

PRESENTATION SUMMARY

- Introduction
 - Overview (*M. Ryan*)
 - Geography
 - Living with the Red (*M. Clamen*)
 - Conclusions and Recommendations
- Accomplishment's
 - Improvements in Flood Forecasting (*D. Luna*)
- Mitigation (Structural/non-structural/Policy/Legislation changes)
 - North of the Border
 - Manitoba (*Doug McNeil*)
 - South of the Border
 - US Federal (*J. DeHarnais*)
 - US State (*D. Frink*)
- Summary
 - What's next? (*M. Ryan*)
- Questions



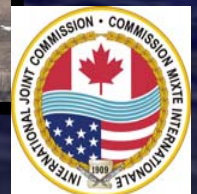
RED RIVER FLOOD OF THE CENTURY – 10 YEARS LATER

Mitigation North of the Canada-US border in Manitoba

Doug McNeil, P.Eng., Manitoba Floodway Authority



Mitigation - Manitoba



Structural and Non-structural Mitigation

- Canada/Manitoba Flood Protection Program
- Red River Floodway Expansion
- City of Winnipeg
- Manitoba Initiatives



Flood Protection Program

- Canada and Manitoba provided \$130 million to mitigate against future floods in the Red River Valley
 - Individual Homes and Businesses
 - Community Ring Dykes
 - City of Winnipeg
 - Environmental Mitigation and Scientific Data
 - Provincial Infrastructure Works



Flood Protection Program

- Over 1700 individual homes and businesses



Flood Protection Program

- Community Ring Dikes



Mitigation - Manitoba



Program Element 2: Communities

Flood Protection Program

- 18 community ring dike projects constructed
- 8 existing ring dikes also upgraded



Mitigation - Manitoba



Flood Protection Program

- Permanent dike construction at river properties (170 homes and 8 condos) in Winnipeg

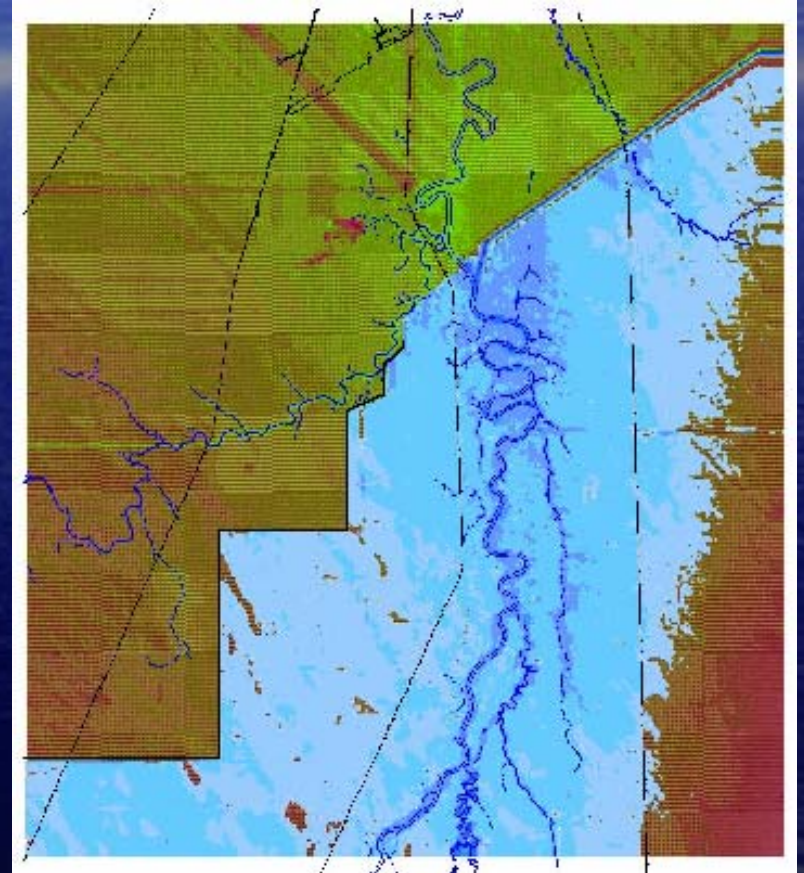


Mitigation - Manitoba



Flood Protection Program

- Environmental Protection and Scientific Data
 - Inventory and seal abandoned wells
 - Collect GIS and Topographic Data
 - Enhance hydrometric station network
 - Mike 11 hydraulic model for Red River valley



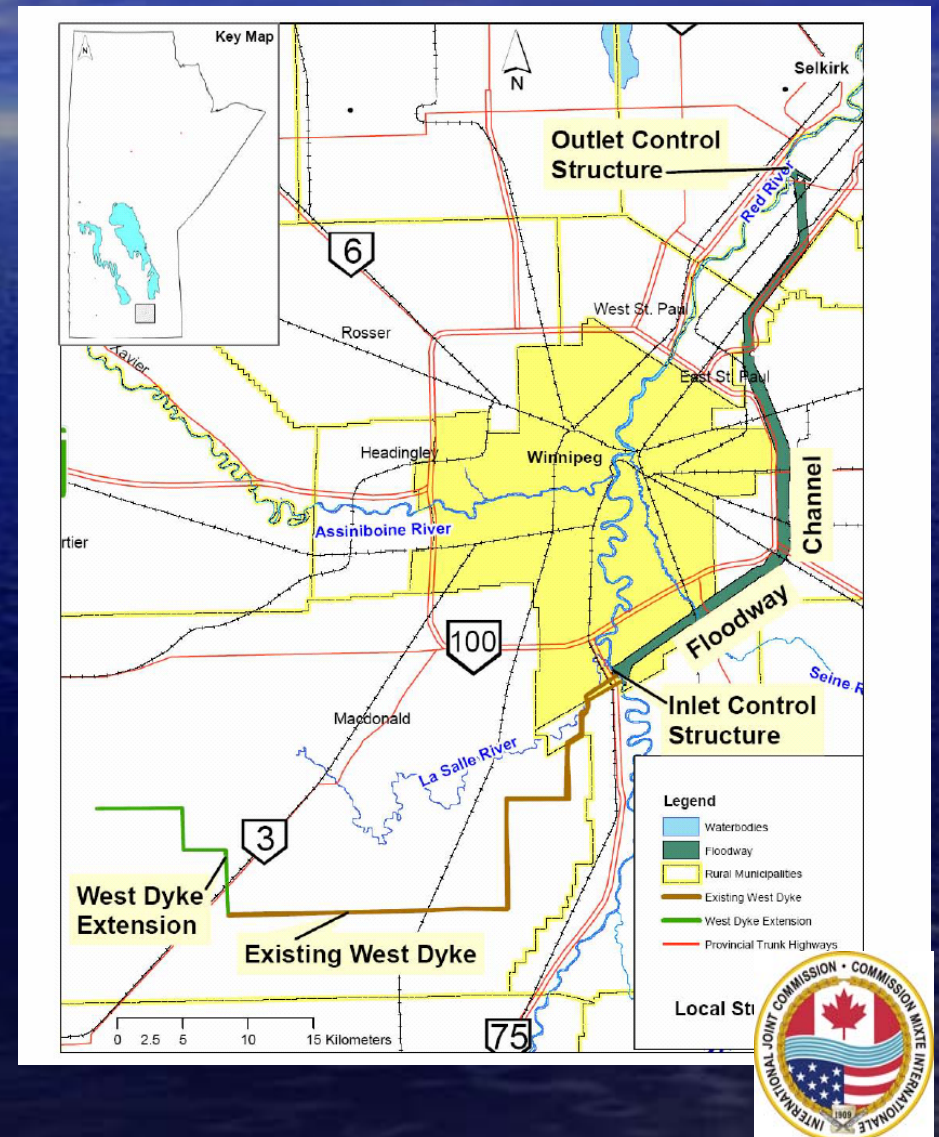
Flood Protection Program

- Provincial Infrastructure Works
 - West Dike Extension
 - Floodway Riprap
 - Floodway gate repairs
 - Portage Diversion and Shellmouth Dam
 - Assiniboine River Dikes



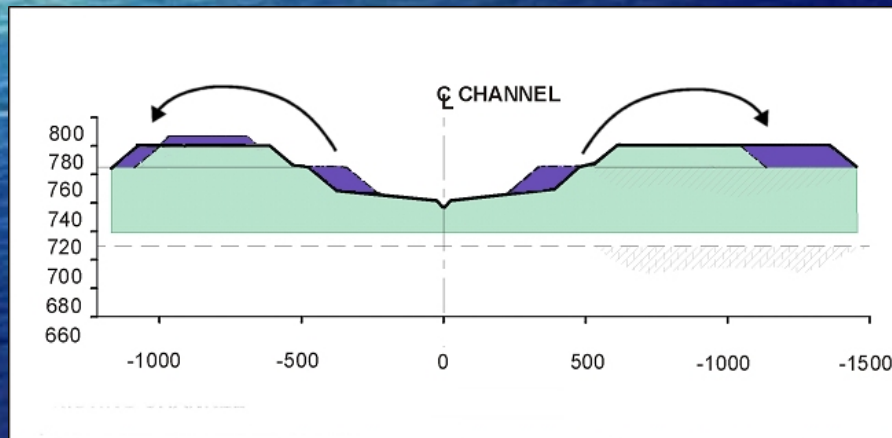
Red River Floodway Expansion

- Expand Red River Floodway channel to increase flow capacity from 1,700 to 4,000 cms
- Protects Winnipeg, East St. Paul and West St. Paul
- \$665 Million
50/50 Canada/Manitoba



Red River Floodway Expansion

- Widening – No deepening
- Excavate 21,000,000 m³



Red River Floodway Expansion

- Raise West Dyke 2 metres and extend 10 km



Mitigation - Manitoba



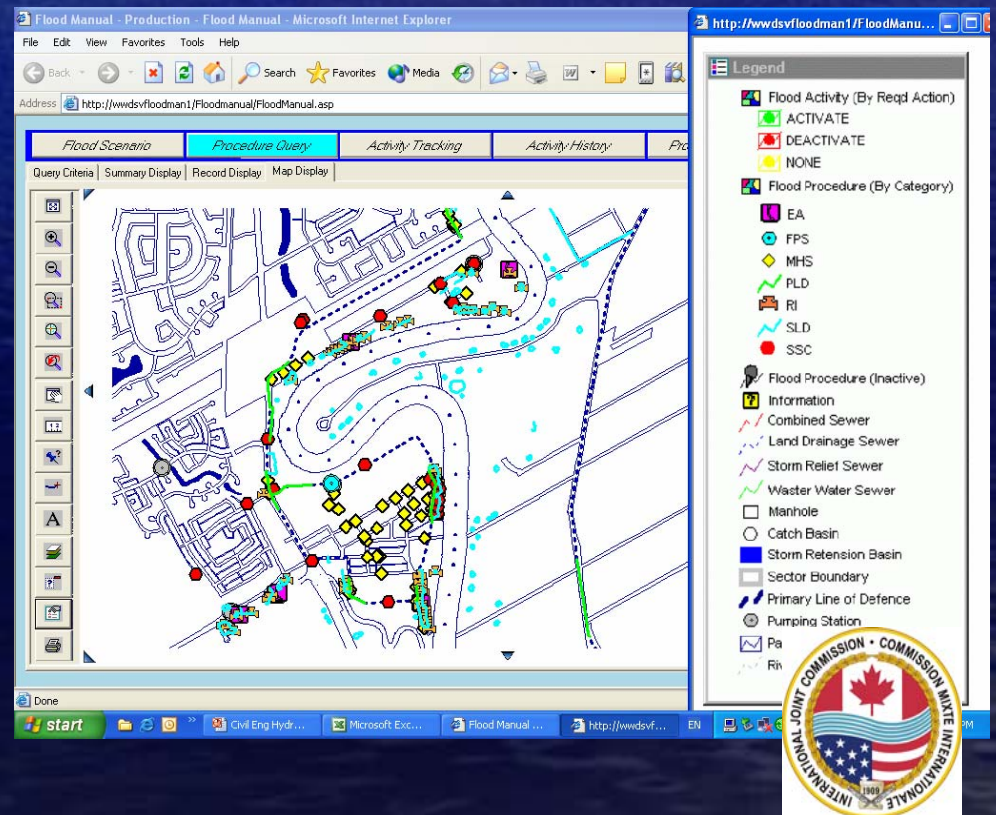
City of Winnipeg

- Sewer and flood protection infrastructure improvements
 - New or Upgraded gates on sewers
 - Upgraded pumping stations
 - \$25 million to date
 - \$20 million over next 6 years



City of Winnipeg

- Updated emergency plan including updated evacuation plans
- New electronic flood manual - \$2.4 million



Mitigation - Manitoba



Manitoba – North of Winnipeg

- Purchase of Amphibex ice breaking machine
- Breaks up ice in anticipation of potential ice jams in the lower reaches of the Red River



Mitigation - Manitoba



Manitoba – Legislation

- Red River Floodway Act
 - Full compensation for artificial flooding
 - Over and above Federal disaster assistance
- Water Resources Administration Act
 - Revised designated flood area regulation
 - All new properties must be protected to 1997 flood (100 year) plus 0.6 m freeboard



Manitoba – Legislation

- Emergency Measures Act Amendments
 - Creation of Orders for evacuation, accessing private property in pre-disaster period
 - Stiffer penalties for refusing to evacuate



Mitigation - Manitoba



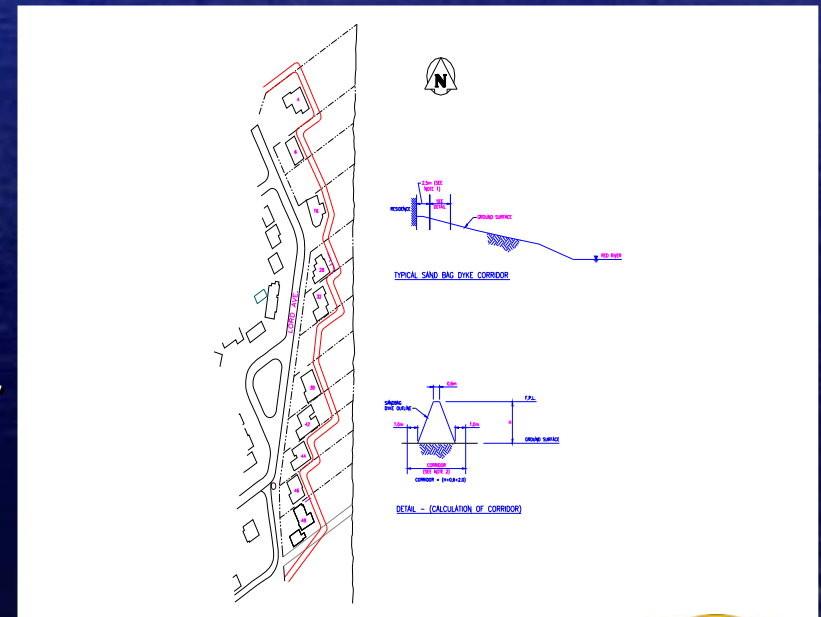
Manitoba – Legislation

- Emergency Measures Act Amendments (cont'd)
 - Every provincial department must prepare an emergency program
 - Every municipality must prepare an emergency plan (must meet 60 points)
 - Municipalities now have paid or volunteer emergency coordinators



Manitoba – Legislation

- City of Winnipeg Charter Act
 - Secondary Dike By-law passed by City Council
 - Protects permanent dikes in place
 - Provides unencumbered corridor for temporary sandbag dike



Manitoba – Emergency Measures

- Improved coordination between Emergency office and all Provincial departments
 - Senior executive briefings and buy-in
 - Updated evacuation plans and communications strategies
 - Increased training and education at health care facilities, regional health agencies



Manitoba – Emergency Measures

- Improved communications through conference calls, e-mail and websites for municipal representatives before, during and after floods
 - Information disseminated
 - Concerns heard



Manitoba – Highways

- Study of Flood Resistant Strategic Highway Routes within the Red River Valley
 - Identified alternate unrestricted routes from North Dakota and Minnesota
 - Various size floods up to 1 in 700 year



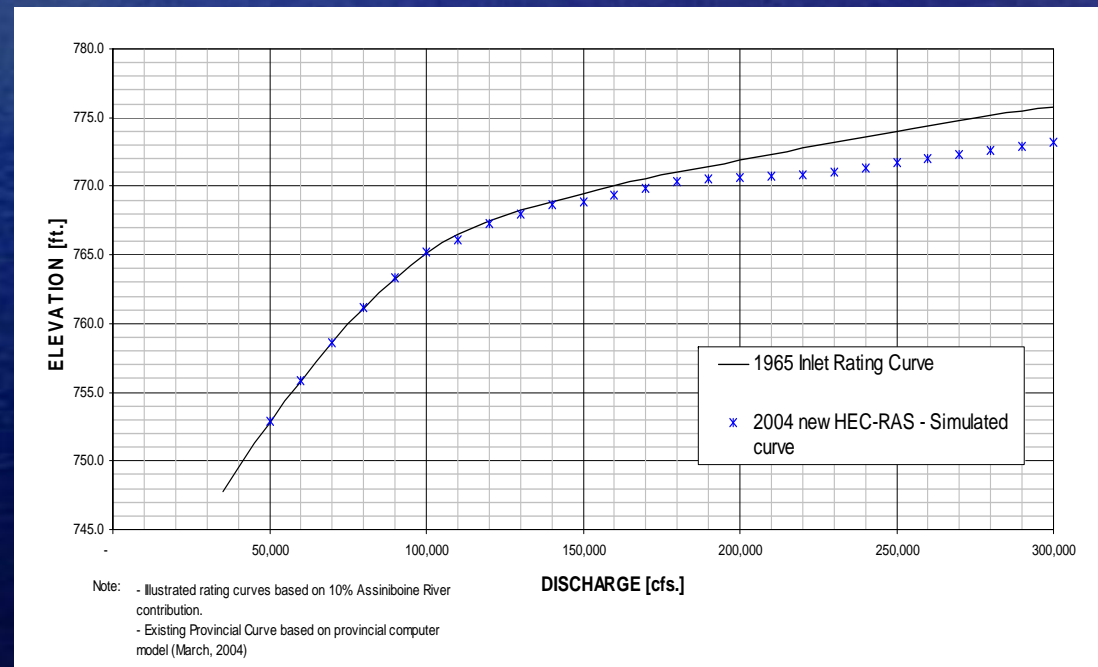
Manitoba – Floodway Operation

- A review of the Red River Floodway Operating Rules resulted in some minor revisions to how the Floodway is operated
 - Changed from flows to elevations
 - Created Advisory Board



Manitoba – Floodway Operation

- Updated for Floodway Operation:
 - River profiles
 - Flooded area maps
 - Flood frequency curves
 - Floodway Inlet Rating curve



WHAT'S NEXT

Mitigation - Manitoba



Red River Floodway Expansion

- Study of artificial flooding and potential mitigation in the Rural Municipality of Ritchot
- Riverbank Stability Study
- Emergency Preparedness Plan

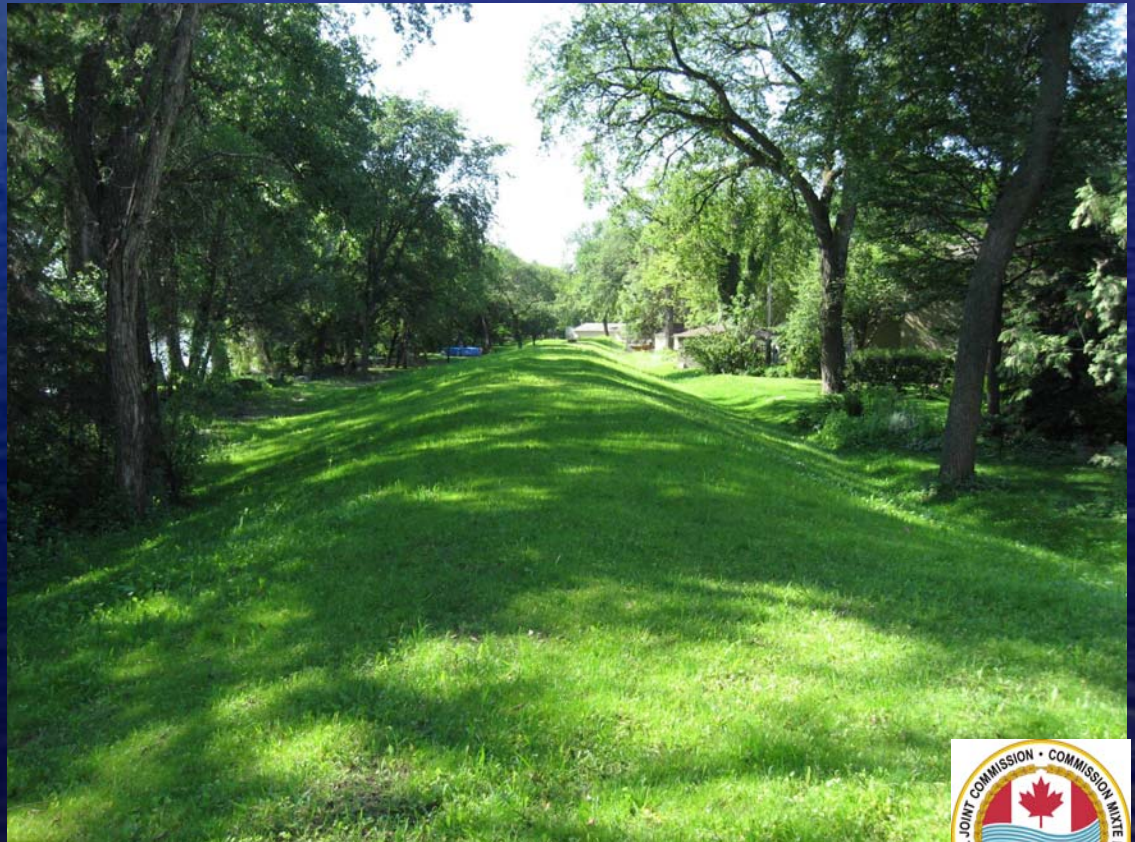


Mitigation - Manitoba



City of Winnipeg

- Flood protection infrastructure improvements
 - Primary dike upgrading
 - \$100 million



Mitigation - Manitoba



Manitoba – Emergency Measures

- On-going review of effectiveness of legislative amendments
- Continue working with municipalities for improved emergency plans
- Apply Best Practices for emergency management



Manitoba – Flood Protection Program

- Another flood protection program for properties that did not take advantage of 1997 to 2003 program ??
- Expect that same criteria would apply
 - Legislative requirement to build to 1997 flood level + 0.6m
 - Property owner pays part of protection
 - Ring dikes, earth raising, structural dikes

