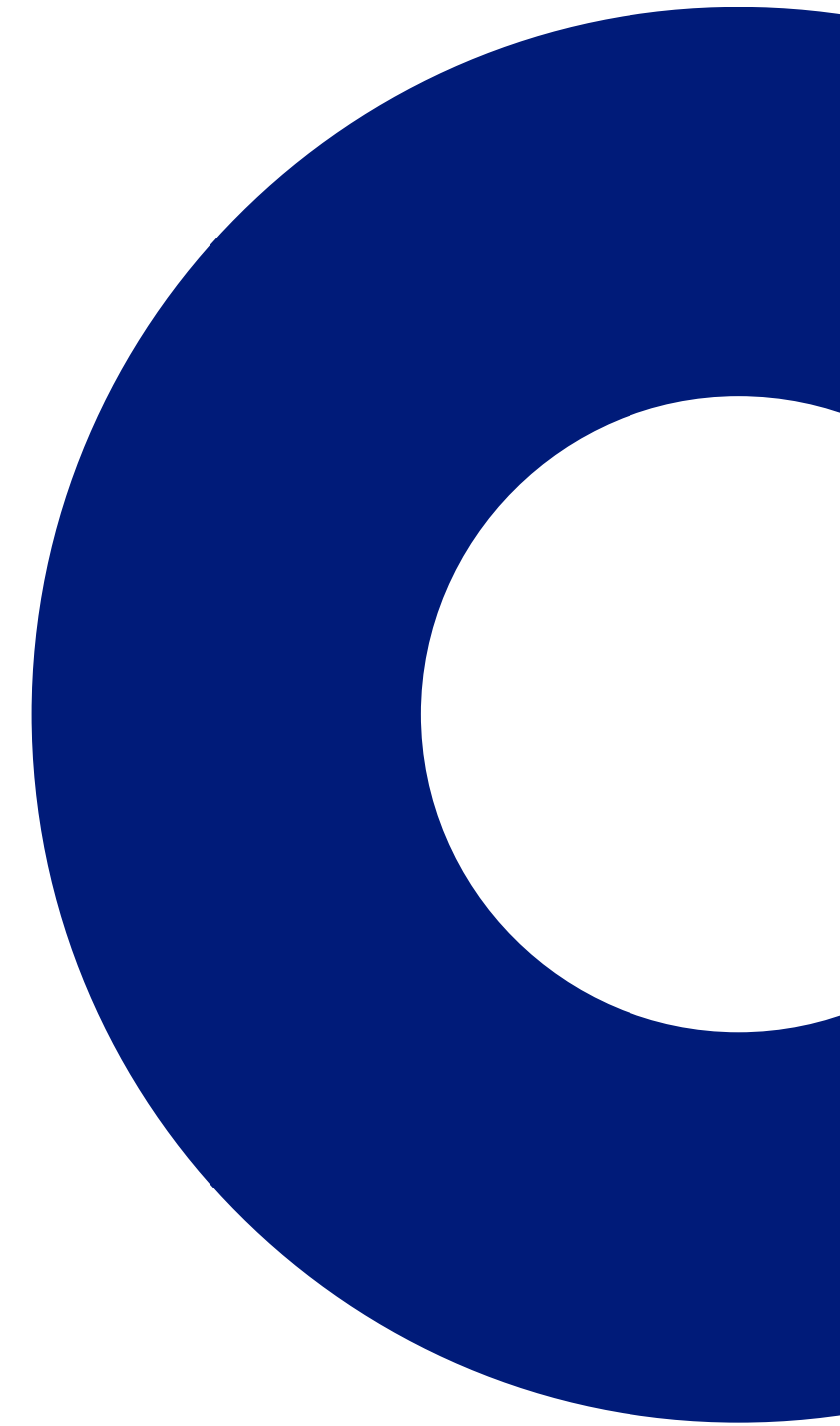
**A RISING TREND: Numerous 100-year events within a 2 year timespan**



# Storm-water management plan

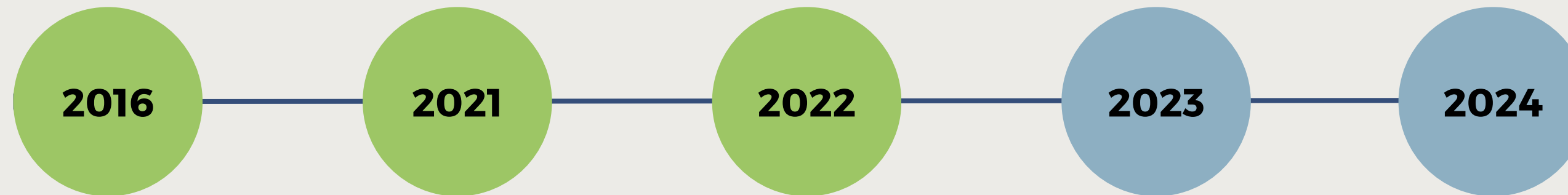
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OUR ACTION PLAN



## 2. OUR STORMWATER MANAGEMENT

### 2.1 OUR ACTIONS : What have we achieved?

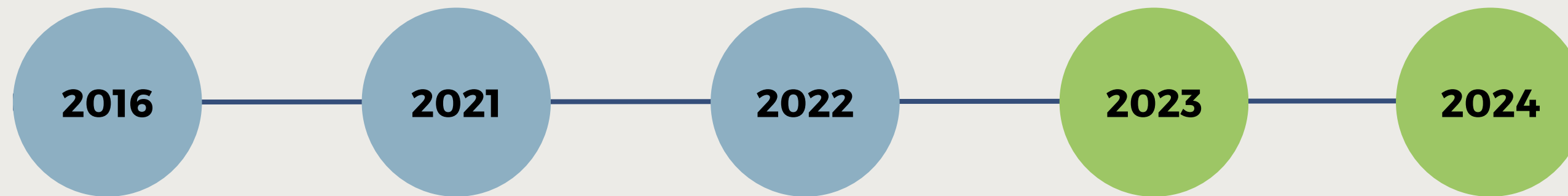


- **Annual maintenance** work by Public Works on the sewer system - 2016 to 2022
- Annual cleaning of sewer catch basins - 2016 to 2022
- **Cleaning and reaming of sewer pipes** according to expert and MAMH recommendations - 2016 to 2022
- Creation of a geomatician position - 2021
- Digitization of plans and modernization of data leading to the creation of a georeferenced database - 2017 to 2022
- Development of an **intervention plan** for the sewer, aqueduct and roadway network and ongoing updating to prioritize work - 2016 to 2022
- Strategy for developing an **asset management plan** - 2021
- Discussion with various experts in the field of stormwater management - 2021 to 2022

- Construction of a 40,000 L retention basin for the “Place de gare” park - 2020 to 2021
- Analysis of infrastructure condition based on CERIU report - 2022
- Planning of investments required to maintain infrastructures - 2022
- **1st hydraulic modeling by JFSA Québec Inc.** - 2022

# 2. OUR STORMWATER MANAGEMENT

## 2.1 OUR ACTIONS : What have we achieved?



2023

- Consultations with various professionals on stormwater management - **possible solutions.**
- Additional university training for employees on stormwater management.
- Sewer master plan by the Town.
- **Preliminary report on hydraulic capacity study and preparation of a short, medium and long term action plan.**

2023

- **Mandate with JFSA to recommend protection measures for private properties.**
- **Consultations with CMMTQ technical director to confirm best practices for building protection.**
- Research on the best practices in other municipalities.
- Regulatory review and various means of informing citizens (letter, web, pamphlet).

2024

- Opening of Jardin Royal Park.
- Flowmeter contract awarded and installation completed the week of August 12, 2024.
- Participation in Metropolitan Forum on urban runoff flooding.
- Delaying various projects to study the possibility of integrating water management measures.

**Continuous maintenance work and discussion with experts and other municipalities**



# 2. OUR STORMWATER MANAGEMENT

## 2.2 OUR ACTION PLAN

maximizing subsidy programs

### 2024-2025 SHORT TERM

- **Calibration of the hydraulic model.**
- **Launch of a mandate to analyze various possible solutions and pilot projects:**  
Stormwater management master plan.
- Creation of a committee bringing together demerged cities and Montreal.
- **Updating and drafting of regulations.**
- Regular network maintenance.
- Project on hold to allow further studies.
- Public awareness campaign.

### 2025-2026 MEDIUM-TERM

- **Reception of the final hydraulic capacity study.**
- **Interventions prioritization through the stormwater management master plan.**
- Update asset management plan.
- Preparation of plans and specifications.
- **Pilot projects.**
- **Define solutions and responsibilities in collaboration with the city of Montreal.**

### 2027 + LONG-TERM

- **Prioritized work :**
  - Water regulation through catch basins;
  - Modification of pavement geometry and design to cope with increased precipitation;
  - Underground water retention on street or park;
  - On-street water retention;
  - Resilient parks;
  - Water retention basins;
  - Increased pipe diameters.
- Vegetated draining curb extension.
- Various green infrastructures.



# 2. OUR STORMWATER MANAGEMENT

## 2.3 Review of the preliminary study of the network's hydraulic capacity

### The mandate

JFSA Québec Inc. needs to validate whether the network meets today's weather conditions.

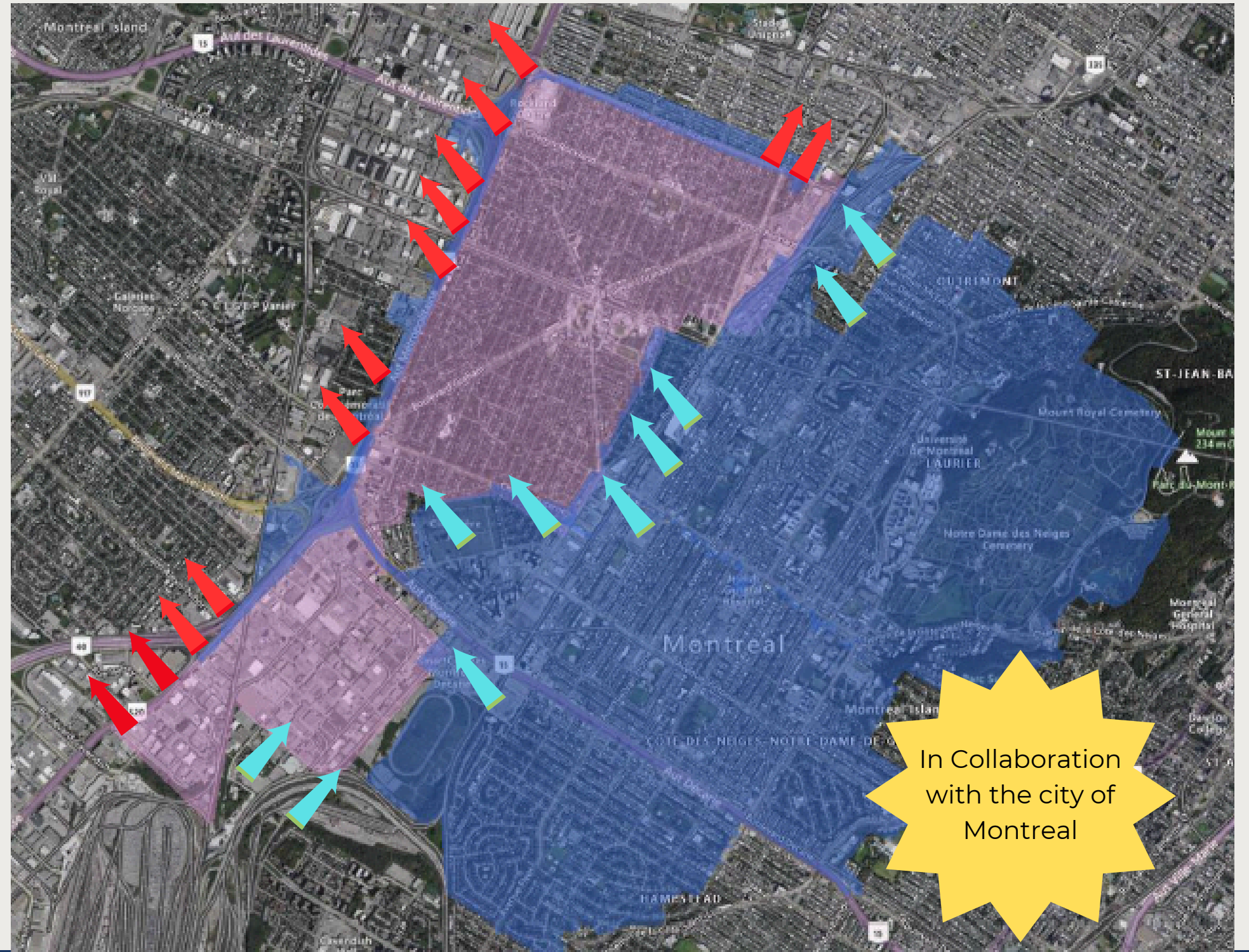
We need to know the actual flow of water passing through the system, both from the Town's pipes and from Montreal's collectors.

### Model calibration

A flow measurement is therefore required, involving the installation of flow meters on the network. The measurement campaign is currently underway.

### Submission of the final calibrated study

The calibration, including the report, is scheduled for delivery to the Town in early 2025.



### So what are we going to use this study for?

It is essential to determine the significant solutions needed to make our system more resilient in the face of climate change.



# 2. OUR STORMWATER MANAGEMENT

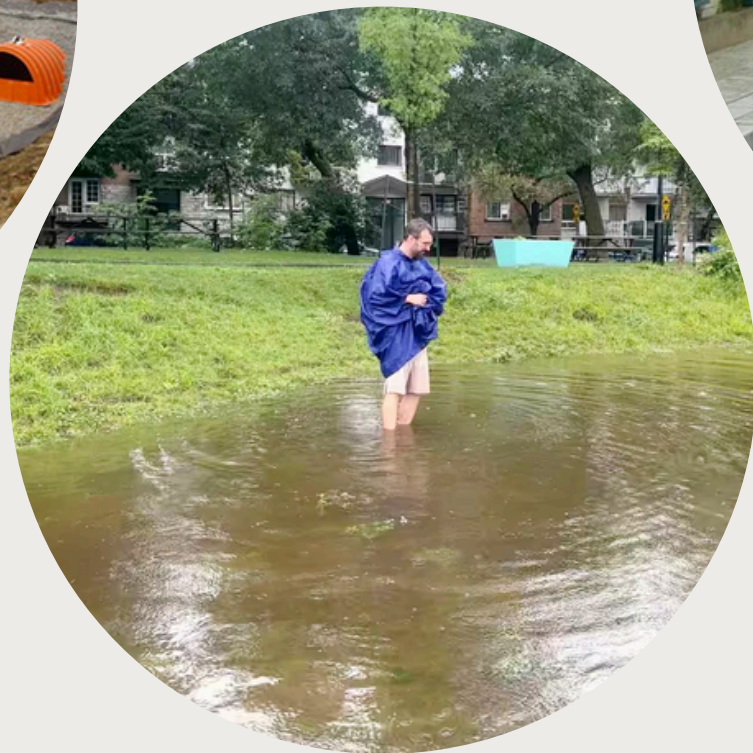
## 2.3 Proposed solutions

### Possible solutions: sustainable development



underground retention basins

surface water retention basins



green infrastructure curb extension

street water storage



increase pipe diameter



If we increased the pipe diameter, would that solve the problem? No.



# 2. OUR STORMWATER MANAGEMENT

## 2.4 Limitations

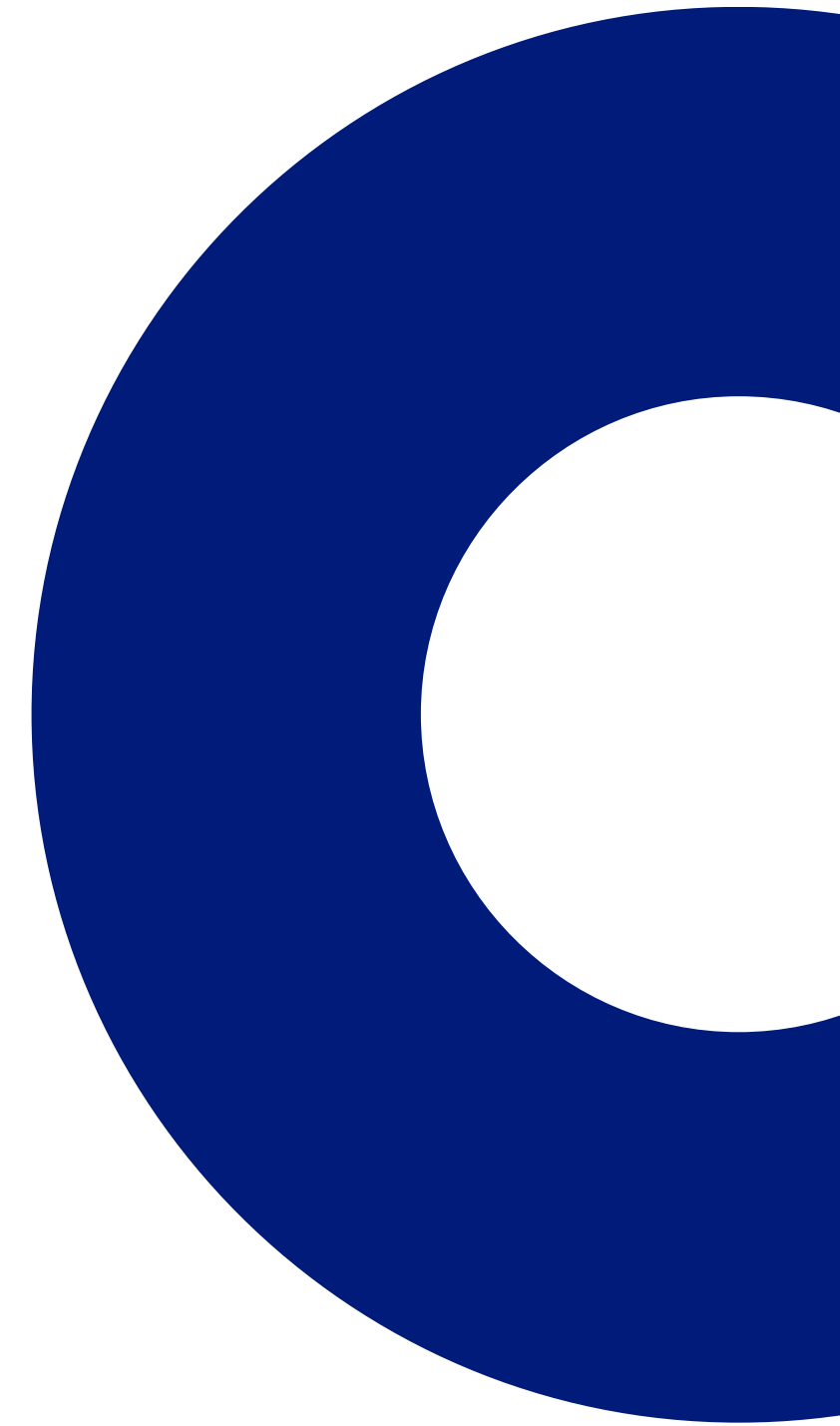


Knowing that there will always be a rainfall heavier than what was anticipated during the design process, what can I do to protect my home?

# Home Resilience & Preparation

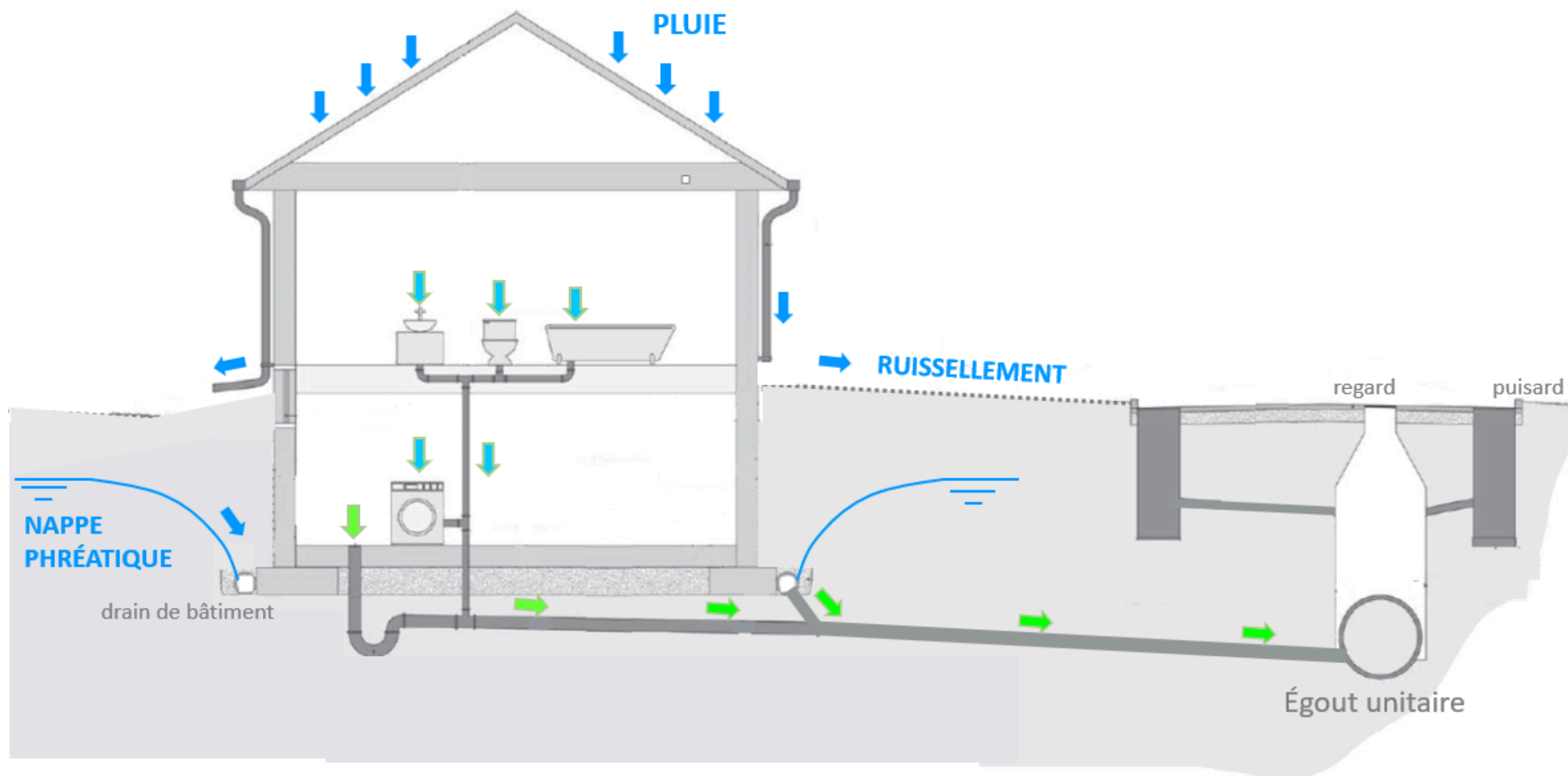


A RESILIENCE THAT CAN CHANGE THE OUTCOMES



# 3. HOME RESILIENCE & PREPARATION

## 3.1 The flow of water



All incoming water to a residential structure must eventually be discharged away from the building.

- ➡ Rainwater, melted snow, runoff, and groundwater are collected by building drains.
- ➡ The water from the aqueduct is used for domestic purposes.
- ➡ All water in the home must drain through one pipe.

# 3. HOME RESILIENCE & PREPARATION

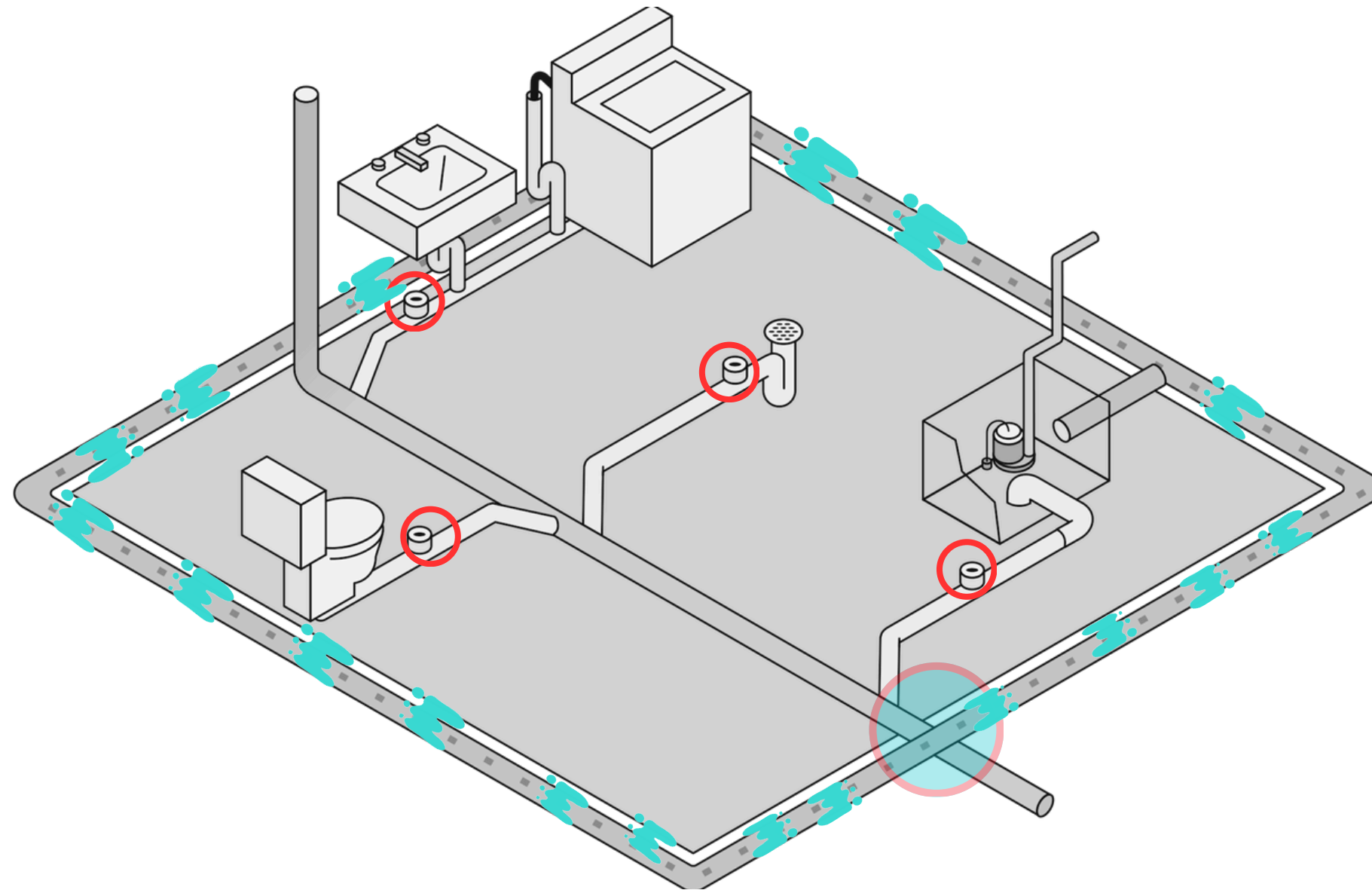
## 3.2 Plumbing notions

### 1 Backflow prevention valves

- All secondary lines must be protected.
- Backwater valves need to be properly installed and thoroughly cleaned on a regular basis.

### 2 French drains

- They must not be connected to the main sewer line.
- Water should be directed to a catch basin, which should be equipped with a backwater valve.
- The emergency pump protects against infiltration by continuously discharging the water entering from the drains and directing to the ground.



Should a backwater valve be installed on the main sewer line? No.

Can a backwater valve “explode” ? No, for very precise reasons

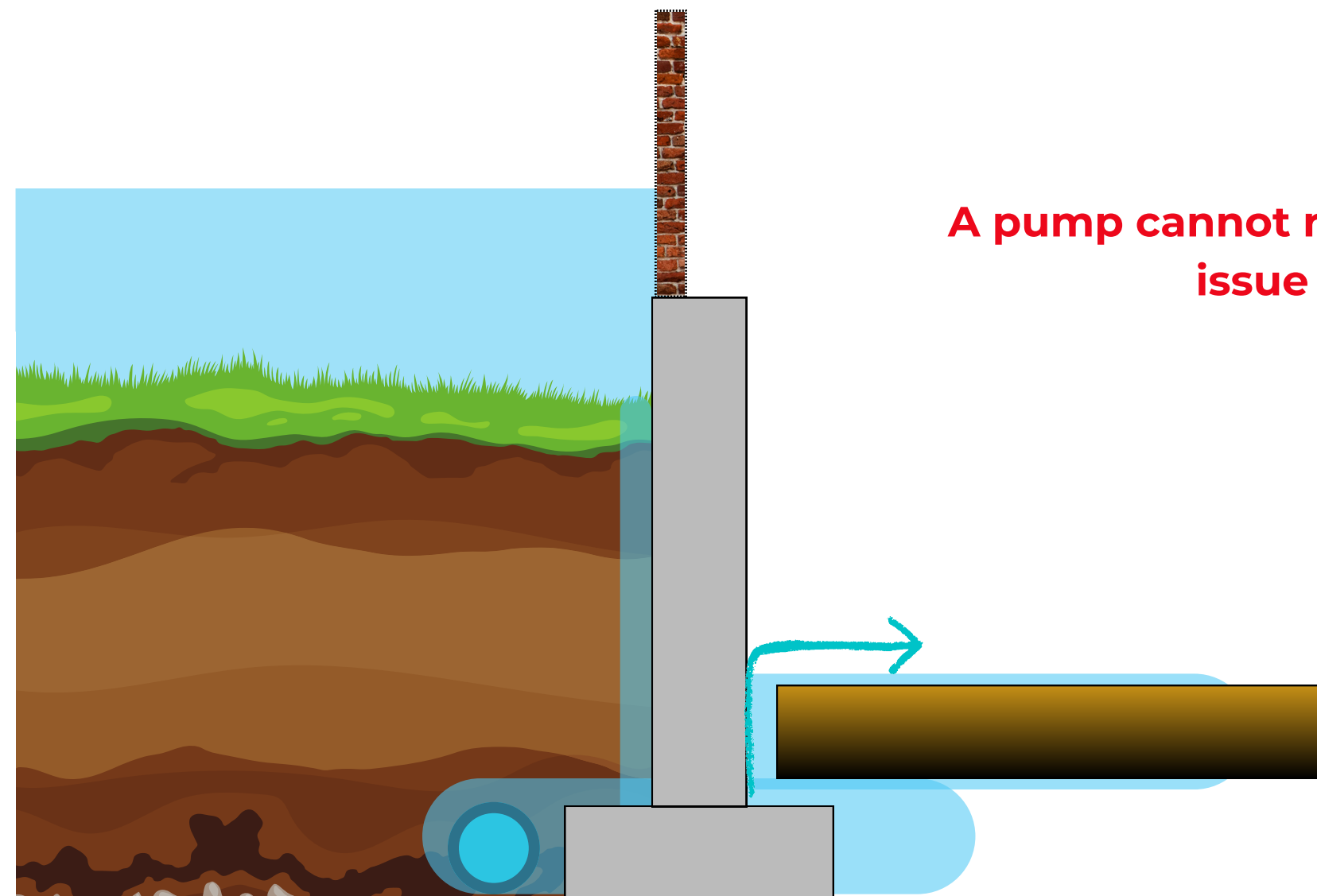


# 3. HOME RESILIENCE & PREPARATION

## 3.2 Plumbing notions

### 3 The foundation

- The landscaping surrounding the home should be sloped to direct water away from the foundation.
- The foundation needs to be impermeable and free of cracks.



**A pump cannot resolve this issue**

# 3. HOME RESILIENCE & PREPARATION

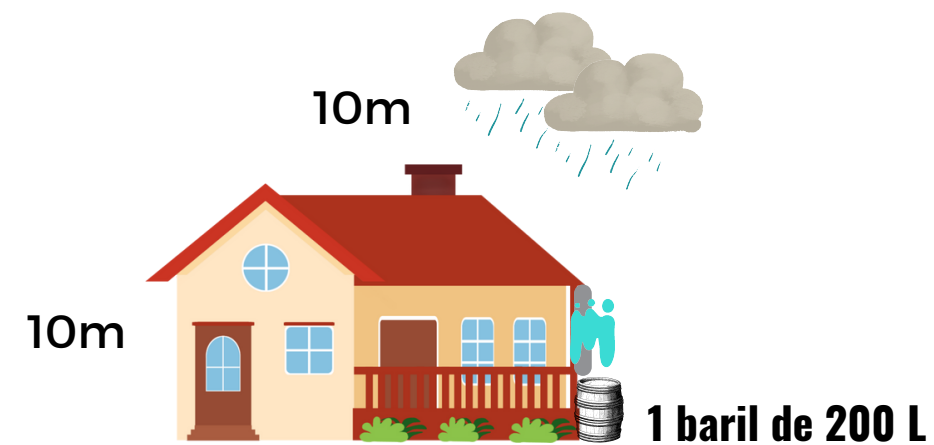
## 3.2 Plumbing notions

### 4 Gutter system

- Must be disconnected from the main collector and/or French drains.
- Must not be directly connected to the town's sewer system.
- Should be 1.5 meters away from the foundation and directed towards the ground.

### 5 Coping stone

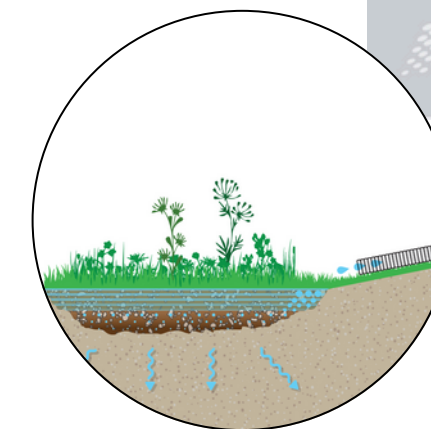
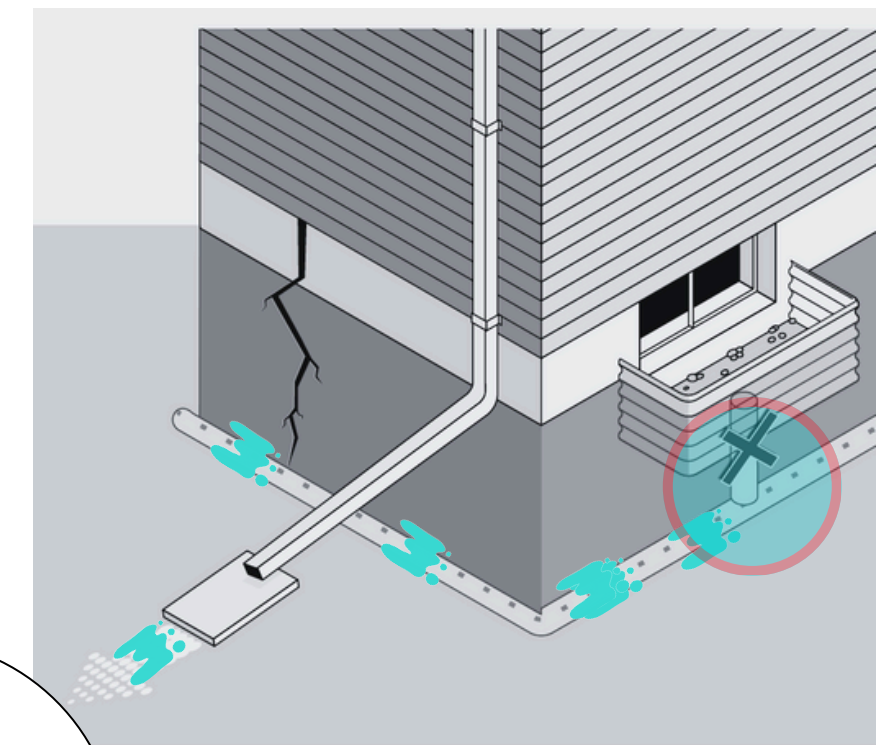
- For windows located below ground level, a coping should form a barrier to surface water, and a stone bed should ensure drainage at the base of the window itself.
- Shall descend to the fill of the French drain but cannot be directly connected to the French drain and/or the main collector.



#### Petite pluie de 25 mm

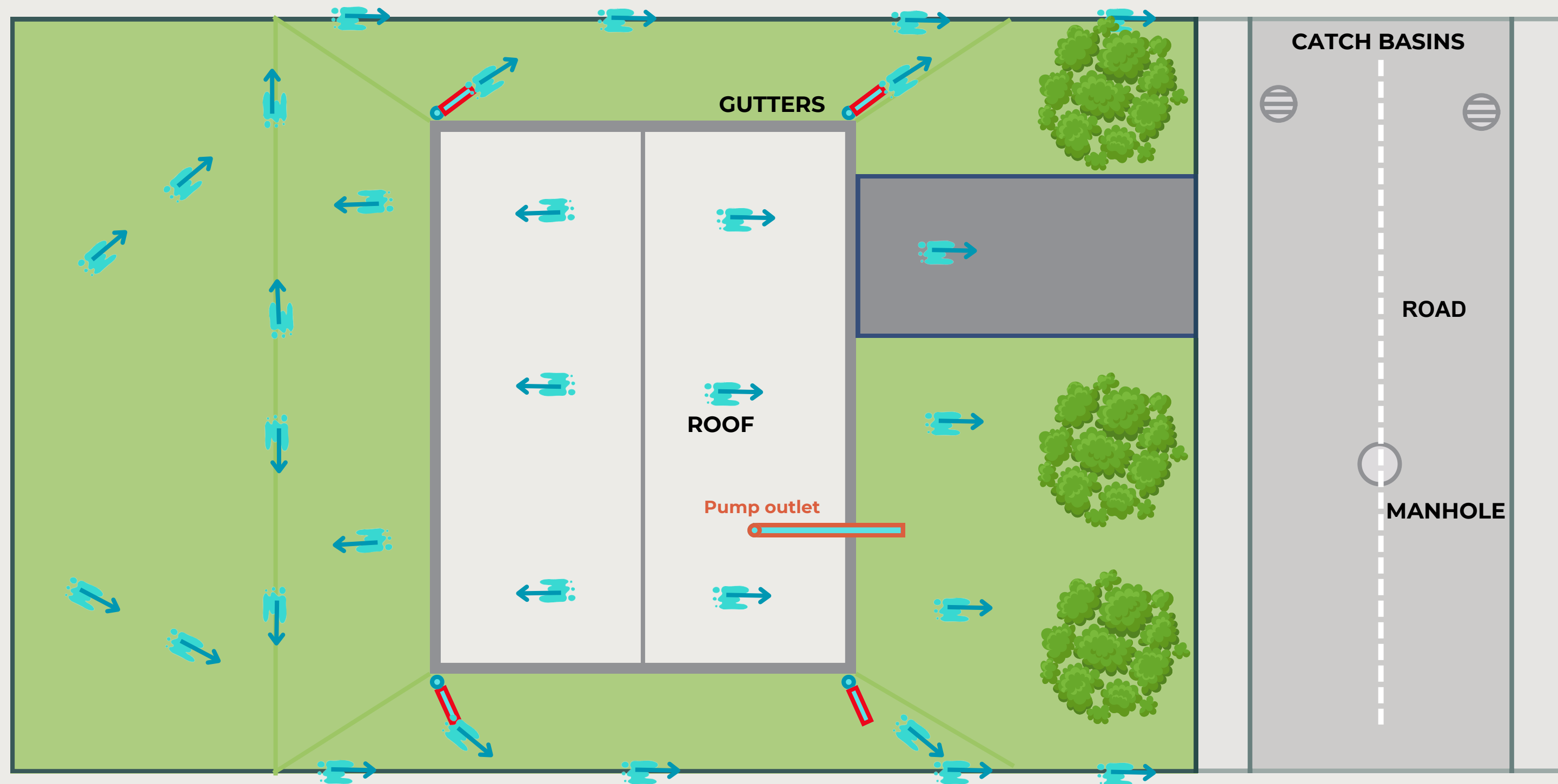


#### Pluie importante de 100 mm



# 3. HOME RESILIENCE & PREPARATION

## 3.3 Stormwater runoff





# Please note

Flyer available online (link below)

[www.ville.mont-royal.qc.ca/fr/services/voirie-et-entretien/egout-et-aqueduc](http://www.ville.mont-royal.qc.ca/fr/services/voirie-et-entretien/egout-et-aqueduc)

**Comment bien protéger ma résidence des fortes pluies?**

Conçu principalement dans les années 1950, le réseau d'égouts de la Ville est un réseau unitaire, c'est-à-dire combiné. Ce réseau gère à la fois les eaux de pluie et les eaux usées. Les eaux contenues dans le réseau d'égouts de Mont-Royal se déversent par la suite dans le réseau de l'agglomération de Montréal.

Aujourd'hui, aucun réseau municipal ne peut faire face seul aux pluies torrentielles devenues courantes. C'est pourquoi il est important de prendre de bonnes mesures en protégeant adéquatement votre résidence et en la conformant aux règlements municipaux, notamment au chapitre III, du Code de construction du Québec - actuellement en vigueur.

Plusieurs résidents affectés par des dégâts d'eau se demandent pourquoi les maisons voisines ont été épargnées. La pose de clapets antiretour sur chaque branchement secondaire est un excellent début, mais ce n'est pas tout. Les eaux de pluie proviennent de vos gouttières, de vos drains français et du ruissellement de votre terrain et de la chaussée.

**Le remplacement de votre collecteur d'égout principal** est...

**Six (6) éléments clés à examiner avec un professionnel**

- Les clapets antiretour**
  - L'ensemble des lignes secondaires doivent être protégées.
  - Le collecteur principal doit être libre de clapets.
  - Les clapets et leurs accessoires doivent être en bon état, adéquatement, accessibles et bien nettoyés.
- Les drains français**
  - Les drains français ne doivent pas être connectés directement au collecteur principal.
  - L'eau des drains français doit être renvoyée vers une fosse de retenue, et celle-ci doit aussi être munie d'un clapet antiretour ainsi que d'une ligne de renvoi vers le terrain.
- Les fondations**
  - Les fondations doivent être étanches.
  - Absence de fissures.
- Les margelles**
  - Pour les fenêtres situées sous le niveau du terrain, une margelle devrait constituer une barrière contre les eaux de surface, et un lit de pierres qui assure l'écoulement au pied de la fenêtre elle-même.

Please note that an information booth will be open at Danyluk Park this Saturday, September 21, 2024, starting at 11:00 AM.

**Thank you**  
**Questions?**

VILLE DE  
MONT-ROYAL



TOWN OF  
MOUNT ROYAL



# Conclusion

## Three key elements to remember

- The Town has developed a sustainable and optimal strategy to mitigate the effects of heavy rainfall.
- There will always be more rainfall occurrences that will strain the sewer system.
- It is important to protect your home.



