

Grand Valley and Waldemar Flood Damage Assessment Study



Katelyn Lynch, P. Eng
Director of Water Infrastructure



Grand Valley, June 2017 (ref: GRCA)

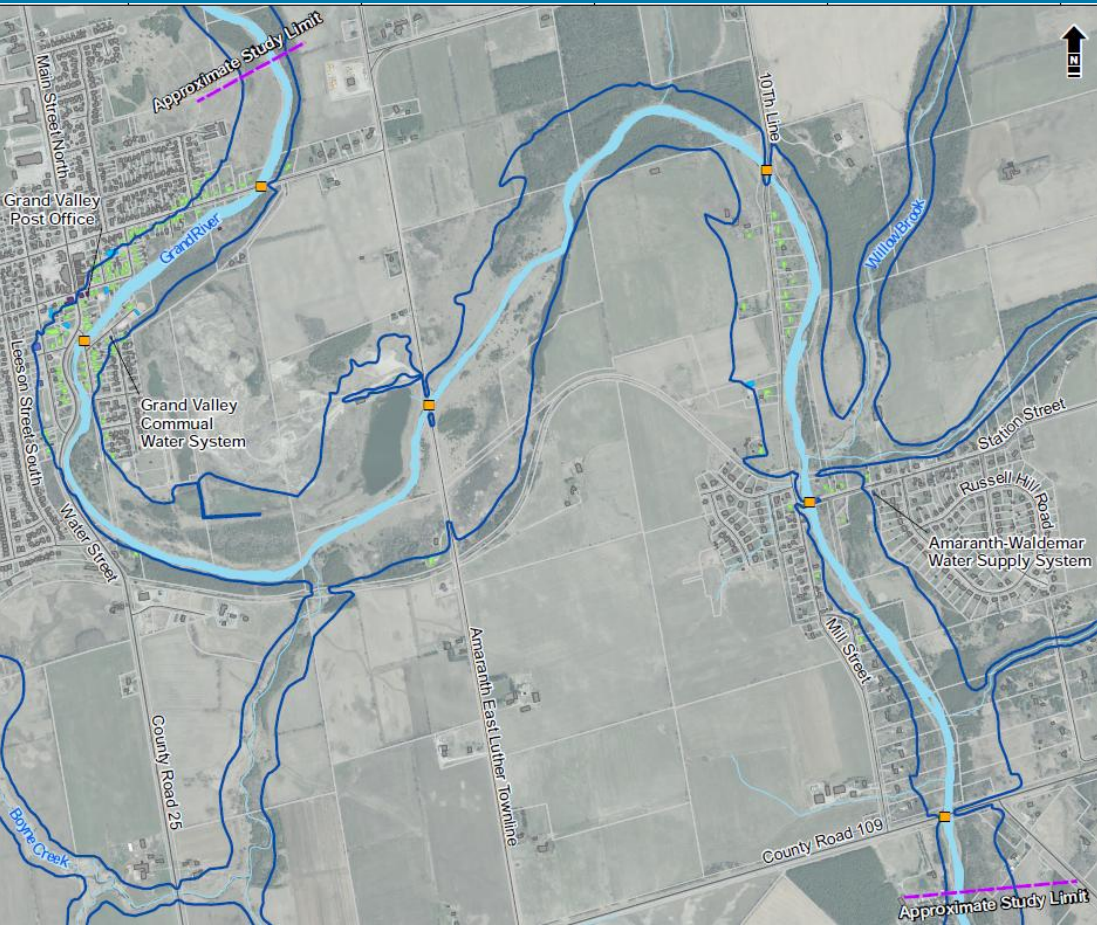
Background

- **Grand Valley & Waldemar** (Upper Grand River) has historically experienced **frequent riverine floodings**.
- Major flood events in June 2017, February 2018, March 2025, and March/April 2026
- Funded by the federal National Disaster Mitigation Program (NDMP), GRCA and Onterris (formerly Matrix Solutions) undertook this study to improve understanding of flood damage impacts and costs in the community



March 16, 2025 (ref: Ontario Storm Reports, Facebook)

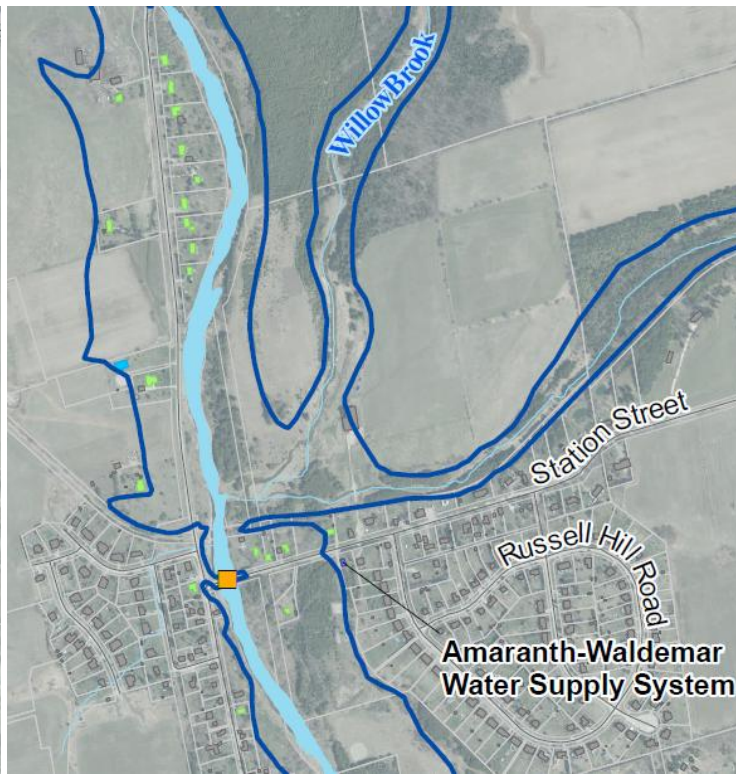
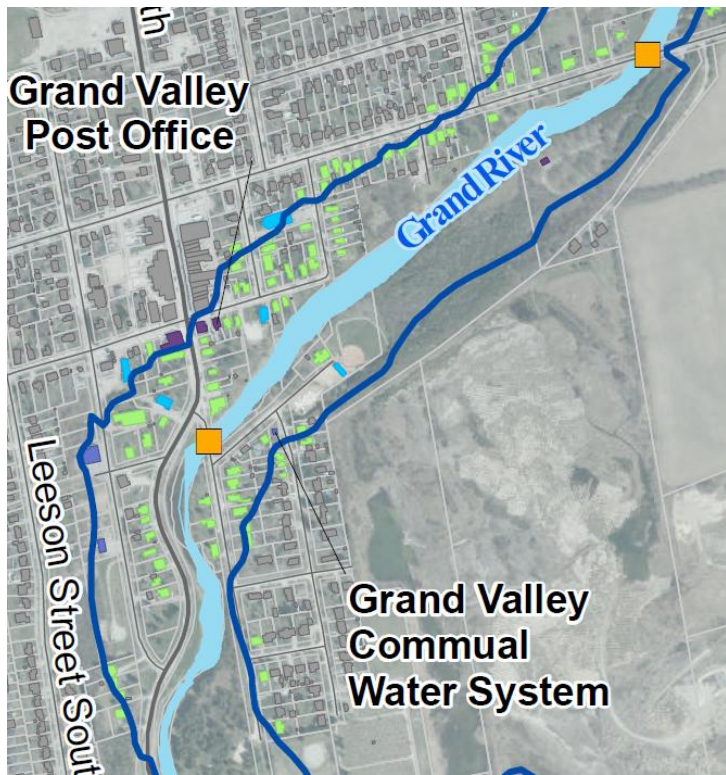
Study Area



Grand Valley and Waldemar

- Population: 3,800 (2021)
- 38 km north of Guelph
- 16 km east of Orangeville
- Located on Grand River upstream of major reservoir; little flood control

Grand Valley & Waldemar



- Existing GRCA Regulatory Floodplain
- Land Parcel
- Water Body
- Watercourse
- Approximate Study Limits
- Highway
- Road
- Bridge
- Building Type**
 - Commercial
 - Industrial
 - Institutional
 - Residential
 - External Structure (excluded from analysis)

Project Objectives & Tasks

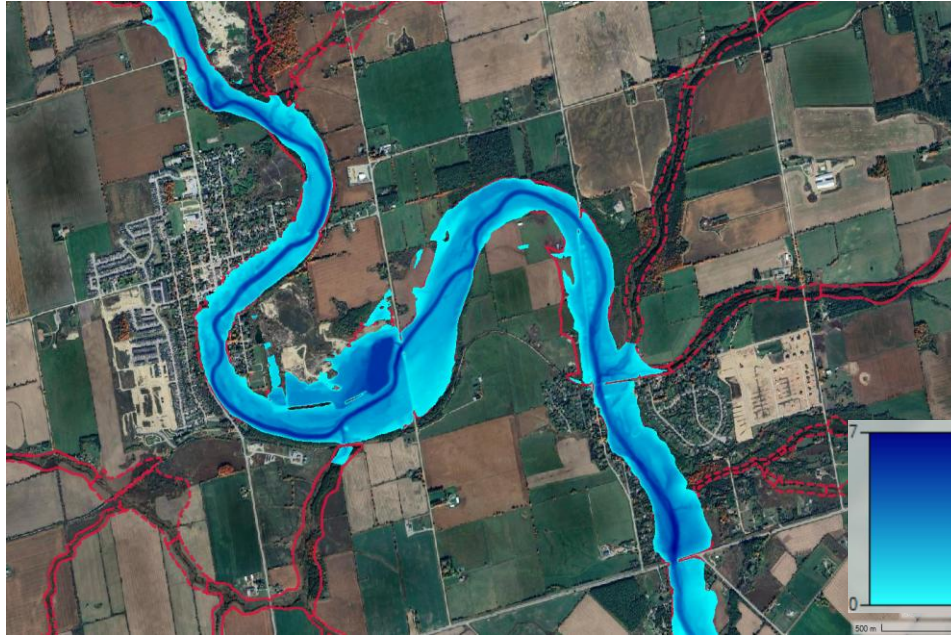
Objective: Assess riverine flood damage costs for Grand Valley & Waldemar

Main Tasks:

1. Apply existing hydraulic models to estimate flood depth for each design storm event
2. Estimate flood damage cost at each building for each event, and flood damage costs on an annual basis for each community

Hydraulic Modelling

Hydraulic model used to simulate flood depth at each building for a given storm event

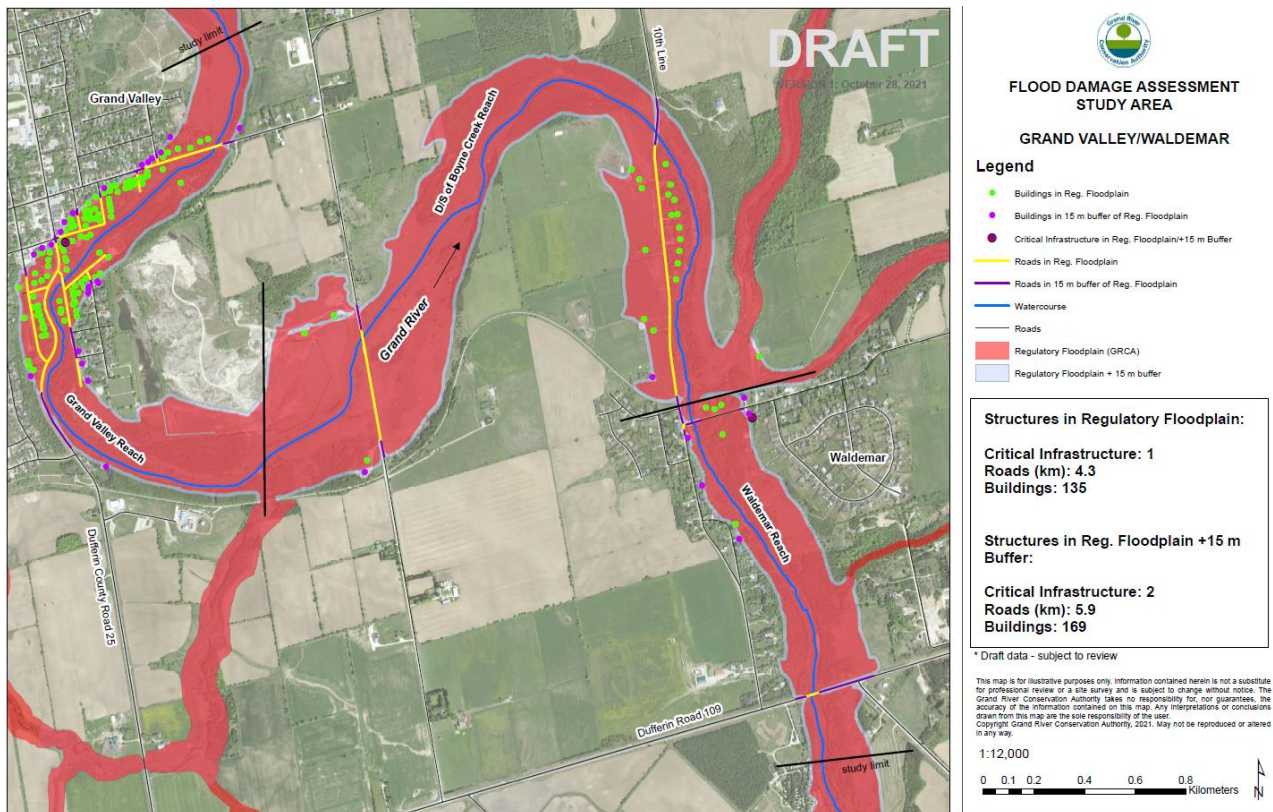


Hydraulic model results, Regional flood depths

Flood Risks to Buildings and Infrastructure

Hydraulic model results paired with mapped data of buildings and infrastructure can be used to:

- Inventory at-risk buildings
- Estimate flood depths in buildings
- Identify at-risk infrastructure.



GRCA Residents Survey

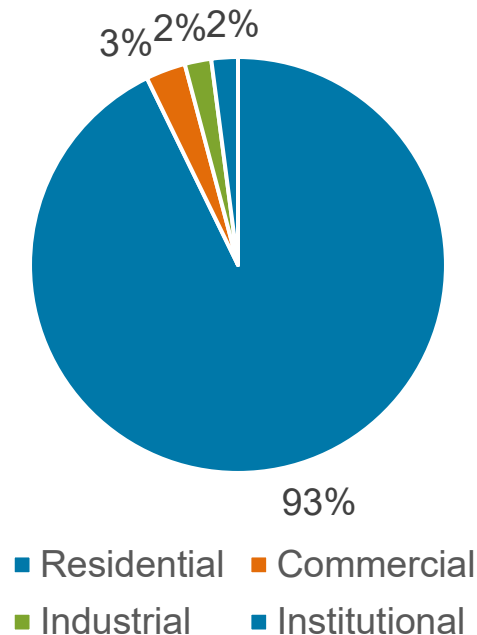
- **30%** of at-risk **residential** properties responded (28 in Grand Valley and Waldemar)
- **50%** of respondents have experienced flooding
- **27%** of respondents had flood damages (mostly due to basement flooding).
- **50%** of residences have either unfinished or no basement;
36% have partially finished;
14% have fully finished basement.
- About **50%** of respondents have taken measures to protect their property from flooding.

Basement Type	Percent of respondents of residential properties
Fully finished	14%
Partially finished	36%
Not finished	46%
No basement	4%

Number and Types of Flooded Buildings

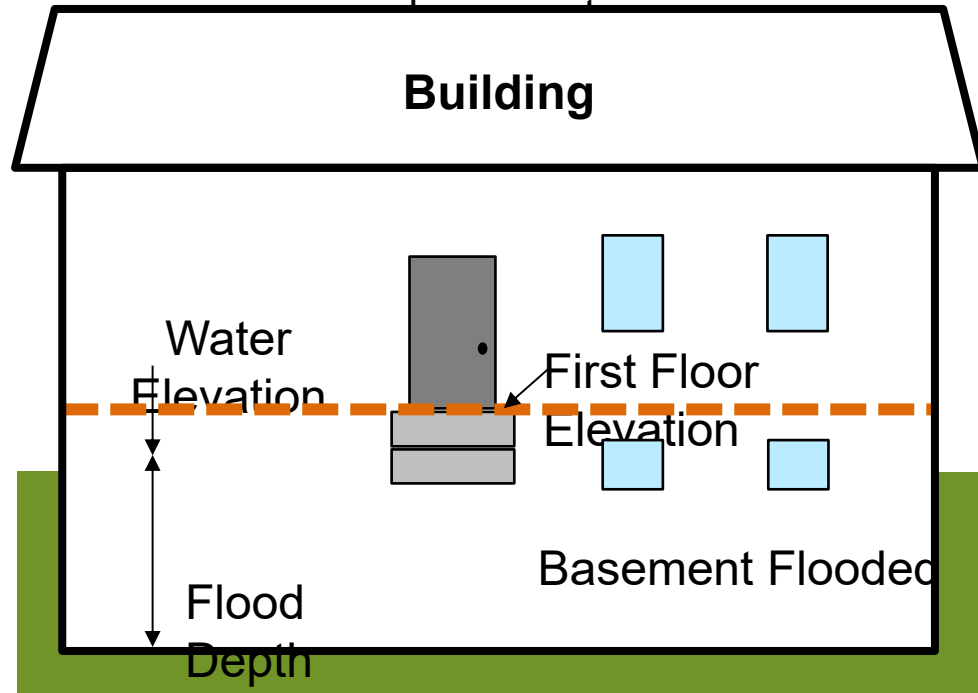
Storm Event	Residential	Commercial	Industrial	Institutional	Total
2 Year	1	0	0	0	1
5 Year	10	0	0	1	11
10 Year	22	0	0	1	23
20 Year	28	0	0	1	29
25 Year	33	0	0	1	34
50 Year	38	0	0	2	40
100 Year	42	0	0	2	44
Regional	90	3	2	2	97

Regional Flooded Building Type



Flood Depths within Buildings

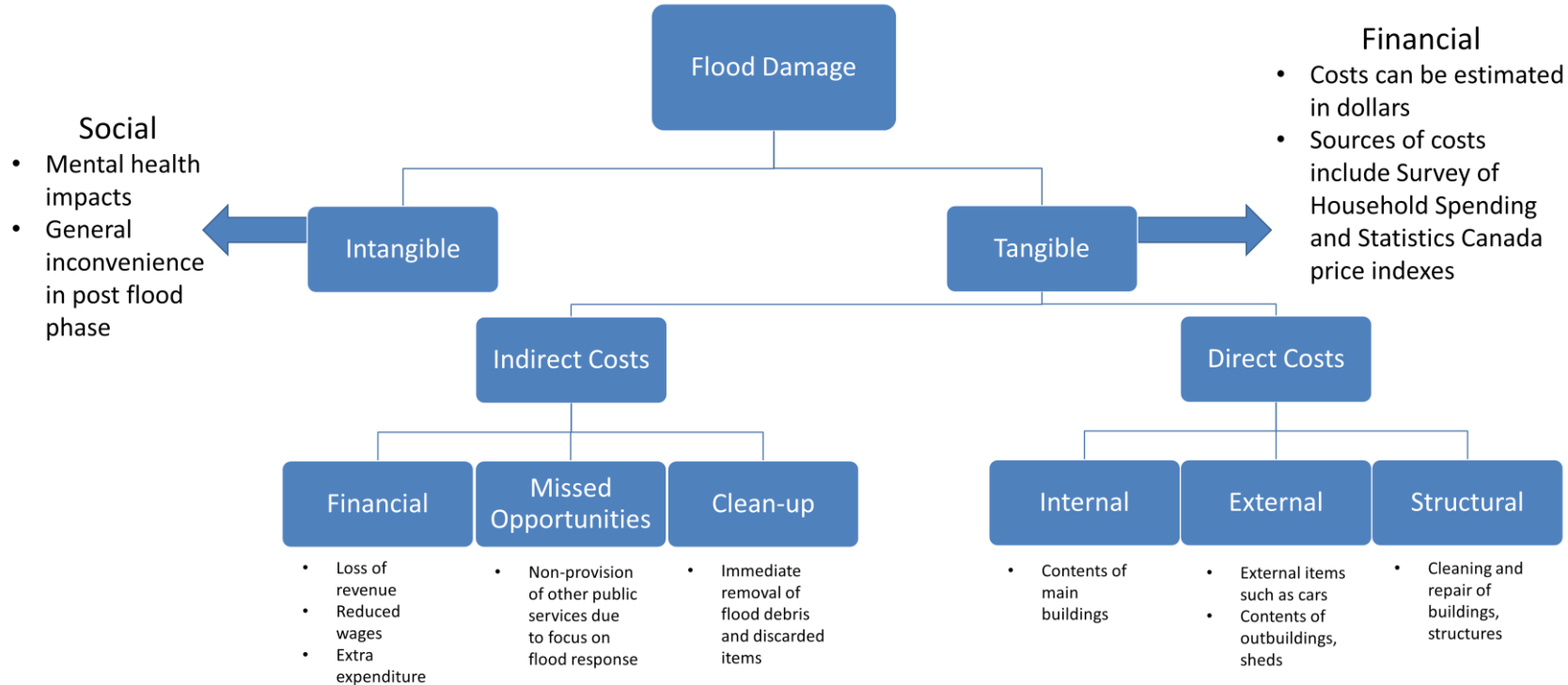
Hydraulic model results are used to estimate depth within buildings with flooded



Inventory of At-Risk Infrastructure

Storm Event	Flooded Roads (km)	Amaranth St E Bridge	Main St Bridge	Amaranth E Luther Townline Bridge	10th Line Bridge	Station St Bridge	Dufferin Rd 109 Bridge	Grand Valley Post Office	Grand Valley Communal Water System	Amaranth-Waldemar Water Supply System
2 yr	0.4	No	No	No	No	No	No	No	No	No
5 yr	1.0	No	No	No	No	No	No	No	No	No
10 yr	1.1	No	No	No	No	No	No	No	No	No
20 yr	1.7	No	No	No	No	No	No	No	No	No
25 yr	1.7	No	No	No	No	No	No	No	No	No
50 yr	2.0	No	No	No	No	No	No	No	No	No
100 yr	2.2	No	No	No	No	No	No	No	No	No
Regional	4.3	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No

What is Included in Flood Damage Estimates?



Source: IBI Group/Golder Associates Ltd. Report: Flood Damage Assessment Study City of Calgary: Assessment of Flood Damages

Flood Damage Costs – Direct Flood Damage

Storm Event	Grand Valley and Waldemar
2 Year	\$58,000
5 Year	\$620,000
10 Year	\$1,491,000
20 Year	\$2,069,000
25 Year	\$2,420,000
50 Year	\$2,799,000
100 Year	\$3,153,000
Regional	\$15,601,000

Flood Damage Results – Indirect Flood Damage

Storm Event	Residential Displacement	Business Disruption	Total Displacement + Disruption
2 year	\$3,000	n/a	\$3,000
5 year	\$34,000	n/a	\$34,000
10 year	\$76,000	n/a	\$76,000
20 year	\$99,000	n/a	\$99,000
25 year	\$116,000	n/a	\$116,000
50 year	\$136,000	n/a	\$136,000
100 year	\$153,000	n/a	\$153,000
Regional	\$500,000	\$490,000	\$990,000

Flood Damage Results – Average Annual Damages

Average Annual Damage (AAD):

Cumulative potential damages occurring from various flood events over an extended period. Averaged over time and presented as a uniform annual amount.

Direct AAD	Indirect AAD (Displacement + Disruption)	Total AAD
\$485,000	\$ 26,000	\$511,000

Total AAD of **Future Climate Scenario** with increased the frequency of severe flooding

Total AAD Existing Climate	Total AAD 2050s	Total AAD 2080s
\$511,000	\$ 847,000 (+66%)	\$1,144,000 (+124%)



Thank you!