

# Sunnyside Flood Barrier

## Where we are today:

- Phase 1 is complete:
  - Flood barrier height approved by Council: 1 in 100-year level
  - Groundwater studies and recommendation
- Proceeding into Phase 2 – final design process

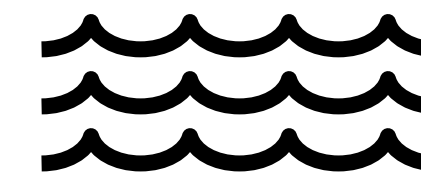
WE ARE  
HERE



2016	2017	2018 – 2020	2020 – 2021	2021 – 2023
Community engagement on Flood Mitigation Measures Assessment	Council approval – Calgary’s Flood Mitigation Strategy	<b>Phase 1</b> Studies and community engagement	<b>Phase 2</b> <b>Final design and regulatory approvals</b>	<b>Phase 3</b> Construction (pending regulatory approvals)

Approved flood barrier height  
for Sunnyside:

**1 in 100-year  
flood level**



Once constructed, this barrier will:



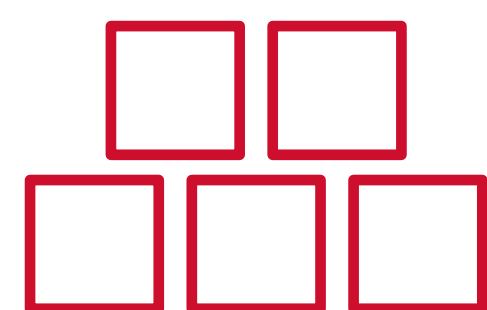
**Reduce 2013-level flood risk,  
which can be further reduced  
by current and future upstream  
reservoirs on the Bow River.**



**Increase the ability to protect  
vulnerable populations.**



**Meet the provincial and federal  
flood standard.**



**Provide a building block for future  
climate resiliency.**

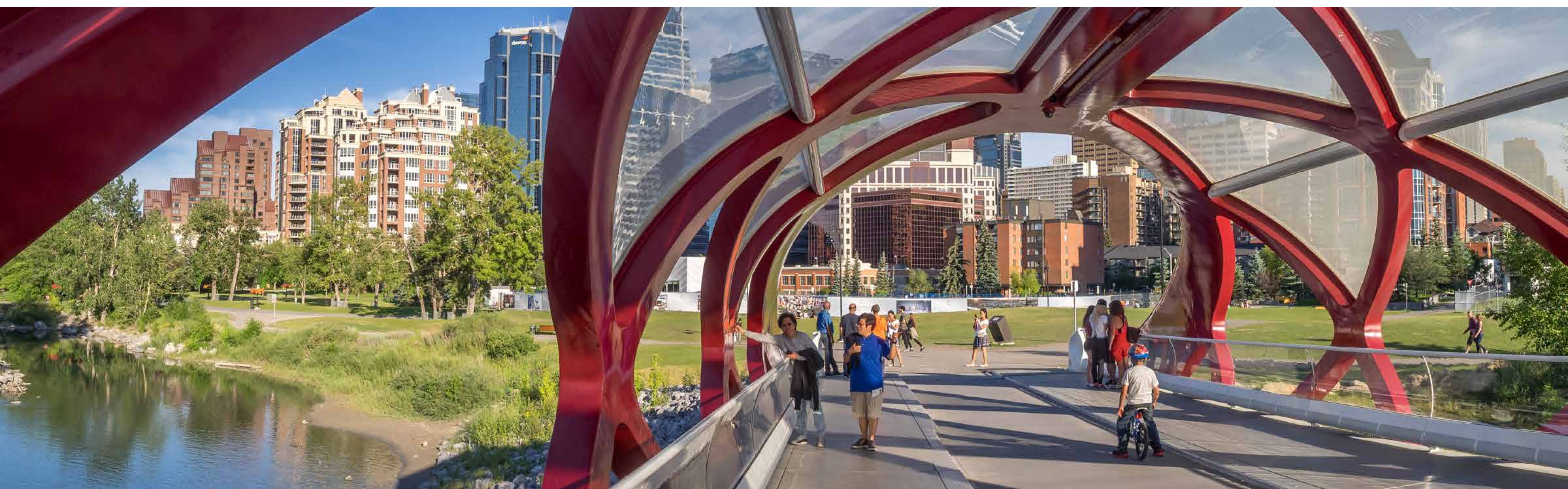


# Understanding groundwater in Sunnyside

Groundwater is water that flows through the spaces that exist between soil particles.

The City conducted groundwater studies for the Sunnyside Flood Barrier project to:

- Understand groundwater flow in Sunnyside.
- Determine the risk that seepage from the river under the barrier poses during a flood.
- Explore options to manage river seepage under the barrier.





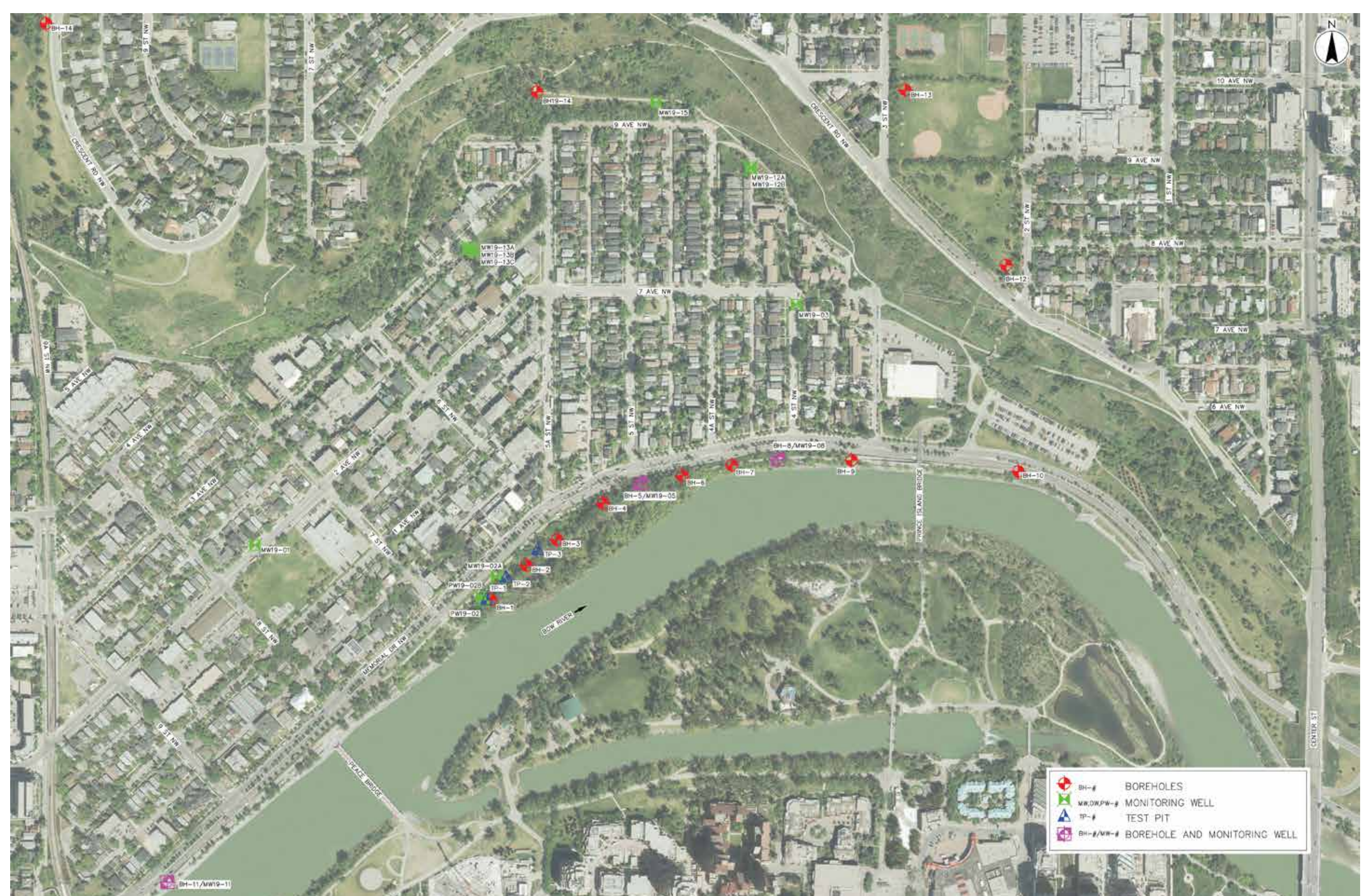
# Groundwater studies

## What we did:

- Examined historical information to understand the various sources that contribute to groundwater conditions in the community.
- Conducted geotechnical testing of borehole materials to understand the existing groundwater conditions in the area.
- Conducted pumping tests and single well response testing of the gravel layers to understand potential water seepage under the barrier.
- Developed a computer model to understand how water might flow through the community day to day, and during different flood sizes and durations.

### Legend

- BH-# Boreholes
- MW,OW,PW-# Monitoring well
- TP-# Test pit
- BH-#/MW-# Borehole and monitoring well





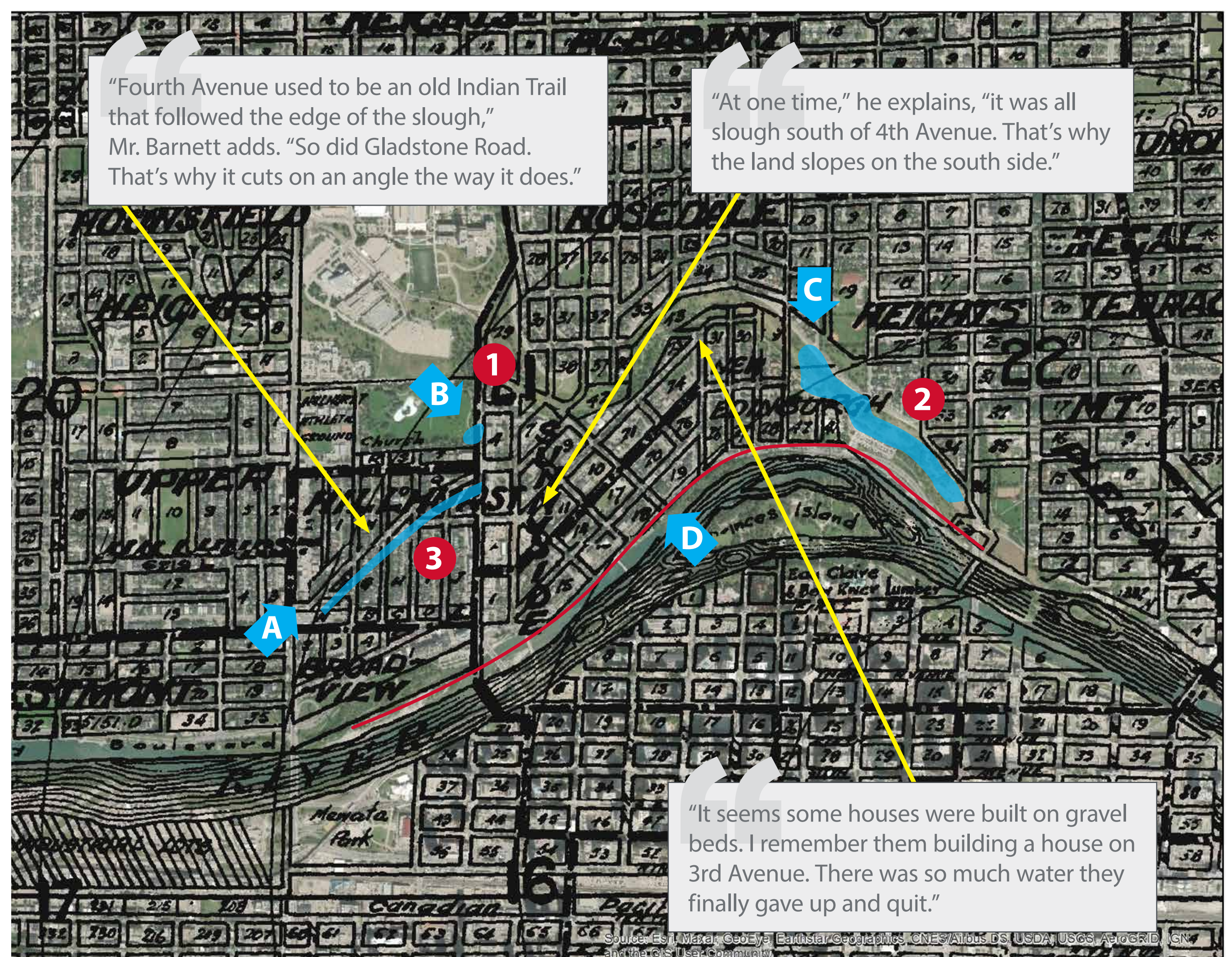
# Historical information review results

The river is only one of the sources that contributes to the groundwater conditions in the community.

Evidence that groundwater is moving through the community as it returns to the river includes:

- Riley Park seep
- Seepage from 10th Street coulee or creek
- 5th Avenue and 10th Street slough
- Sunnyside seep
- Old channel or avulsion near McHugh Bluff
- No historic development in Sunnyhill Lane
- 3rd Avenue gravel beds
- Gladstone Road old trail at edge of slough

- 1 The 10th Street Coulee
  - 2 The Sunnyside Seep (avulsion channel)
  - 3 The Gladstone Oxbow
- A Seepage through the floodplain
  - B Seepage from 10th Street Coulee
  - C Seepage from the valley wall
  - D Seepage from the river flooding



All quotes are from the book *Hillhurst-Sunnyside Remembers* by Margaret Tanko, published by the Hillhurst Sunnyside Community Association in 1978.

“Strangely enough, there are people in the community who have never had any problems with flooding, not even in Sunnyside.”

“It used to be the people across the street had water in their basements all the time,” says Mr. Barnett.



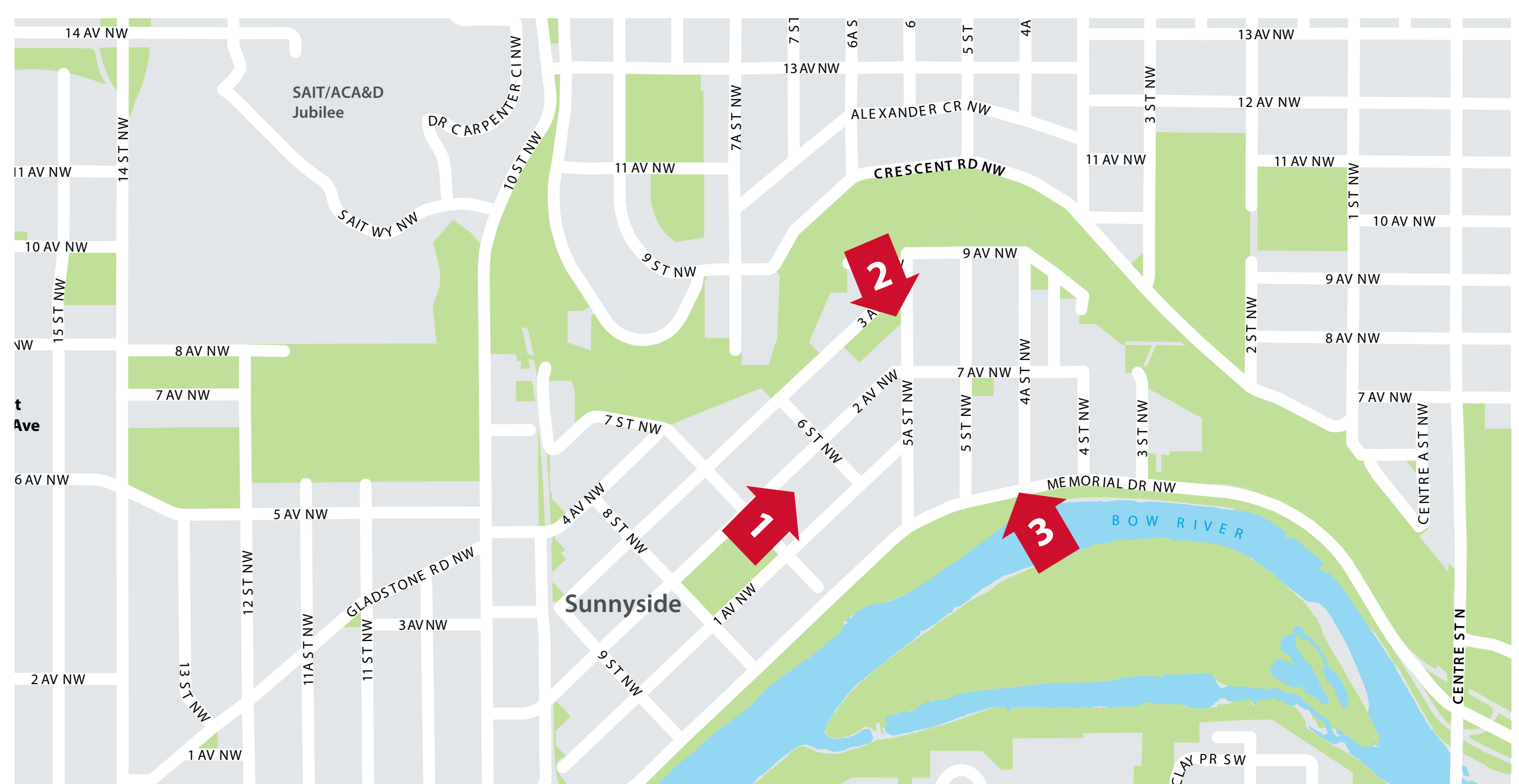
# What did we learn from the historical information?

Groundwater moves in three directions through Sunnyside:

- 1 **Along the river valley:** Groundwater is continuously moving downstream through the sand and gravel layers in the river valley.
- 2 **From the plateau:** Groundwater enters Sunnyside from under McHugh Bluff as it makes its way down the valley.
- 3 **From the river:** When the river floods, the high water level may change groundwater flow direction and seep under the barrier into Sunnyside.

## General groundwater flow directions

- 1 ↑ Along the river valley
- 2 ↓ From the plateau
- 3 ↗ From the river



Groundwater flow directions in Sunnyside

# Groundwater studies results and findings

## What are the existing groundwater conditions in the area?

- Groundwater does not move through Sunnyside as quickly as initially assumed.
- The Sunnyside area has always had pockets of high groundwater.
- Studies confirmed that various sources contribute to the groundwater conditions in the community; the river is only one source. Other sources of groundwater travel through Sunnyside from the north and the west ends of the community to the river.
- A flood barrier that cuts off seepage from the river (e.g. sheet pile) will trap groundwater that is passing through the community and cause groundwater flooding issues.
- Model simulations suggest that solutions that pump water from the vicinity of the barrier (e.g. wells or a seepage trench) cannot completely eliminate the risk of basement flooding.

## What effect will the flood barrier have?

The barrier will hold back river water during a 1-in-100 year flood; however, by holding back river water the river seepage pressure increases, which poses a risk to the integrity of the barrier and Memorial Drive between the Calgary Curling Club and 8th Street. Groundwater mitigation in this area is needed.



# Groundwater recommendations

We're addressing areas where the flood barrier will impact groundwater conditions and threaten the stability of the barrier and nearby infrastructure.

- A seepage collection trench is proposed along the south side of Memorial Drive between the Calgary Curling Club and 7th Street.



Seepage collection trench

- The seepage trench would be installed at a specific depth to alleviate this pressure (and capture some of the groundwater from the river) during flood conditions, while allowing pre-existing groundwater from within the community to find its way out to the river.

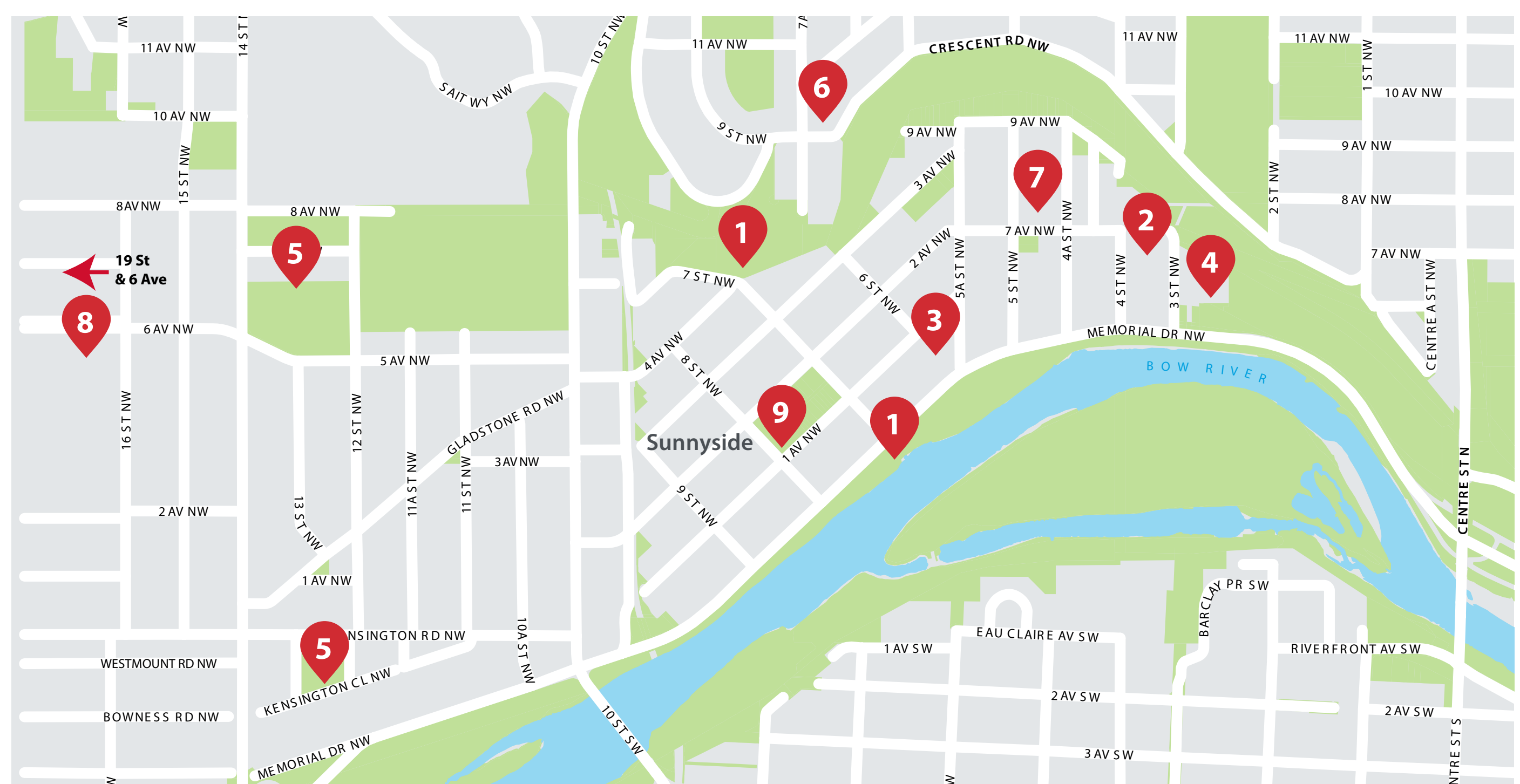


## Additional projects in the community will help address localized flooding and lower groundwater risk

- 1 Upper Plateau Separation**  
To help prevent flooding of Sunnyside/Hillhurst, The City is building dedicated stormwater infrastructure for the upper plateau.
- 2 Sunnyside Sanitary Lift Station Replacement**  
This lift station was upgraded for flood resiliency.
- 3 Sunnyside Storm Lift Station 04A Upgrade (Pump Station #2)**  
The lift station is being upgraded for flood resiliency and will more than double its pumping capacity.
- 4 New Sunnyside Storm Lift Station (Pump Station #1)**  
A new lift station will alleviate overland flooding on Memorial Drive, and localized flooding in the southeast area of Sunnyside.

**Northwest Inner-City Community Drainage Improvement**  
Various projects in Sunnyside and Hillhurst will address stormwater capacity issues of the existing system.

- |                         |                         |
|-------------------------|-------------------------|
| <b>5</b> Kensington     | <b>8</b> West Hillhurst |
| <b>6</b> 10 Street N.W. | <b>9</b> 1 Avenue N.W.  |
| <b>7</b> 7 Avenue N.W.  |                         |





# Groundwater, a shared responsibility

The most effective way for homeowners to mitigate basement flood risk is at the property-level.

What you can do:

- Install and use a sump pump.
- Install backflow preventer valves.
- Ensure downspouts drain onto the ground at least two metres away from buildings.
- Grade lots away from the house foundation.
- Repair cracks in the foundation.
- Finish basements with easily washable materials, such as concrete floors and walls.
- Install water alarms in the basement to alert you if water is backing up.





## Next steps

- Through the detailed design process, we will complete a tree inventory, geotechnical investigation and explore potential opportunities for community input on design aesthetics.
- The project is currently estimated to cost \$34.2M (approx. \$6.2M to address groundwater). This fall, during The City's annual budgeting and business planning process, we will discuss with Council how this project will be funded.
- We expect construction to begin next spring depending on the regulatory process. We estimate it will be completed in time for the 2023 flood season.

