



**Credit Valley  
Conservation**  
inspired by nature

# **Making the Case for Investing in Climate Resiliency**

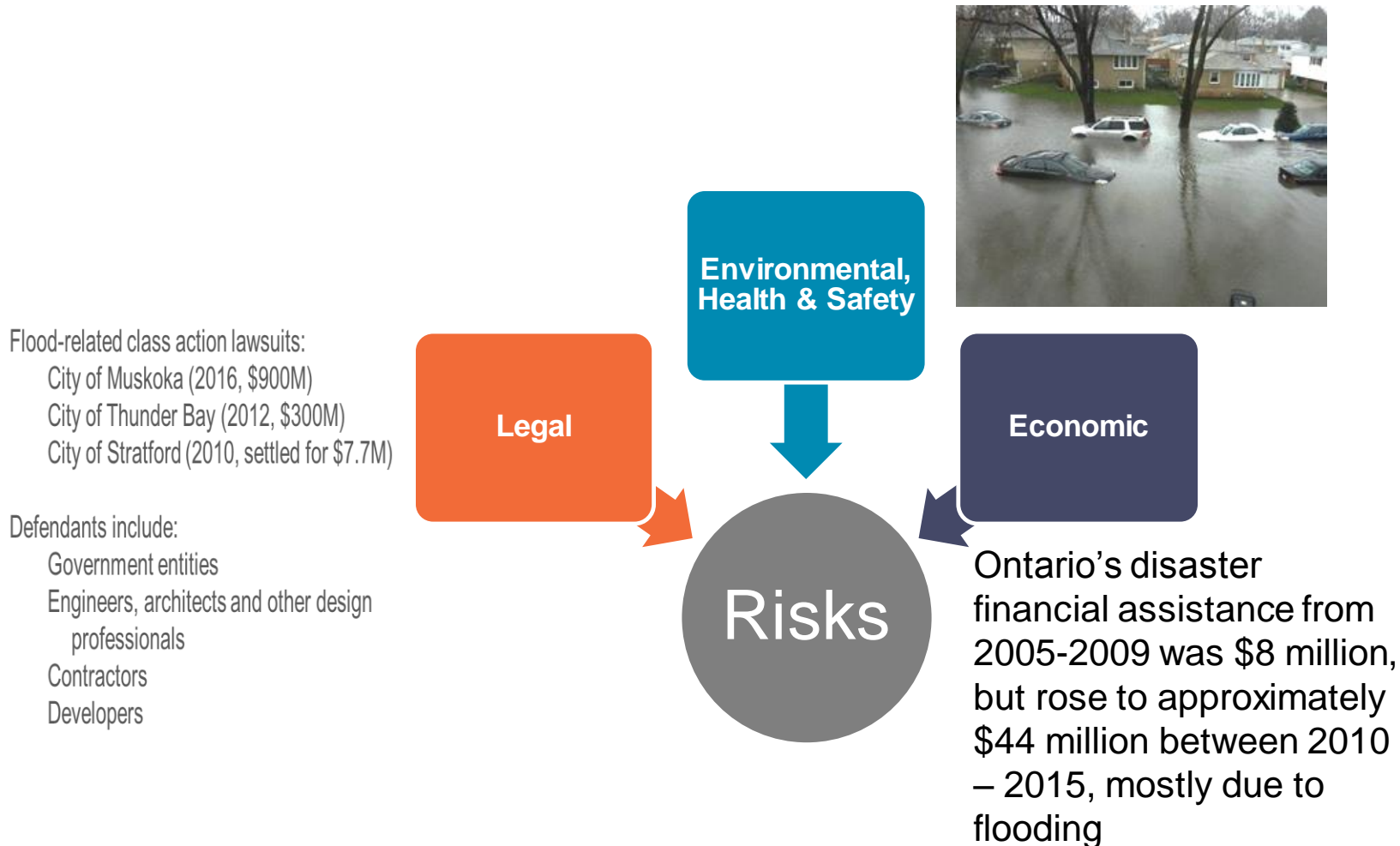
Presented at Building Climate Resilient  
Infrastructure Systems in Ontario

September 26, 2019

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Senior Manager, Water and Climate Science  
Credit Valley Conservation

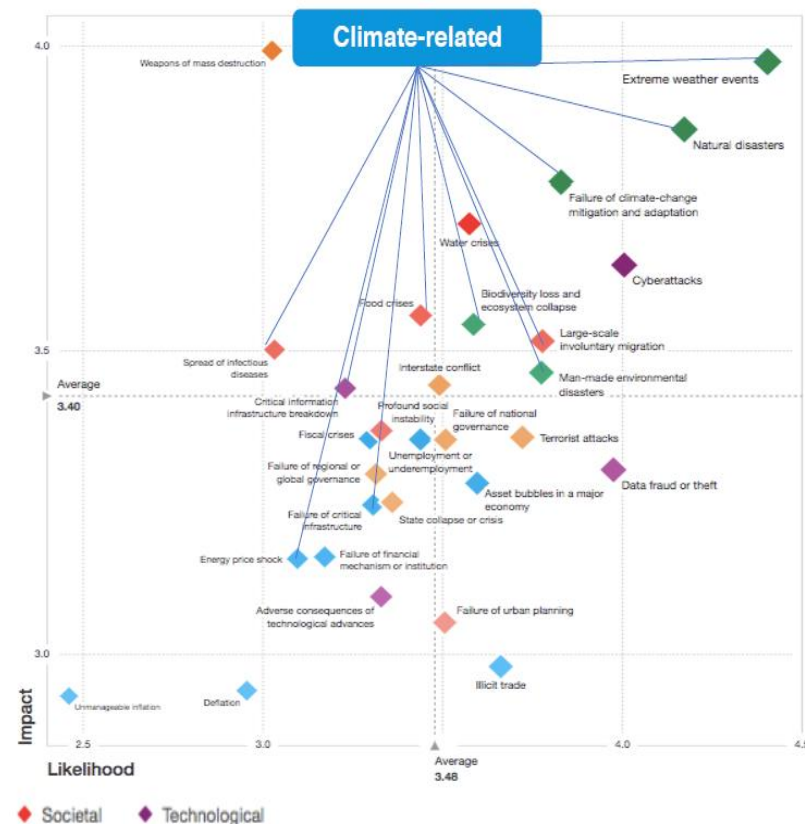


# Risks of not including Climate Change into our Operational Planning/Budget/Resources



# Global Economic Trends

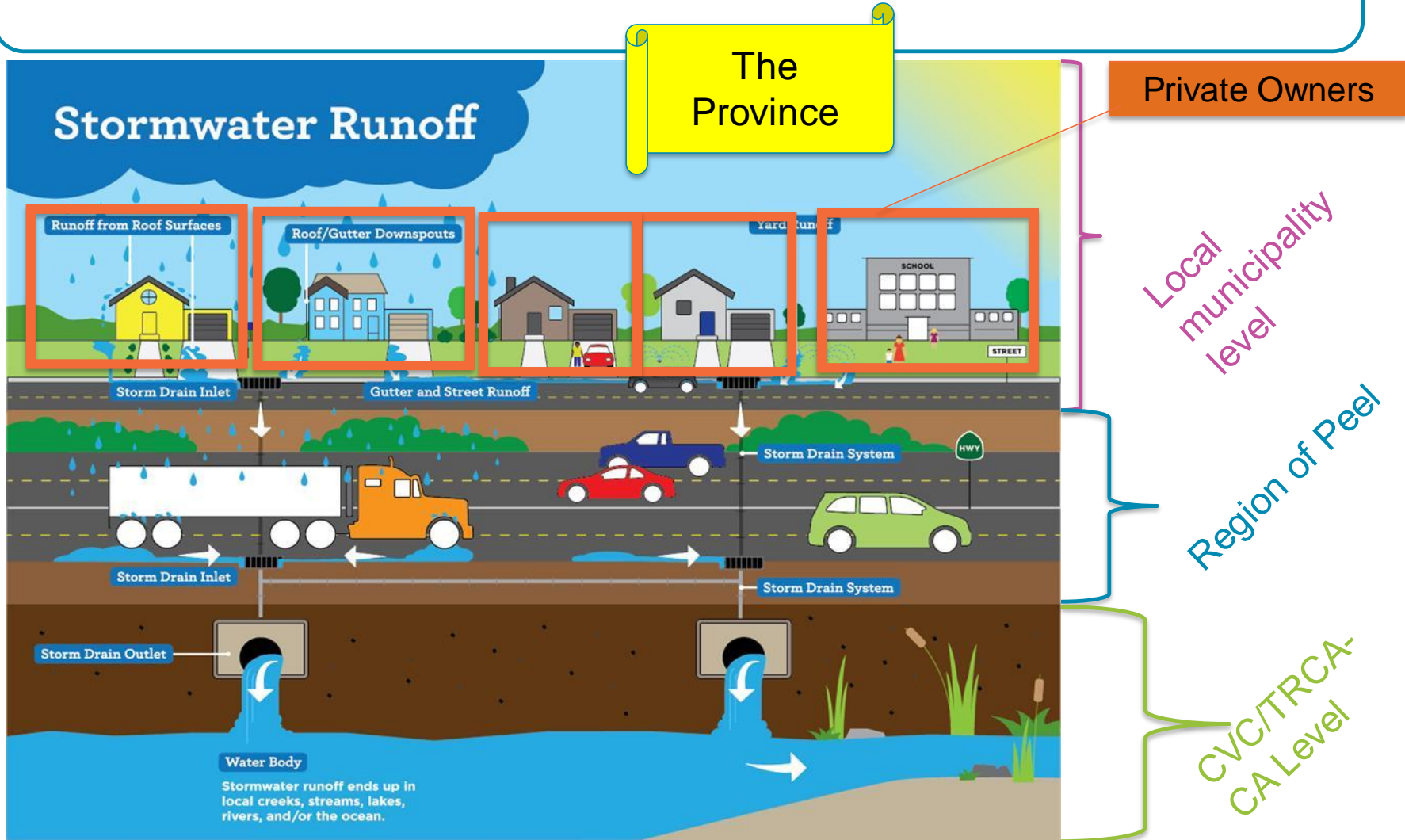
- The world's biggest companies representing ~ US\$17 trillion have valued climate risks to their businesses at ~ US\$1 trillion - with many likely to hit within the next 5 years
- Bank of Canada warns that estimated cost of inaction could be \$21-43 billion/year by 2050
- World Economic Forum named climate change top trend in 2017 Global Risks Report
- **Pension funds**, Investors, stock exchanges, securities regulators, **Moody's Municipal credit rating agency** pushing for enhanced climate-related disclosure



# How does risk disclosure apply to Stormwater?



# SWM Challenges: Jurisdictions



Source: Adapted from Municipality of Middlesex, 2015 (<https://www.middlesexcentre.on.ca/Public/Stormwater>)



# What does Stormwater Level of Service mean to you?



Planning



Design



Monitoring,  
Inspection &  
Maintenance



Flood  
Forecasting,  
Warning  
Systems &  
Emergency  
Management



Audit &  
Adaptive  
Management



Level of Service

# Different Types of Flooding



**Riverine Flooding (surface)**  
*Source: Toronto Region  
Conservation Authority, 2019*



**Urban Flooding  
(overland)**



**Sanitary Sewer Backup**  
*Source: Minneapolis Basement Flood  
Damage Restoration*

# Flooding does not only impact infrastructure, there are other municipal and community risks that need to be considered



**Evacuation Plans do not consider flooding**



**Critical Infrastructure failure poses potential threat to public**

News / GTA

## Mississauga resident living in tent since flood

Ken Hills, 60, is one of hundreds living near Cooksville Creek displaced since last storm.

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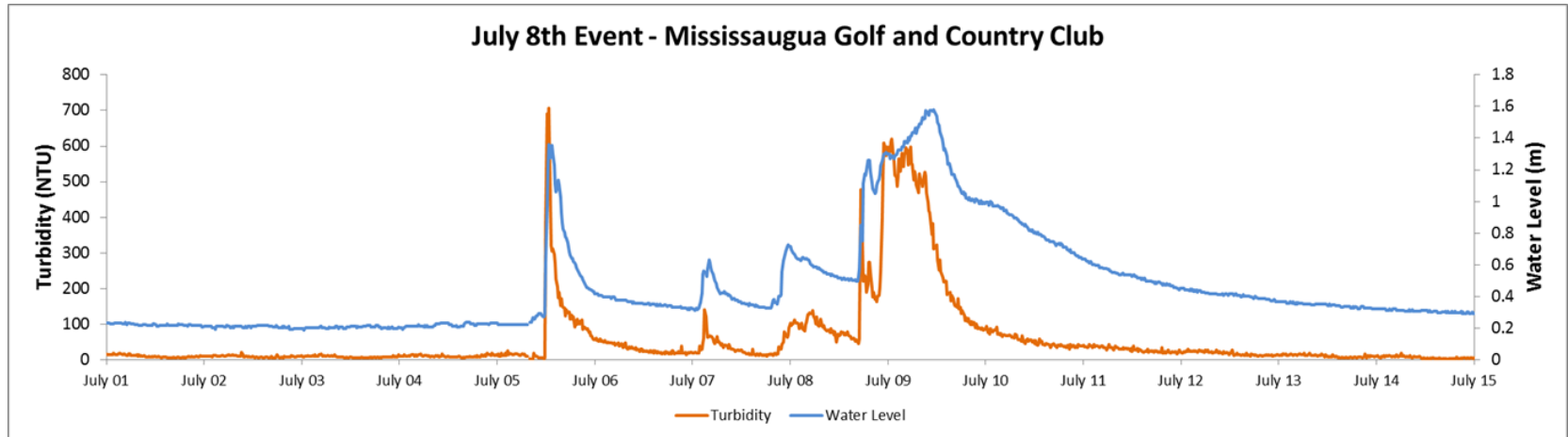


ALEX NINO GHECIU / TORONTO STAR [Order this](#)

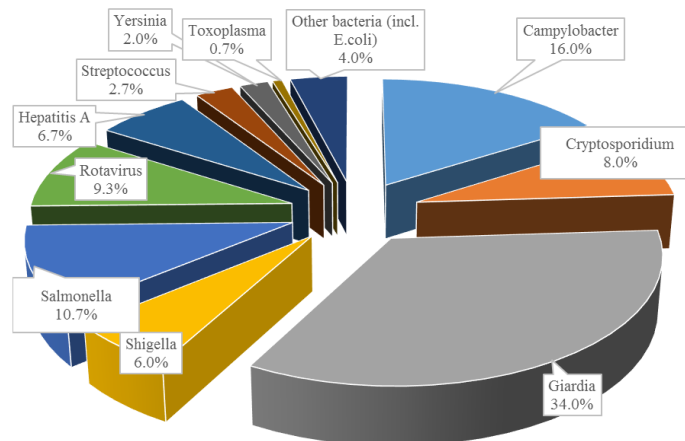
**Community and municipal service needs**



# Water Quality Impacts of Flooding

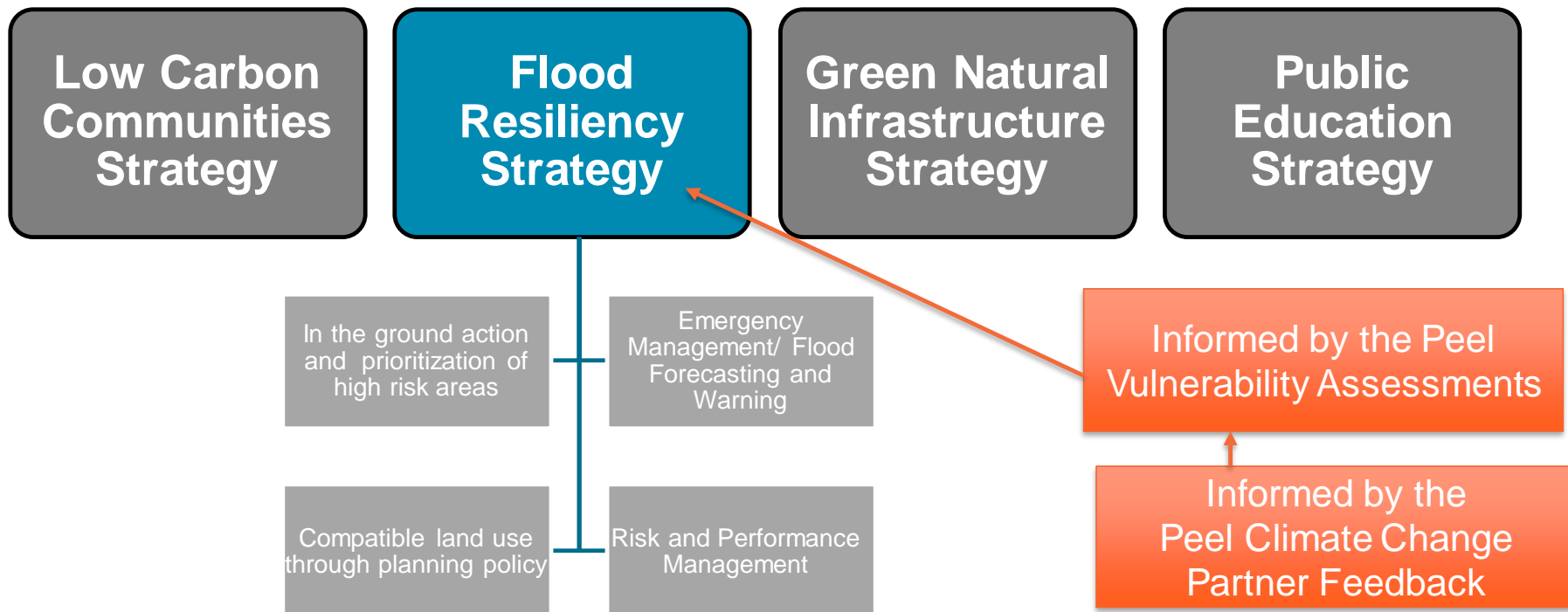


Percentage of reported waterborne diseases in Canada  
(Schuster et al., 2005; Health Canada, 2008)



# Peel Climate Change Partnership Plan: Four Strategies 2018-2022

**Mandate:** Working together to adapt to and mitigate the effects of climate change as we transition to low carbon and resilient communities within Peel Region.



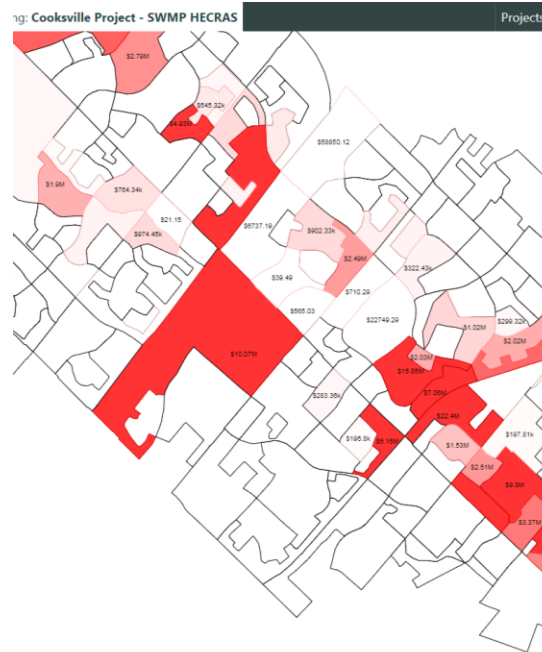
**Partners:**



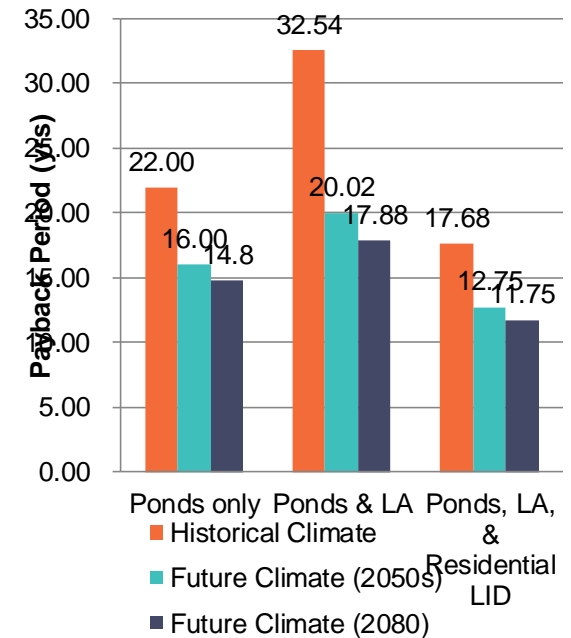
# Risk and Return on Investment Tool



**Identify Flood,  
Water Quality and  
Erosion Risks**



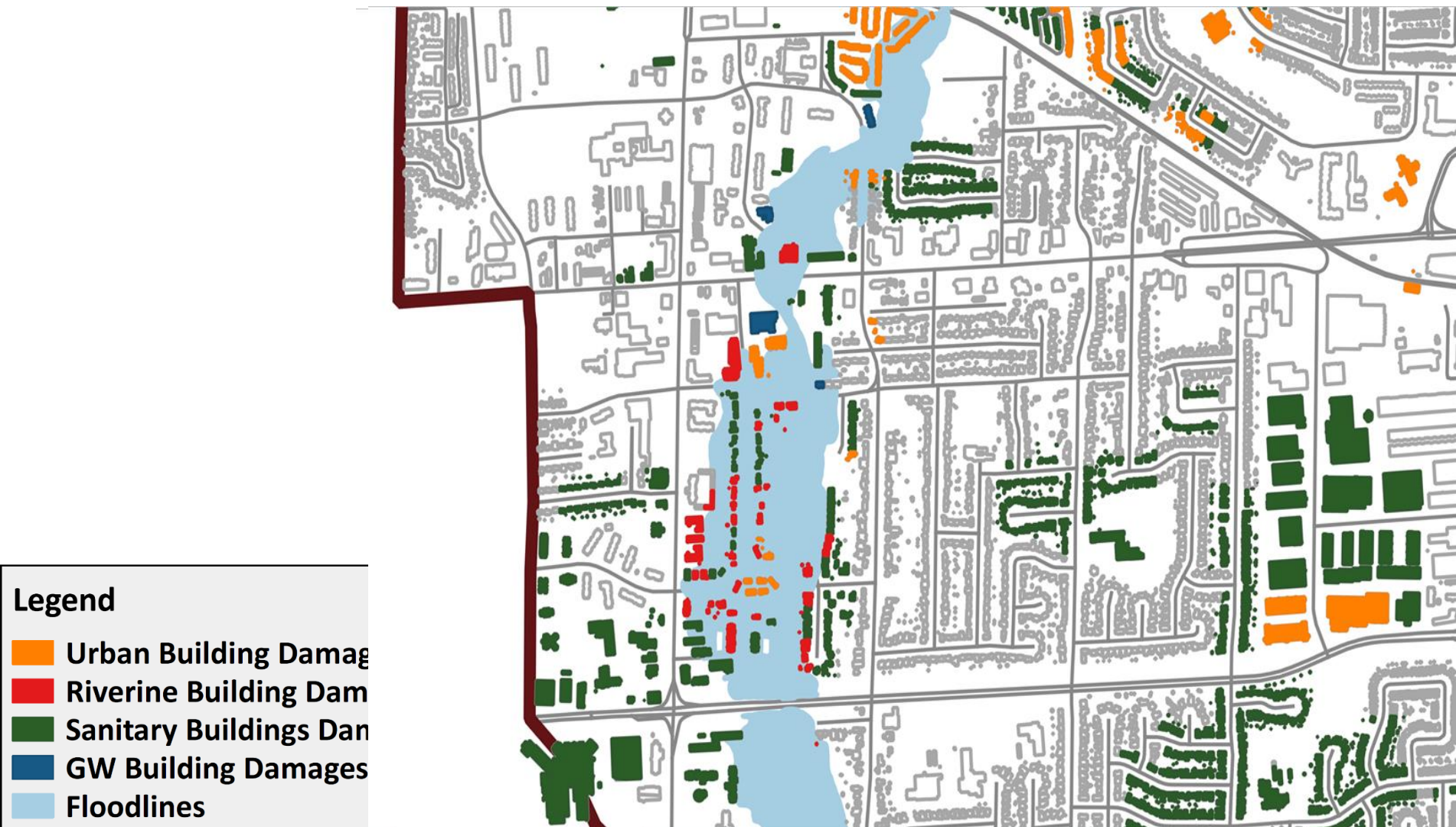
**Identify Potential  
Damages**



**Evaluate Options  
for greatest ROI**

## Direct Damages to Buildings due to flooding

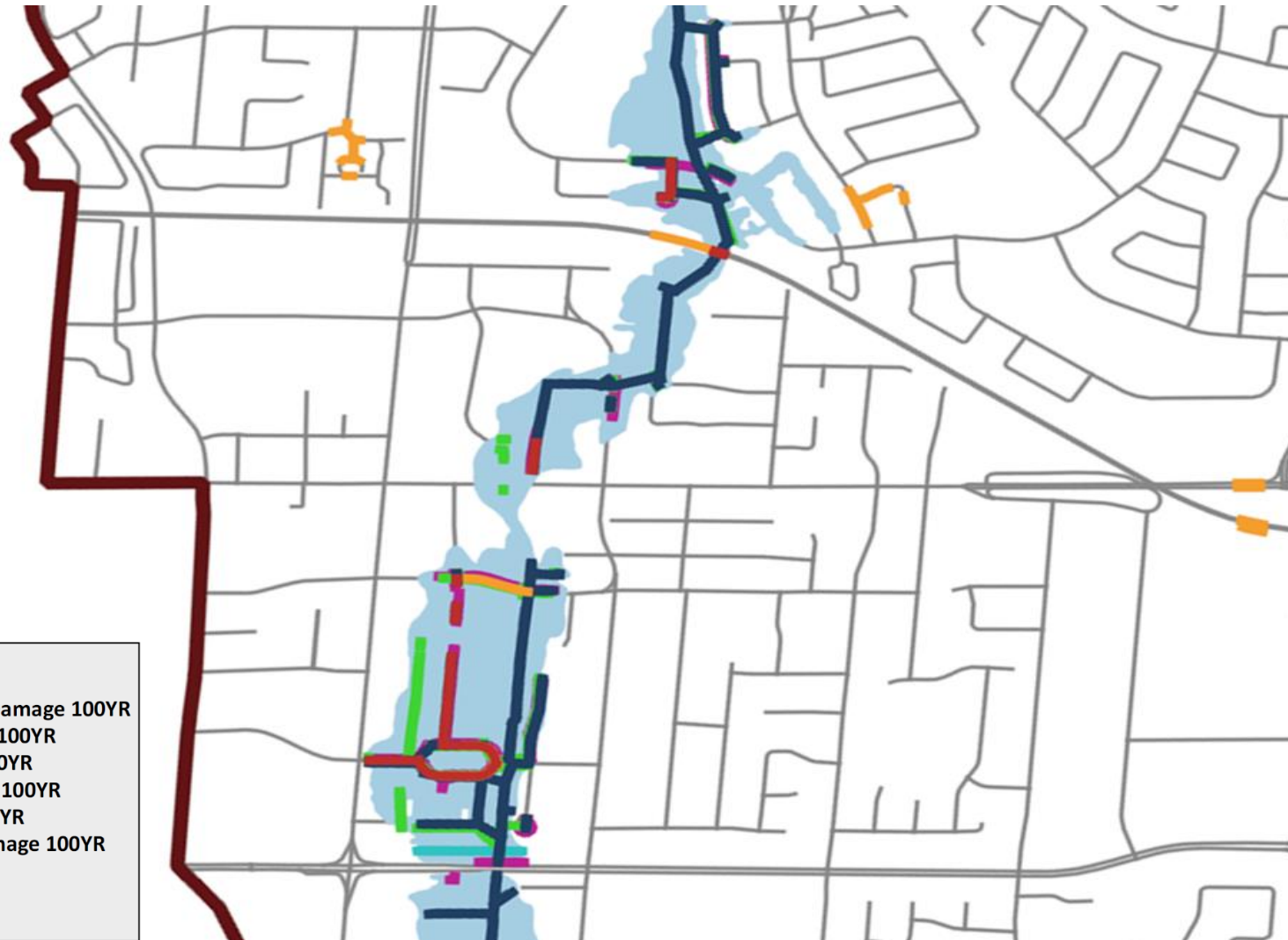
*'do nothing' baseline climate scenario (100 yr return period)*





## Direct Damages to Buried Infrastructure (including Roads and Railways) due to Stream Erosion

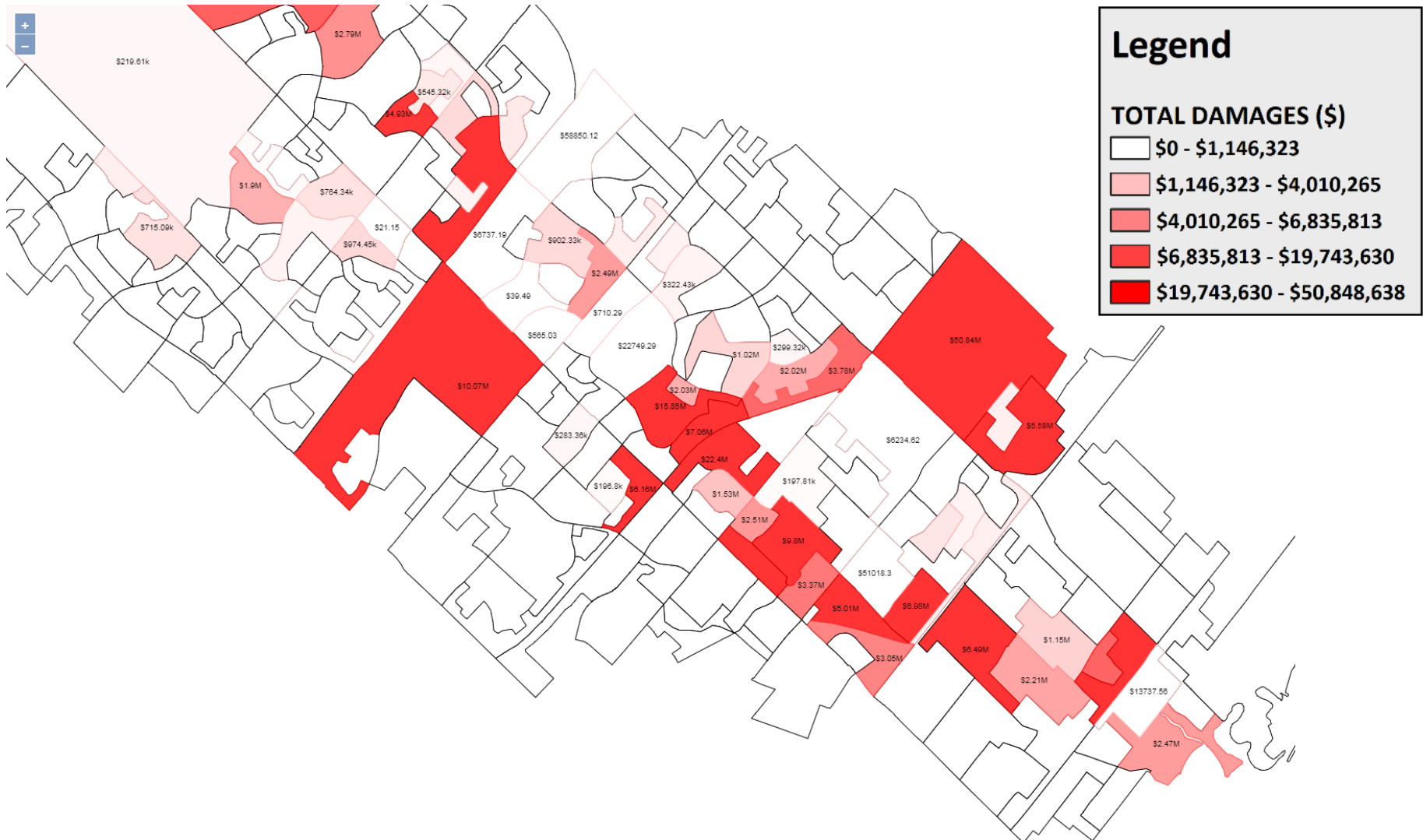
*'do nothing' baseline climate scenario (100 yr return period)*



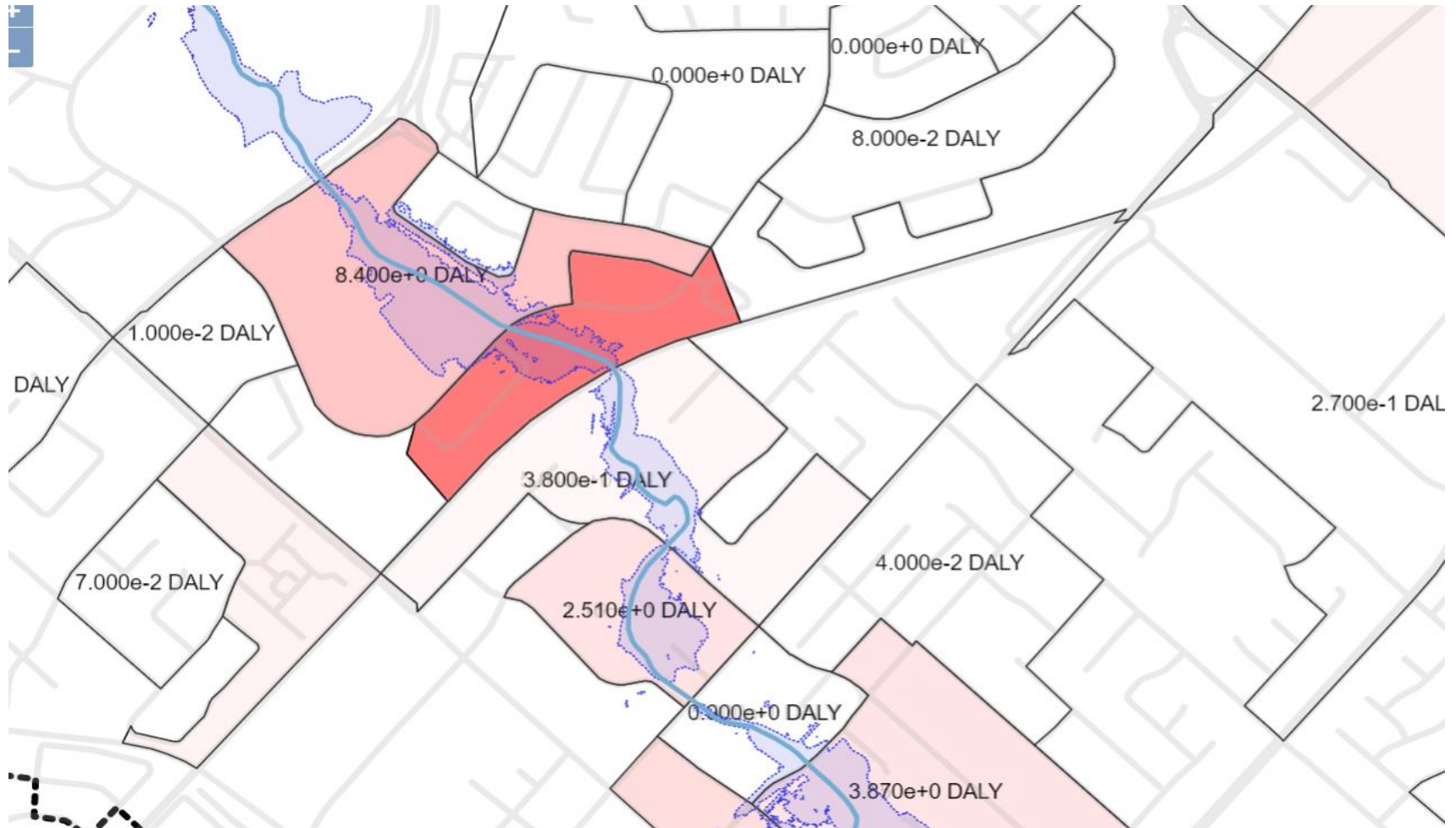
### Legend

- Rails & Roads Urban Overland Damage 100YR
- Rails & Roads Riverine Damage 100YR
- Stormsewer Erosion Damage 100YR
- Sanitary Sewer Erosion Damage 100YR
- Watermain Erosion Damage 100YR
- Telecommunication Erosion Damage 100YR
- Gas Erosion Damage 100YR
- Roads
- Floodline

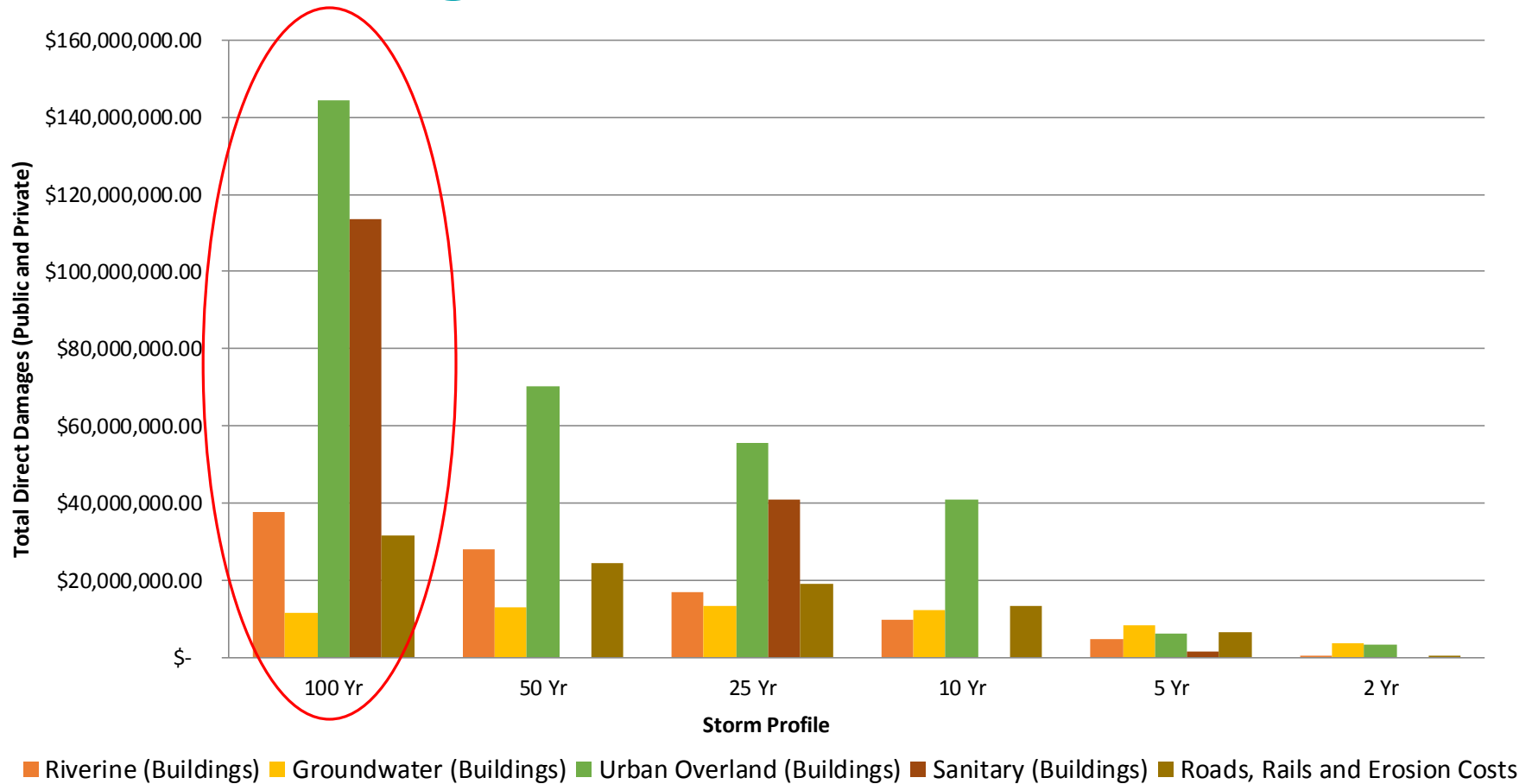
# Priority Flood Risk Areas based on Total Economic Impact



# Priority Emergency Preparedness Mapping



# Total Direct Damages – Baseline Climate ‘do nothing’ Scenario





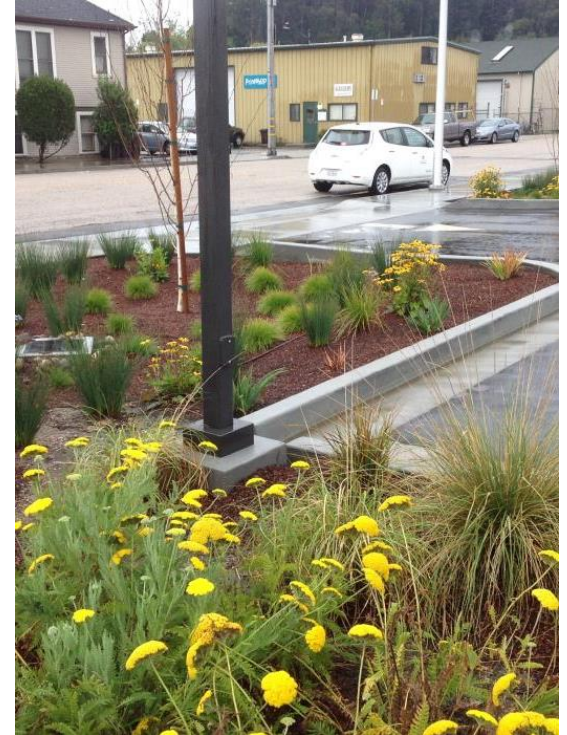
# Evaluating Management Options



**SWM Pond**

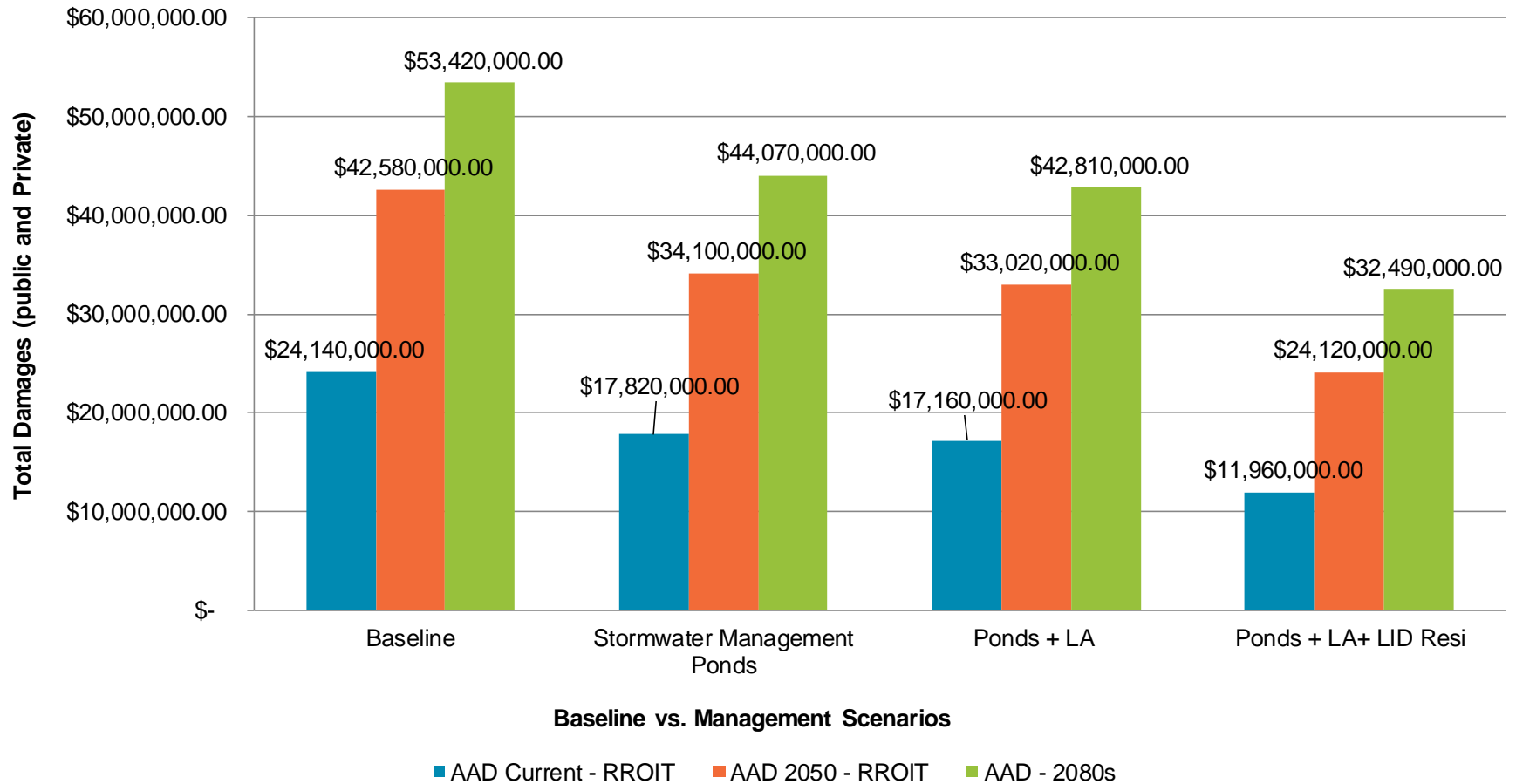


**Land Acquisition**

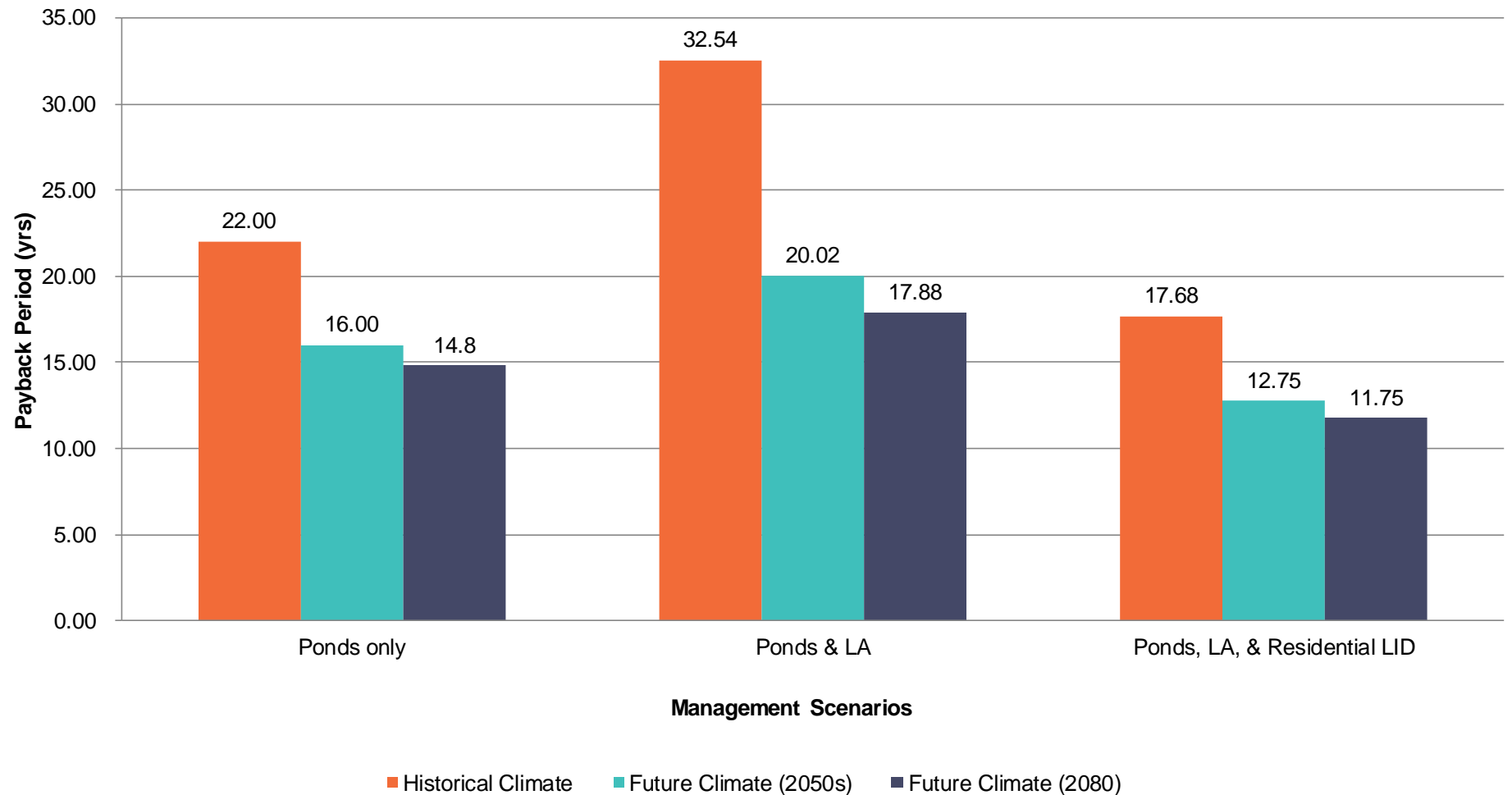


**LID**

# Average Annual Damages (AAD)



# Payback Period



## **How the Risk Tool Fits into the Flood Strategy**

- Identifies High Priority areas for Partners
- Identifies management options for upgrades
- Informs Master Plans, Watershed Plans, Asset Management Plans, Flood Mitigation Plans
- Meets Federal and Provincial grant requirements (Climate Change Lens, considers social vulnerability, ROI and life cycle costing)

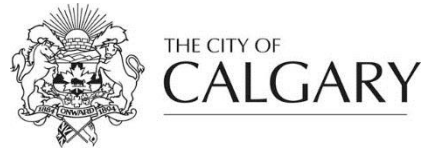


## Funders and Contributors



Public Safety  
Canada

Sécurité publique  
Canada



**questions?**

**inspired by nature**



# Climate Change Results

## 24 Hour Storm – 2050s

Current Return Period (years)	Current Annual Probability (%)	RROIT - 2050s Annual Probability (%)
2	50%	65%
5	20%	30%
10	10%	15%
25	4%	10%
50	2%	5%
100	1%	3%
150	0.7%	2%
325	0.3%	1%

## 24 Hour Storm – 2080s

Current Return Period (years)	Current Annual Probability (%)	2080s Annual Probability (%)
2	50%	63%
5	20%	36%
10	10%	23%
25	4%	13%
50	2%	9%
100	1%	6%
140	0.71%	4%
340	0.29%	2%
835	0.12%	1%