

Navigating the Waters: The City of Winnipeg Flood Manual



ClimateWest 2026 Forum
The Leaf Assiniboine Park
May 12, 2026

City of Winnipeg Flood Manual

Presentation Outline

- Background
- Flood Manual Application Concept
- City of Winnipeg Flood Proofing Tasks
- Flood Manual Procedures
- Other Improvements Since 1997
- Summary

Background

1997 “Flood of the Century”

FLOOD DISASTER: ■ Risk grows in south Winnipeg
■ Ice jams flood St. Pierre-Jolys


Grand Forks in ruins

Evacuation one of largest in recent U.S. history

By Paul Wiecek and Kim Guttormson
Staff Reporters

GRAND FORKS, N.D. — North Dakota's second-largest city became a watery ghost town with its downtown a burnt-out shell yesterday as flood and fire combined to reduce a once-thriving city to ruins. Officials estimated that over 45,000 Grand Forks residents — or 95 per cent of the city's population — have now been evacuated and a temporary shelter at Grand Forks Air Force Base is now believed to have a larger population than the entire city. Other evacuees have spread throughout the state, Minnesota and Manitoba to church basements, homes of friends or family or those of total strangers. The Red Cross and Federal

Mon, Apr 20th Prov revises forecast,
- Emerson to Morris +3 to 4ft,
- Ste. Agathe to Winnipeg +4 to 8 ft



Background

- 1997 Flood revealed limitations in existing manuals.
- Many flood measures implemented were on a reactionary basis.
- City recognized need to compile, enhance and supplement existing information
 - Reflect the experiences of 1997 Flood
- Flood Manual awarded in 2000; completed in 2003.
- **Concept:** Comprehensive data set of known actions or procedures required to fight a flood stored within a geographically referenced database



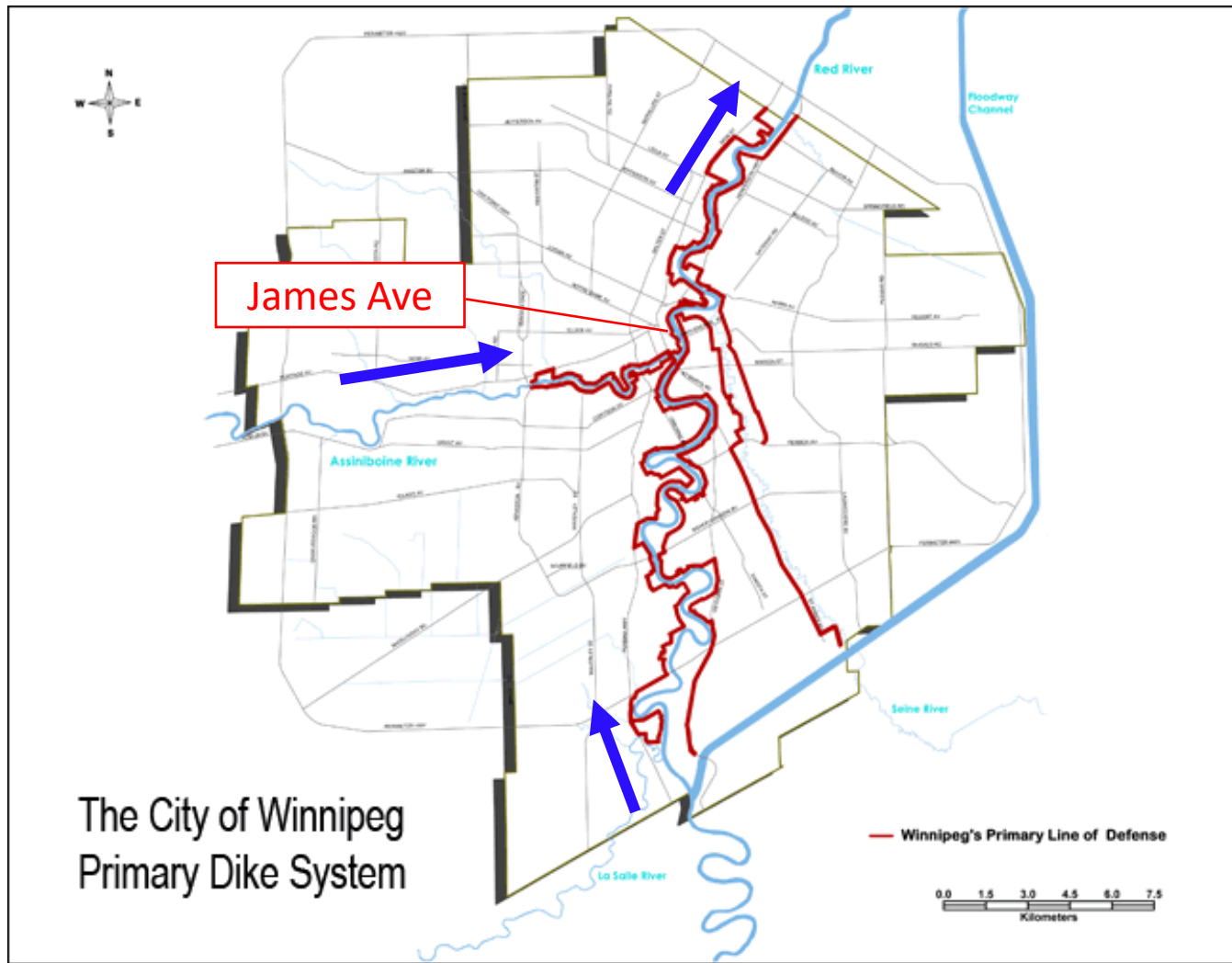
Flood Manual Application Concept



- River levels calculated at monitoring points for flood scenario
- Procedures with “trigger” level $<$ predicted river level are identified
- Procedure is executed (i.e. an “activity”)
- Procedure query produces tables or GIS mapping of flood activities



Flood Manual Application Concept



Winnipeg Flood Proofing Tasks



- Sewer System Control (SSC)
 - activate flood pumping stations (Combined Sewer districts)
 - check flaps & gates on outfalls
 - install temporary pumping
- Outside Primary Dike (Secondary Lines of Defence)
 - build sandbag dikes (starting at 20 ft)
 - undertake alternative flood proofing measures (External Agencies list)
 - carry out residential isolations
- Other Activities
 - seal wastewater manholes on the “dry side” of the Primary Line of Defence
 - raise primary dikes (~James 24 ft)

Hydraulic Profile Calculator (HPC)

Home Properties

Hydraulic Method

James Reference Method

Control at SALD

Ice Jam

Documents

River Levels

Procedures

Activities

Hydraulic Method

Units

Metric Imperial

River Flows (cfs)

Red River - Above Floodway

92700

Red River - Below Floodway

44500

Assiniboine River - Headingley

4590

Smaller Watersheds

LaSalle-St. Norbert

3708

Sturgeon Creek

3000

Omand's Creek

300

Local

100

River Gauges and Water Level Measurements

Red River (geod-ft)

Inlet Control Headwater (39.39 miles) 766.77

Inlet Control Tailwater (38.92 miles) 0

South Perimeter Bridge (35.05 miles) 0

Fort Garry Bridge (29.46 miles) 0

James Pumping Station (19.35 miles) 0

Chief Peguis Bridge (13.70 miles) 0

North Perimeter Bridge (11.63 miles) 0

Assiniboine River (geod-ft)

Osborne Bridge (21.28 miles) 0

Maryland Bridge (22.62 miles) 0

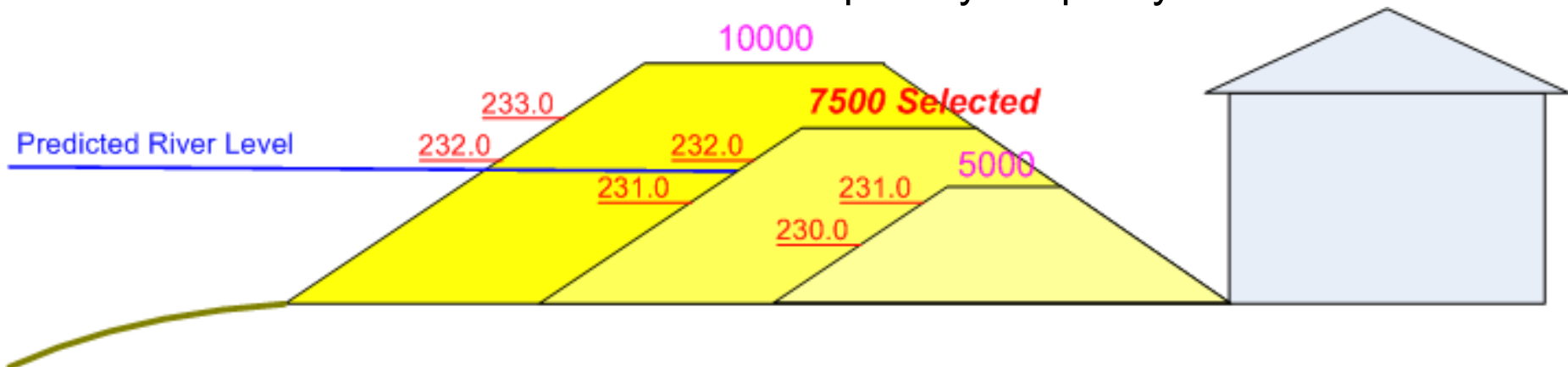
Kenaston Bridge (24.61 miles) 0

Charleswood Bridge (27.65 miles) 0

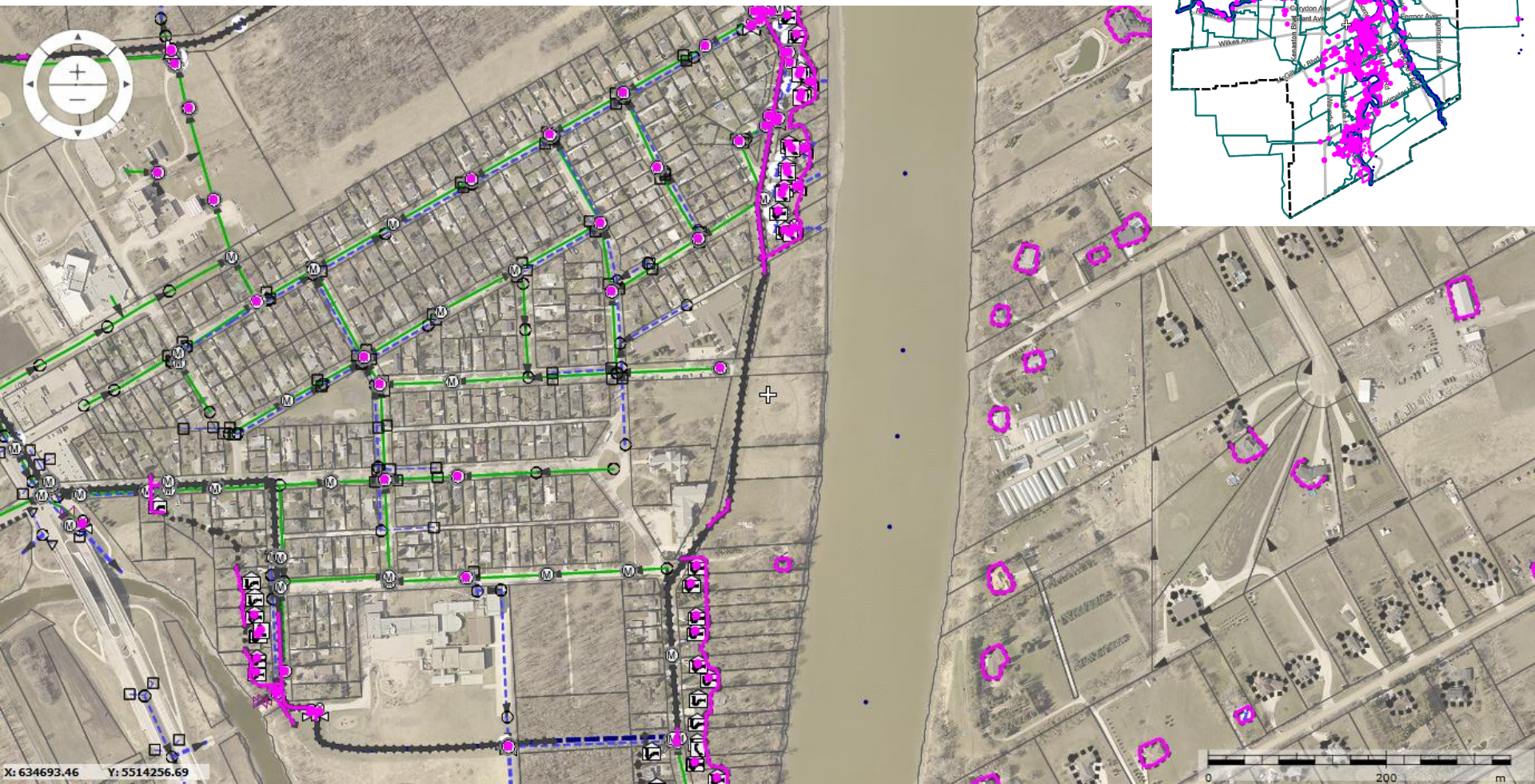
West Perimeter Bridge (31.76 miles) 0

Resource Quantity Database

- Flood Procedures often require varying amounts of “resources” (sandbags, pumping capacity etc.), depending upon predicted water level
- Resource quantity database is linked to flood procedures
- System selects amount of required resources based on water level
- Primary data:
 - Linked Procedure ID
 - Resource type (sandbag, pump, etc.)
 - Quantity / capacity
 - Min and Max water levels for each quantity / capacity increment



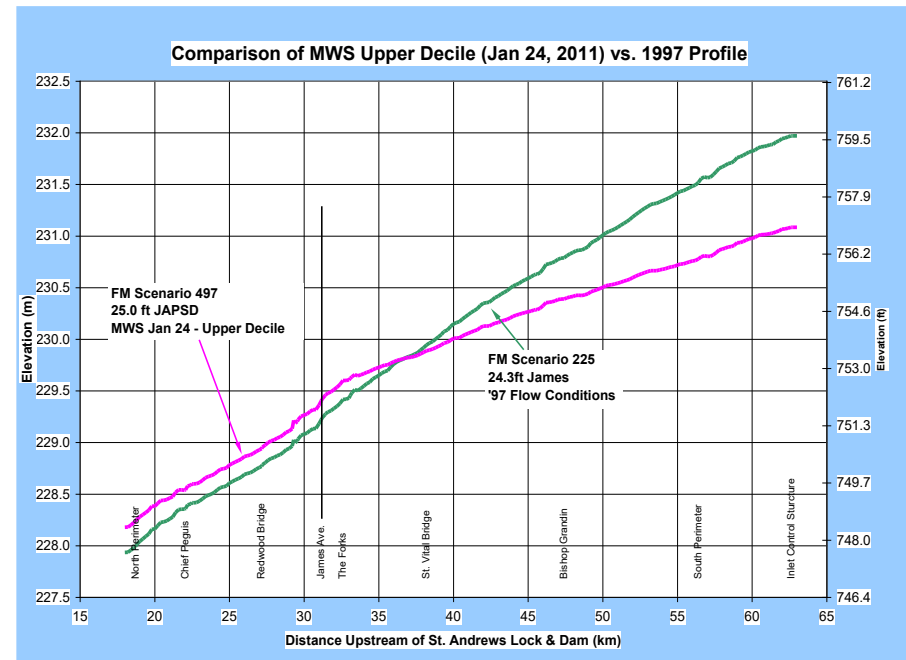
Flood Manual Procedures



Improvements Since 1997

Major Flood Manual Upgrade

- Initiated as a result of the 2011 spring flood
- Raise computational ceiling from JAPSD 25 to 27.5 ft
- Software and Documentation upgrades
- Software Enhancements



Improvements Since 1997

Permanent Dike Raises

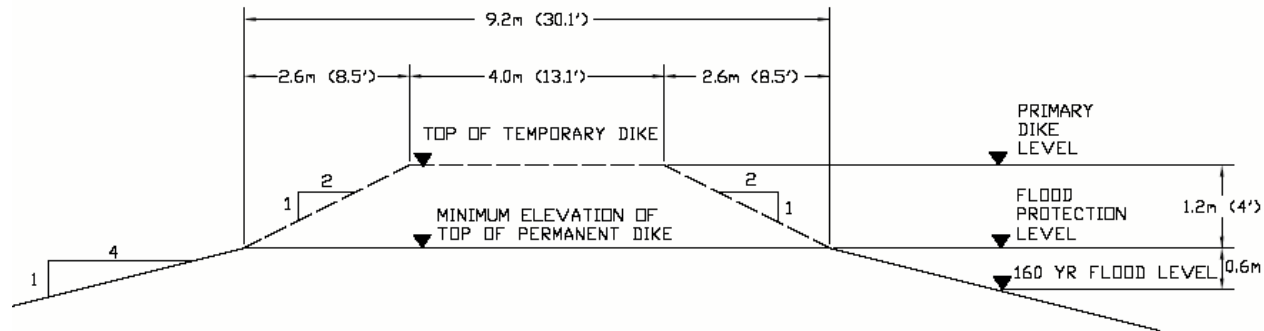


Improvements Since 1997

Higher Design Standard – Primary Dikes

RAISING PRIMARY DIKES WITH EARTH FILL

Old Standard:



TYPICAL PRIMARY DIKE SECTION
NTS

New Standard:

- Top of Dike built to 1997 water level + 2 ft + 2ft freeboard OR 700 yr + 2ft freeboard
- Minimum top width 4.0 m
- Designed by Geotechnical Engineer

Summary

- Following the '97 flood, the City knew it needed a better solution to fight a wide range of flood levels and to capture knowledge gained from a major flood
- The solution was to develop a unique Wpg based GIS Flood Manual that captures all the flood fighting tasks and the complicated river hydraulics from the Red, Assiniboine rivers and Floodway
- FM has been instrumental in spring floods of 2006, 2009 and 2011, 2013, 2014, 2020, 2022, summer flood of 2005, and fall flood of 2019
- FM has proved invaluable when forecasts change suddenly and City has to respond quickly (e.g. 12 to 36 hrs) or to do what-if scenarios (short and long term)
- The FM is not a static document it is continually updated
- Interest from other jurisdictions to develop their own tools
- Clear communication between the City / Province as well as City and affected homeowners is crucial

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Thank you

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