Managing Flood Risk in an Uncertain Climate

Lisa Bowering, MESc
FIDS Member 2008 - 2011


Lake Kinneret, Israel

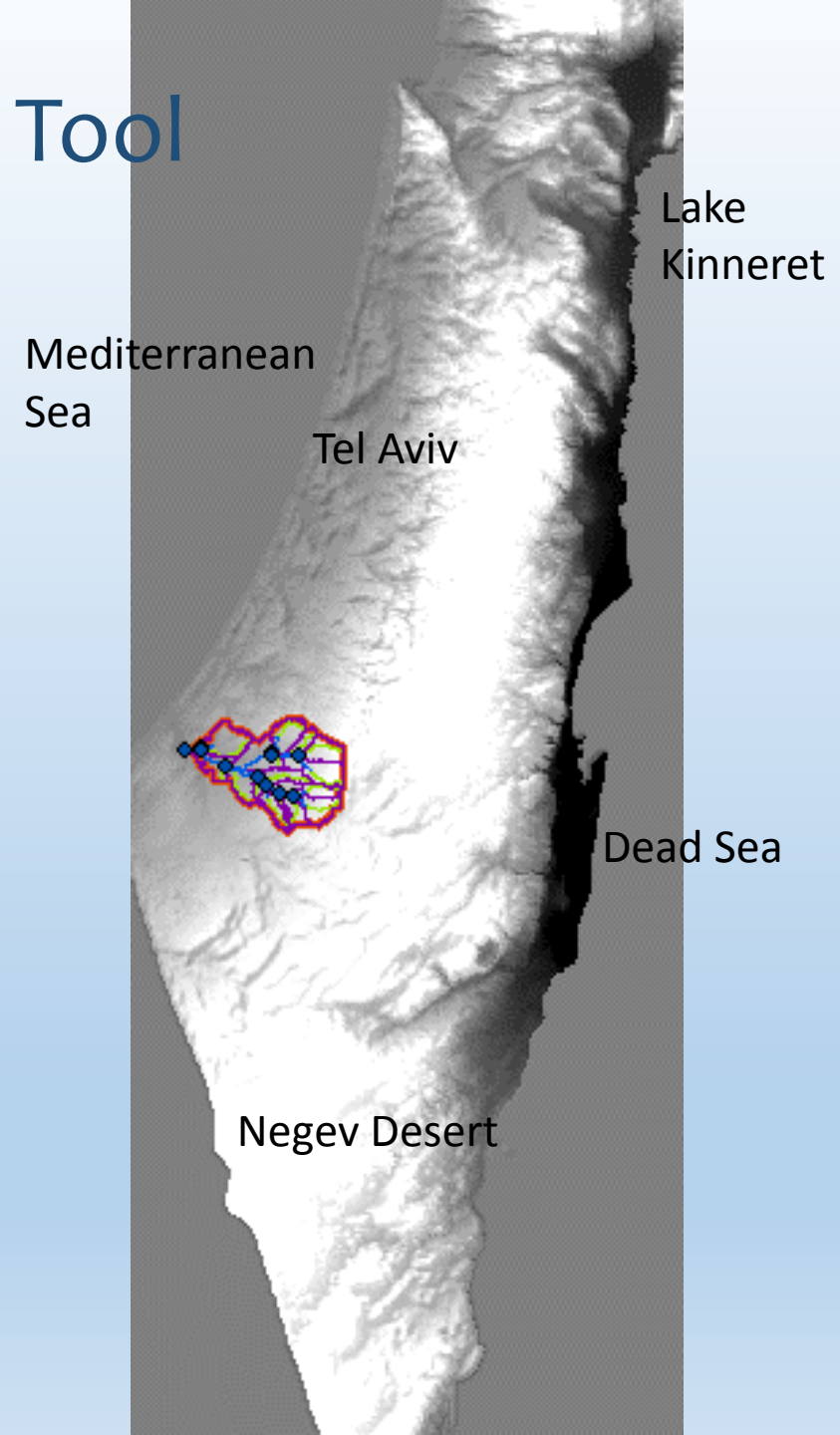

Negev Desert, Israel

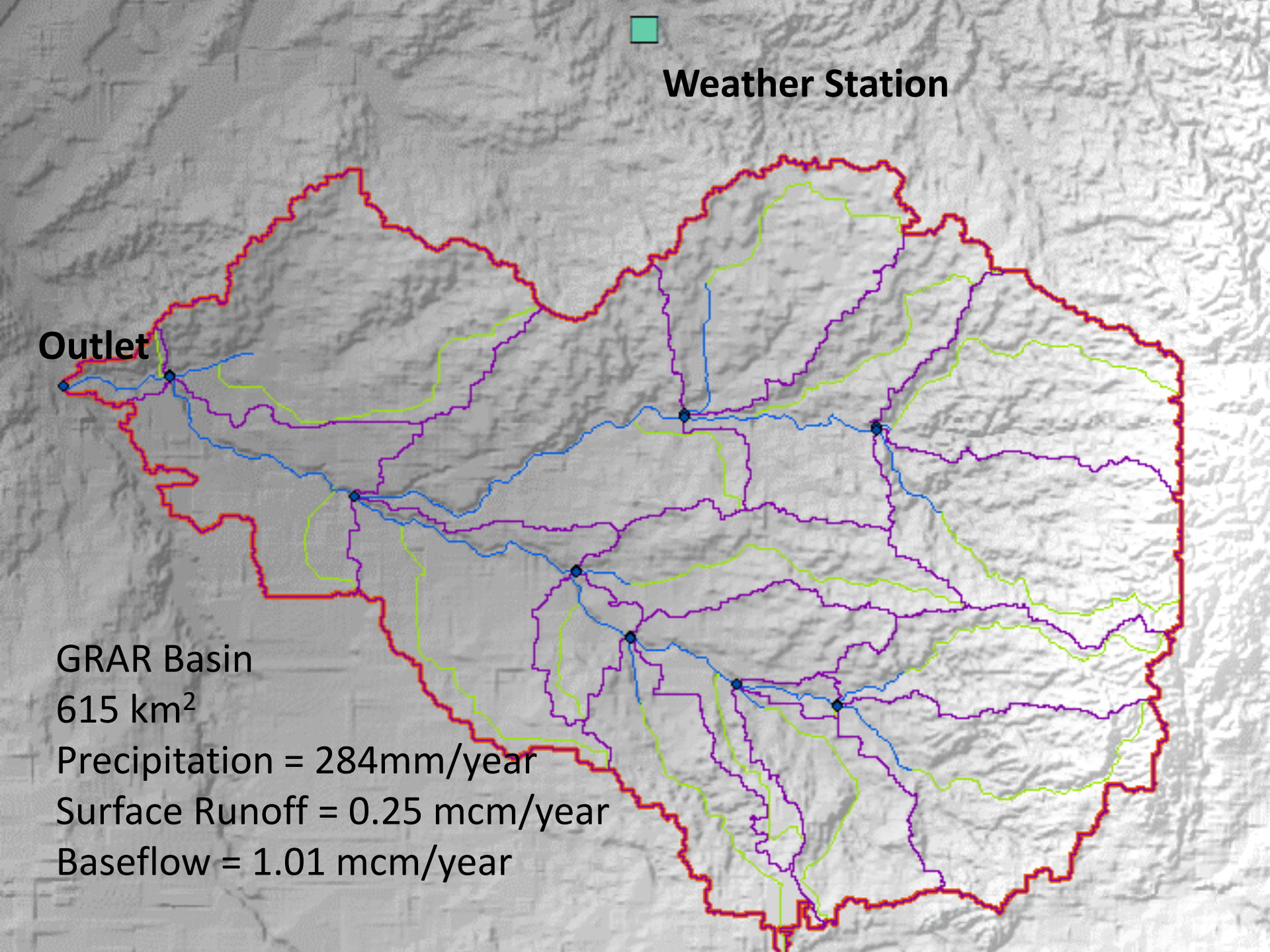

Lake Kinneret, March 2012


Dead Sea, Israel

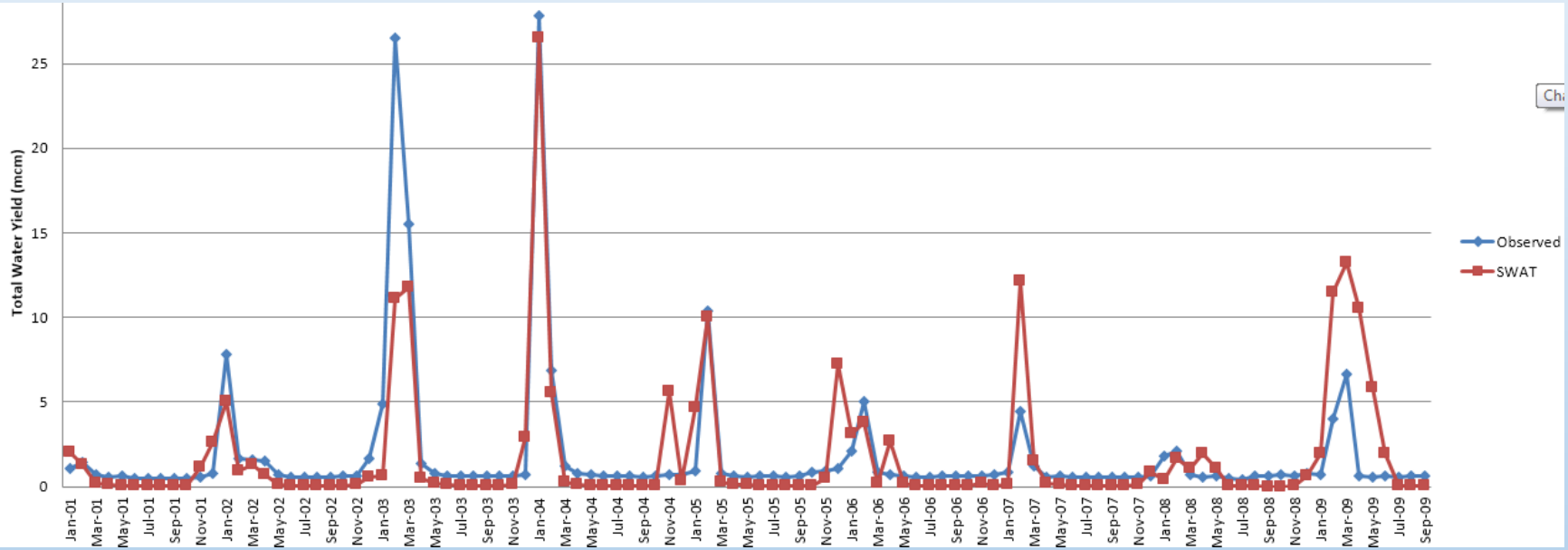
Soil & Water Assessment Tool (ArcSWAT)

- Public Domain
- USDA-ARS and Texas A&M University
- Predict the effect of management decisions on water quality and quantity
- Land use + Soil + Weather = yield and quality

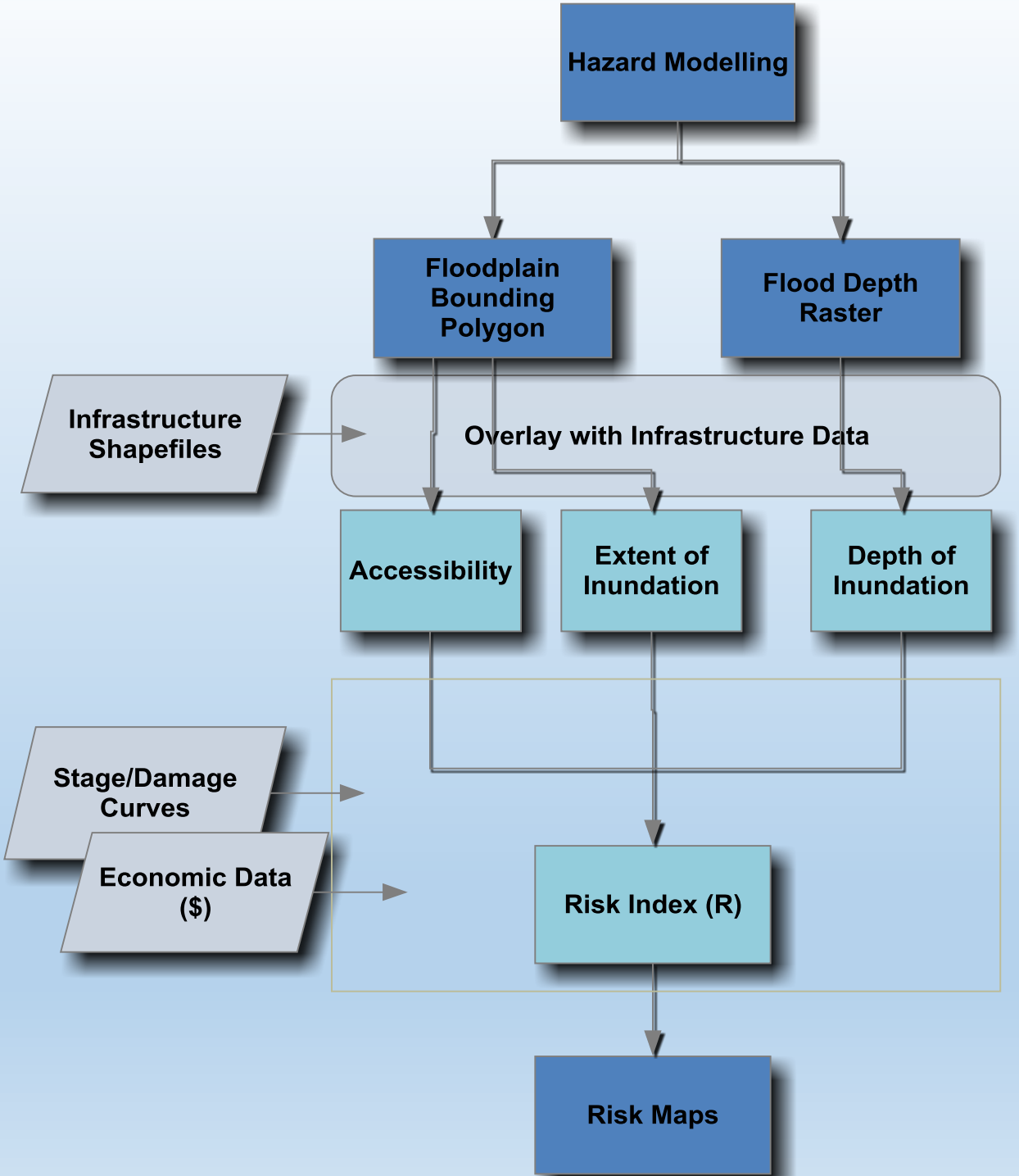


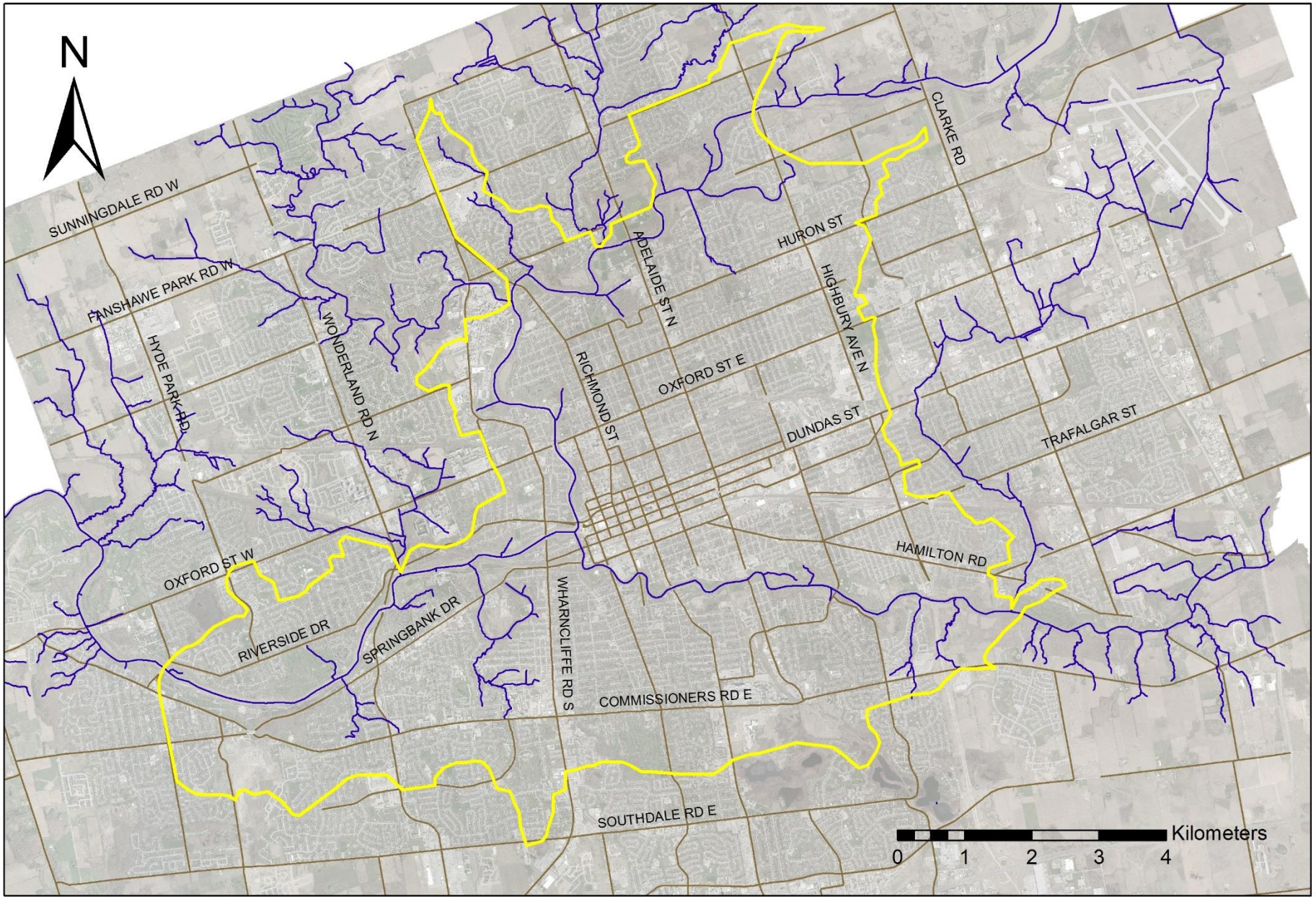

Weather Station
Outlet
GRAR Basin
615 km²
Precipitation = 284mm/year
Surface Runoff = 0.25 mcm/year
Baseflow = 1.01 mcm/year

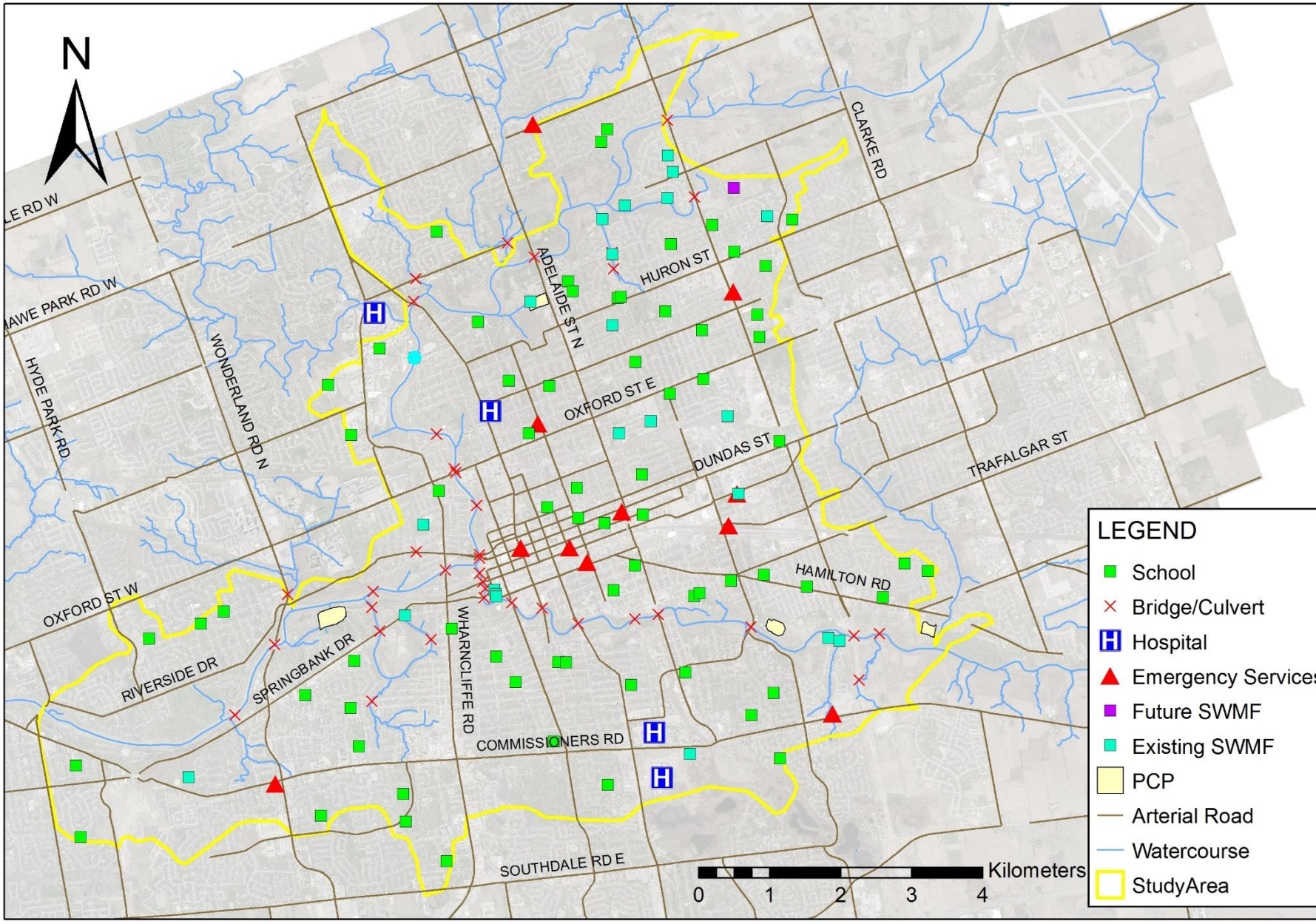
Shortcomings

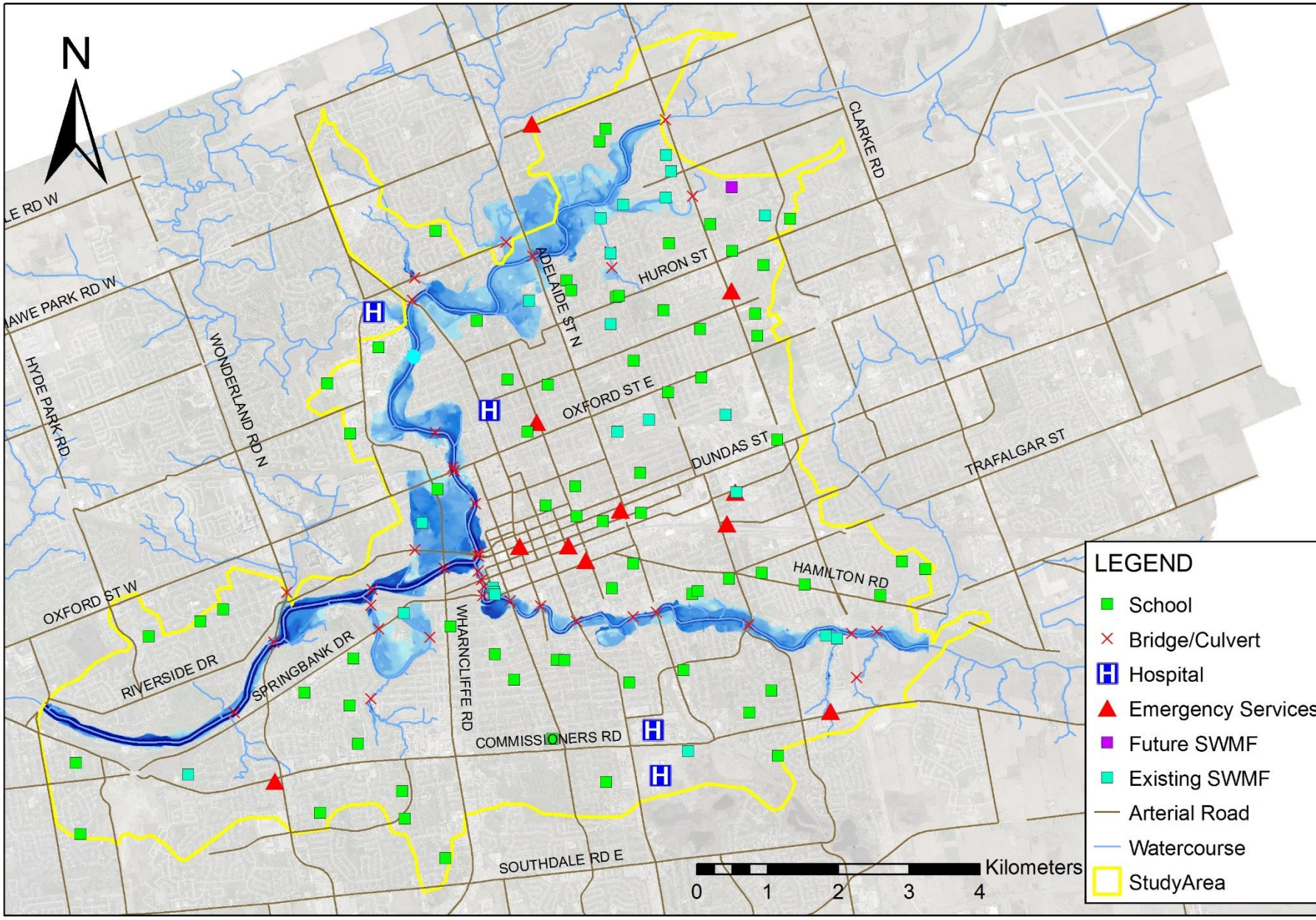


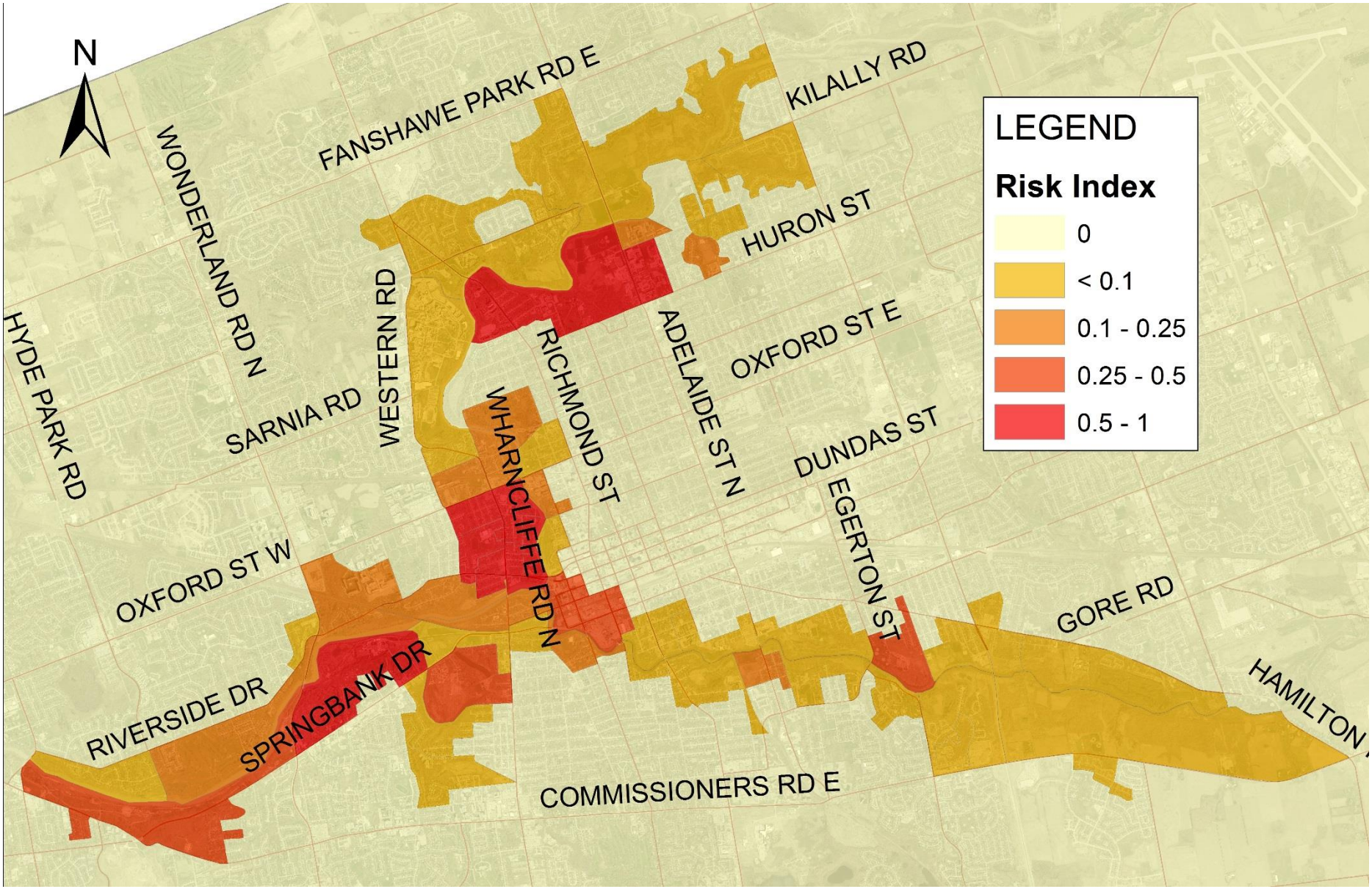
Past and Present: Flood Risk Methodology


Hazard Modelling
Floodplain Bounding Polygon
Flood Depth Raster
Infrastructure Shapefiles
Overlay with Infrastructure Data
Accessibility
Extent of Inundation
Depth of Inundation
Stage/Damage Curves
Economic Data ($)
Risk Index (R)
Risk Maps


N
SUNNINGDALE RD W
FANSHAWE PARK RD W
HYDE PARK RD
WONDERLAND RD N
ADELAIDE ST N
HURON ST
CLARKE RD
HIGHBURY AVE N
RICHMOND ST
OXFORD ST E
DUNDAS ST
TRAFALGAR ST
HAMILTON RD
OXFORD ST W
RIVERSIDE DR
SPRINGBANK DR
WHARNCLIFFE RD S
COMMISSIONERS RD E
SOUTHDALE RD E
Kilometers
0
1
2
3
4


N
LE RD W
AWE PARK RD W
HYDE PARK RD
WONDERLAND RD N
ADELAIDE ST N
HURON ST
CLARKE RD
OXFORD ST E
DUNDAS ST
TRAFALGAR ST
HAMILTON RD
OXFORD ST W
RIVERSIDE DR
SPRINGBANK DR
WHARNCLIFFE RD
COMMISSIONERS RD
SOUTHDALE RD E
LEGEND
School
Bridge/Culvert
Hospital
Emergency Services
Future SWMF
Existing SWMF
PCP
Arterial Road
Watercourse
StudyArea
Kilometers
0
1
2
3
4


N
LE RD W
AWE PARK RD W
HYDE PARK RD
WONDERLAND RD N
ADELAIDE ST N
HURON ST
CLARKE RD
OXFORD ST E
DUNDAS ST
TRAFALGAR ST
HAMILTON RD
OXFORD ST W
RIVERSIDE DR
SPRINGBANK DR
WHARNCLIFFE RD
COMMISSIONERS RD
SOUTHDALE RD E
H
H
H
H
0 1 2 3 4
Kilometers
LEGEND
School
Bridge/Culvert
Hospital
Emergency Services
Future SWMF
Existing SWMF
Arterial Road
Watercourse
StudyArea



Existing Conditions 1:100 year Upper Bound Event

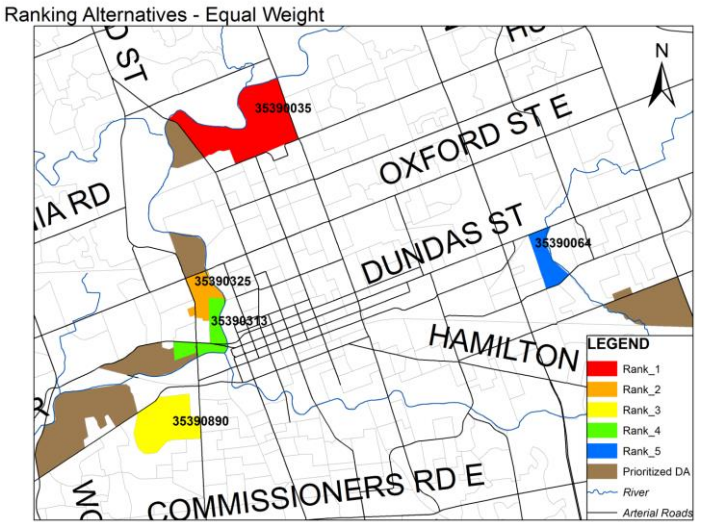
Multi-Objective Analyses

- Compromise Programming
- Consider socio-economic factors along with risk
- Prioritize the 10 highest at-risk areas for action

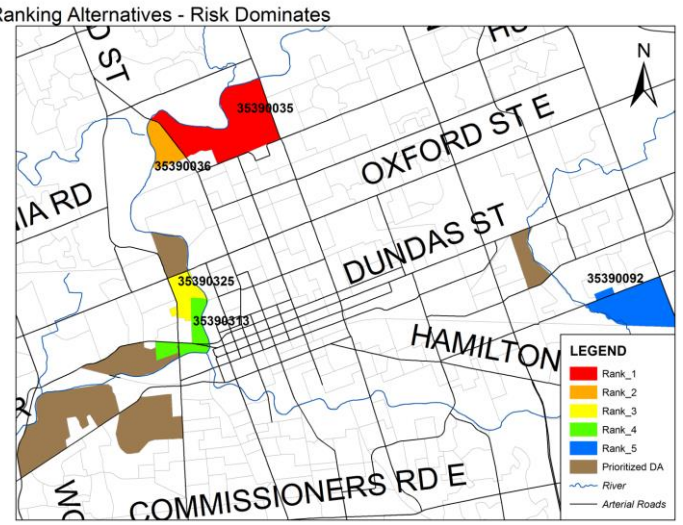
	Maximize	Maximize	Maximize	Maximize
	RISK	SOCIAL	SOCIAL	ECONOMIC
DA	100 CC_UB (RI)	Single Mother (ppl)	65+ Age (ppl)	Low Income (%)
35390035	1175358.8	10	125	10.5
35390036	628337.7	0	45	36.4
35390325	607841.9	40	60	11.4
35390313	571387.0	20	75	7.1
35390092	430922.4	35	60	6.9
35390326	375026.8	10	60	23.5
35390429	344518.8	30	40	0
35390064	267825.1	10	160	11.5
35390890	224690.4	10	245	12.5
35390706	199429.5	10	225	4.7

Indicator	Risk	Single Mother	65+ years of age	Low Income
Case 1	100	100	100	100
Case 2	100	1	1	1
Case 3	1	1	1	100
Case 4	1	100	100	100

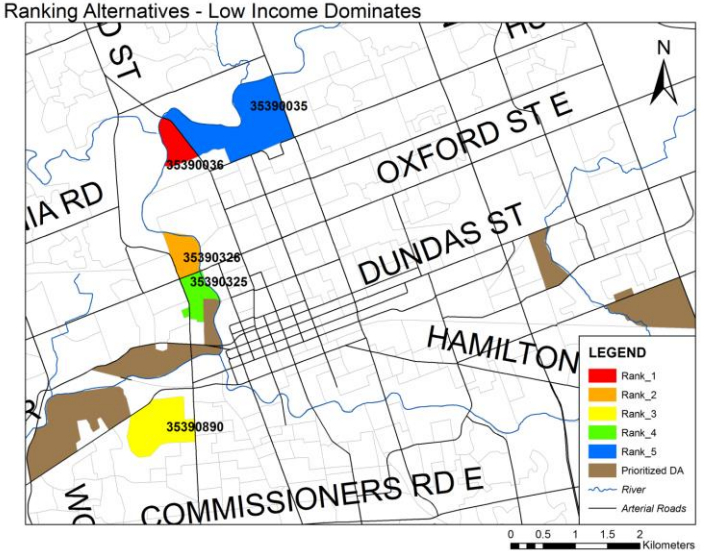
1



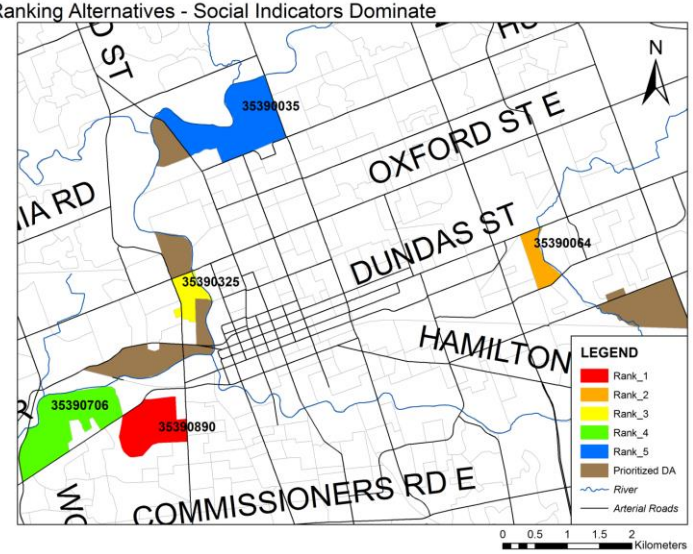
2

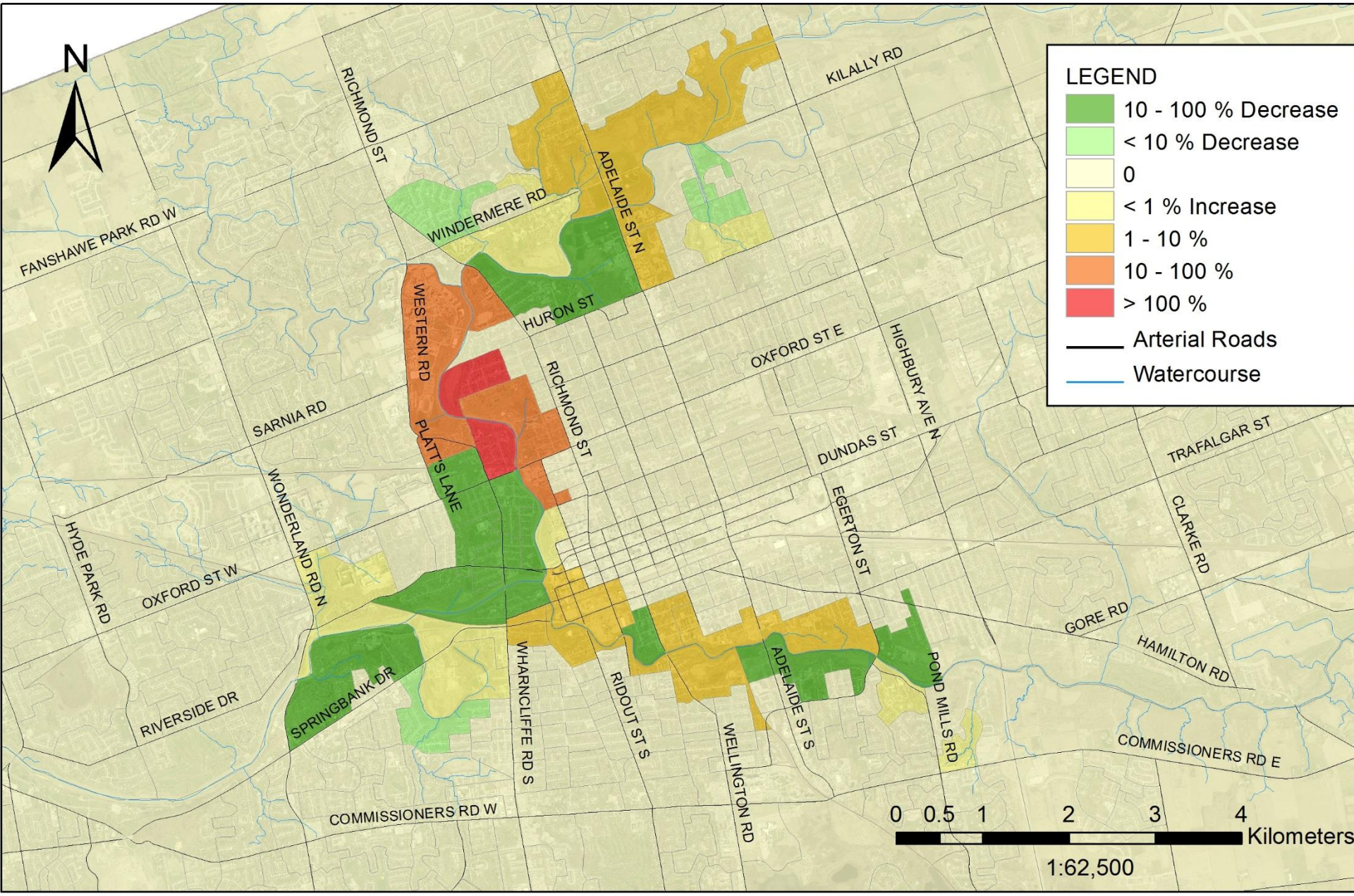


3



4





1:100 year Upper Bound Event with Dykes raised to 1:100 year levels

Thank you!