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# RED RIVER FLOODWAY EXPANSION PROJECT

PROPOSAL FOR A FRAMEWORK AGREEMENT BETWEEN

THE GOVERNMENT OF CANADA

THE GOVERNMENT OF MANITOBA

THE CITY OF WINNIPEG

MARCH 7, 2003

Red River Floodway Expansion Project  
Framework Agreement Proposal  
Manitoba Conservation



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**OCTOBER 30, 2002**

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## EXECUTIVE SUMMARY

Winnipeg is exposed to an inordinate risk of major flood damage. To combat this risk the governments of Canada and Manitoba jointly funded the construction of the Red River Floodway in the early 1960s.

Prior to 1997, the Red River Floodway had been operated in 17 years. Without the Floodway the city of Winnipeg would have flooded in five of those years. In the other years, the primary dikes within the city would have been high enough to prevent flooding. For the five years where flooding would have occurred without the Floodway potential damages to the city have been conservatively estimated at **\$2.6 billion** (in 2002 dollars). The flood of 1996 alone would have caused damages estimated at **\$1.0 billion** (in 2002 dollars).

In 1997, Manitoba experienced what has been termed the "Flood of the Century." Extensive flooding occurred in the Red River valley in both Canada and the United States. Without the Red River Floodway it has been estimated that damages to the city of Winnipeg would have been **\$6.0 billion**.

The design capacity of the Red River Floodway is 1,840 m<sup>3</sup>/s (60,000 cfs). When it was built it was thought that the Floodway would provide Winnipeg with protection against a 1 in 160-year flood. The flood of 1997 exceeded the Floodway's design capacity by 140 m<sup>3</sup>/s (5,000 cfs). It has been estimated that the 1997 flood was a 1 in 90-year event. Subsequent to the 1997 flood, the International Joint Commission (IJC) concluded that "under flow conditions similar to those experienced in 1997, the risk of a failure of Winnipeg's flood protection infrastructure is high. Public safety requires that the city, province and Canadian federal government focus immediate attention on designing and implementing measures to further protect Winnipeg."

Engineering studies and public consultation have lead to the conclusion that an expanded floodway is the favoured alternative to provide the necessary flood protection for the City of Winnipeg:

Major projects deemed to be in the "public good", such as flood control infrastructure, have been subject to Federal/Provincial cost-sharing arrangements in the past. For example, the cost of the original Floodway was shared approximately 60% Federal - 40% Provincial. Since the completion of the original Floodway, Manitoba's population and economic infrastructure has become increasingly concentrated in Winnipeg. As such, enhanced protection of the City of Winnipeg, through Floodway expansion, has become vital to sustaining the social and economic fabric of the province of Manitoba as a whole. It is proposed that representatives of the Federal and Provincial governments enter into discussions with the purpose of concluding a framework agreement on expansion of the Red River Floodway, the cost of which is estimated at \$660 million.

Discussions to date have suggested funding for this project may be provided through the recently announced federal Strategic Infrastructure Program. Manitoba's top priority, Floodway expansion, is seen as a perfect fit with the program's stated focus on infrastructure essential to competitiveness and sustainable growth.

## I. BACKGROUND

### 1. Red River Floodway

The Red River originates in the north central United States some 563 kilometres (350 miles) almost due south of its outlet in Lake Winnipeg. Its major tributary, the Assiniboine River, joins it in the City of Winnipeg. Approximately 80 percent of the total drainage area of the Red River is in the United States and a very large portion of its peak flows originate from there.

The central portion of the Red River drainage area is the bed of the former glacial Lake Agassiz. This region is a broad, flat plain with very gentle slopes. Consequently, once the Red River leaves its banks extensive areas are subject to flooding.

The Government of Canada set up the Red River Basin Investigation following the disastrous Red River flood of 1950. As the report of the Red River Basin Investigation did not include a study of economic benefits it made no recommendations for action. The Royal Commission on Flood Cost Benefit, established in 1956, expanded on the work of the Red River Basin Investigation and recommended three major projects: A Greater Winnipeg Floodway, the Portage Diversion and a storage reservoir near Russell (Shellmouth reservoir). There are two noteworthy points in the Royal Commission report. Firstly, a choice had to be made between enlarging the river channel through Winnipeg and building a floodway around the city. Not only was a floodway more economical but as stated in the report "it can also be expanded in size more easily...." Secondly, it was recommended that a floodway 570 m<sup>3</sup>/s (20,000 cfs) larger than justified by the benefit cost ratio be constructed. This recommendation was based on the forecasted increase in size and population of the city.

The Red River Floodway is 47.3 kilometres (29.4 miles) long and involved the excavation of 91,440,000 cubic metres (100,000,000 cubic yards) of earth. It has a design capacity of 1,700 m<sup>3</sup>/s (60,000 cfs) and will protect Winnipeg from a flood with a peak flow of 4,790 m<sup>3</sup>/s (169,000 cfs). At the time of its construction, it was thought capable of providing flood protection against a 1 in 160-year flood. Costs for the Floodway were shared by the Federal and Provincial governments on approximately a 60 % Federal – 40 % Provincial basis. It was stated in the 1962 Federal - Provincial agreement on building the Floodway that "controlling flooding in Greater Winnipeg is necessary in the public interest and would constitute works of a major character." Other major works, as recommended by the 1956 Royal Commission on Flood Cost Benefit, were also constructed on a cost shared basis with the Federal government. These included the Portage Diversion and the Shellmouth Dam and reservoir. Acting together this infrastructure provides the major flood protection works for the city of Winnipeg. The strong degree of partnership in building this flood protection infrastructure has proved extremely beneficial to both levels of government over the years.

Prior to 1997, the Red River Floodway has been operated in 17 years since it was commissioned in 1968. Without the Floodway the city of Winnipeg would have flooded in five of those years. In the other years, the primary dikes within the city would have been high enough to prevent flooding. For the five years where flooding would have occurred

without the Floodway potential damages to the city have been conservatively estimated at **\$2.6 billion** (in 2002 dollars). The flood of 1996 alone would have caused damages estimated at **\$1.0 billion** (in 2002 dollars).

## 2. Flood of the Century (1997)

In 1997, Manitoba experienced what has been termed "the Flood of the Century." The peak flow of this flood has been calculated to be 4,620 m<sup>3</sup>/s (163,000 cfs). This flow rate is similar to that of the 1950 flood but the peak was much higher. Protection was provided to the city of Winnipeg by diverting a maximum flow of 1,840 m<sup>3</sup>/s (65,000 cfs) through the Red River Floodway. It is interesting to note that this is 140 m<sup>3</sup>/s (5,000 cfs) more than the Floodway's original design capacity. The frequency of this flood has been estimated at 1 in 90 years, using current hydrology. (i.e. there is a 1.1 percent chance of a flood of this magnitude or greater occurring every year).

Extensive flooding occurred in the Red River valley in both Canada and the United States. Temporary levees built to protect the city of Grand Forks, North Dakota were overtopped. The resulting damages to the cities of Grand Forks and East Grand Forks (population 60,000) have been estimated at **\$5.4 billion**. Without the Red River Floodway it has been estimated that damages to the city of Winnipeg would have been **\$6.0 billion**.

## 3. International Joint Commission (IJC) Review and Report

Subsequent to the 1997 flood, the International Joint Commission investigated the causes and effects of the flooding and recommend ways to reduce the impact of major floods. Two of the areas the IJC was specifically asked to report on were the relations of the 1997 flood to past and future Red River floods and the effects on flood conditions of flood control and other structures. The IJC established the International Red River Basin Task Force with experts from both Canada and the United States to assist it in this regard. In its report of November 28, 2000 the IJC endorsed most of the Task Force's conclusions and recommendations, modified some, and added some new conclusions and recommendations of its own.

Some significant conclusions and recommendations of the IJC report are:

- "Although the 1997 flood was a rare event, floods of the same size as the 1997 event, or greater, can be expected to occur in the future in the Red River basin. People and property remain at risk from these floods."
- "Under flow conditions similar to those experienced in 1997, the risk of a failure of Winnipeg's flood protection infrastructure is high. Public safety requires that the city, province and Canadian federal government focus immediate attention on designing and implementing measures to further protect Winnipeg."

- "The design flood used as the standard for flood protection works for Winnipeg should be the highest that can be economically justified or, at a minimum, the flood of record, the 1826 flood."

#### 4. A Look at Options

In early 2000, KGS Group, consulting engineers, submitted a report on "Flood Protection for Winnipeg" to the International Joint Commission. This report identified two major flood protection schemes that could substantially reduce Winnipeg's exposure to the risk of major flood damages. These two options are the Red River Floodway expansion and the Ste. Agathe Detention Structure. In December the provincial government commissioned KGS Group to carry out additional studies of these two options.

In their final report KGS Group estimated the cost of an expanded Floodway at \$660 million. This option would provide flood protection to the city of Winnipeg in the event of a 1 in 700 year flood. KGS rated the Floodway expansion option superior to the Ste. Agathe Detention Structure from the following perspectives:

- Susceptibility to legal issues;
- Management of extreme floods that would exceed the selected flood protection capacity of both options;
- Providing the opportunity to control summer water levels in Winnipeg at the least cost;
- Potential for recreational development;
- Providing flood protection improvements to Winnipeg as soon as possible;
- Approximately one third of the risk of having to raise water levels above the "state of nature" conditions compared to existing Floodway or Ste. Agathe Detention Structure, and;
- Environmental impacts.

At the request of the government of Manitoba, the Manitoba Clean Environment Commission conducted public meetings during January 2002 to gather the views of Manitobans on the two proposed flood protection options for the city of Winnipeg. The purpose of these meetings was to provide information on the two options, receive comments and concerns from the public and prepare a summary report. Over 1,000 individuals representing a wide range of interests attended these public sessions. The public expressed a desire to be involved at an early stage in the public participation process and gave a strong message of getting on with the job of protecting the city of Winnipeg residents.

A Value Engineering/Value Analysis study was carried out on the Floodway expansion option. This study essentially involved a peer group review of this option as presented by the KGS report. This review indicated that there were no major omissions in the analysis of the Floodway expansion option as presented in the KGS report and that all essential aspects for a project of this magnitude had been considered.

Both Provincial and Federal levels of government have agreed with the need for greater flood protection for the City of Winnipeg as recommended by the International Joint Commission. Both Provincial and Federal levels of government have publicly expressed support for the floodway expansion option to protect Winnipeg.

## II. THE PROPOSAL

### 1. Preamble

Subsequent to the 1997 flood, a number of factors have become apparent:

- Should a flood of the magnitude of 1997 occur, there is a high probability that the city of Winnipeg's flood protection system will fail;
- Damages to the city would be catastrophic and would be in the billions of dollars. These would include:
  - Structural damages to residential, commercial and industrial buildings;
  - Temporary relocation costs for as many as 400,000 people;
  - Damages to city infrastructure such as roads, sewers, water treatment and distribution facilities, power distribution facilities;
  - Additional costs for pre-emptive flood works, flood fighting and emergency response, and;
  - Additional costs for transportation due to shutdown of key traffic routes including the Trans-Canada Highway and all east-west rail lines.
- Although extreme floods are rare, it is only a matter of time before a flood similar to 1997, or greater, does occur. A recent independent study for the IJC indicated that there is approximately a 37 percent chance that the capacity of Winnipeg's existing flood protection works would be exceeded at least once in the next 50 years.

Major projects deemed to be in the "public good", such as flood control infrastructure, have been subject to Federal/Provincial cost-sharing arrangements. Considerable foresight was shown by both levels of government in agreeing to jointly fund construction of the original Floodway. The billions of dollars saved by the present Floodway have offset its initial cost many times over.



## 2. Proposed Framework Agreement

**It is proposed** that representatives of the Federal, Provincial and City governments promptly conclude negotiations regarding a framework agreement for expansion of the present Red River Floodway.

In 1962, Canada and Manitoba signed an agreement that facilitated the construction of the original Floodway. The final apportionment of the nearly \$63 million (in 1968 dollars) project was approximately 60 % Federal and 40 % Provincial. Discussions to date have suggested that funding of Floodway expansion could begin through the recently announced federal Strategic Infrastructure Program.

Following a commitment to cost-sharing for the full floodway expansion project, payments to Manitoba could be processed through progress claims submitted on agreed upon frequency and form, verified by Canada. Another alternative would be to receive advance funds from Canada and draw on those funds as progress reports are provided to Canada. Funds to be contributed would be in accordance with terms stipulated and eligible costs would be apportioned between Canada and Manitoba from fiscal years 2002/03 to 2008/09.

### III. AGREEMENT OBJECTIVES

#### The Primary Objectives of the Floodway Framework Agreement include:

- A commitment to cost – sharing the full costs of the Floodway Expansion project.
- A commitment to a funding formula that ensures incremental flood protection throughout the construction phase of the project.
- A commitment to a Floodway Authority Structure to facilitate all aspects of the Floodway Expansion Project including design, environmental licensing and construction.
- A commitment, on behalf of Manitoba, to conduct public hearings with regard to issues of compensation and operating rules.

#### 1. Project Description

Project components, as foreseen at this time, are:

- Expansion of the existing channel to provide a design capacity to pass a 1 in 700 year flood (a reduction in flood risk to Winnipeg to less than one fifth of the current exposure);
- Modification of the 13 bridges, 5 hydro-electric power transmission lines, other crossings, and 7 drainage structures along the channel route;
- Expansion of the Outlet Structure and the discharge channel to the Red River;
- Improvements to the Floodway Inlet Control Structure;
- Increasing the freeboard of the West Dike, with provision of protection from wind effects;
- Improving and upgrading flood protection infrastructure in Winnipeg to enable the maximum flood flow through Winnipeg, thereby minimizing the extent of required expansion of the Floodway channel capacity;
- Incorporation of potential recreational facilities to the maximum practical extent, including, but not limited to, a white-water park, ski/hiking trails, interpretive center(s), ski hill(s), golf courses, hang gliding site(s), and the alternative vegetative coverage to support these activities;
- Mitigation works for adverse effects to groundwater, and;
- The incorporation of modifications to the Floodway, if required, to achieve summer water level control in Winnipeg.

## Notional Project Estimate

The costs associated with the proposed 1 in 700 year floodway expansion are summarized in the figure below.

Figure 1: Floodway Expansion Project – Summary of Estimated Total Cost

ITEM	ESTIMATED COST (\$MILLIONS, 2001)
Floodway Expansion	
Earthworks	323.6
Highway Bridges and Road Works	130.4
Hydraulic Structures	80.0
Utilities	14.0
Upgrades to Flood Protection Infrastructure in Winnipeg <sup>(1,2)</sup>	110.0
Total	\$658.0

- Note:
1. Costs include engineering, site supervision, owner's cost, contingency, interest and escalation during a 4 to 5 year construction period.
  2. Interest and escalation have been added.
  3. Price escalation has been added.

Preliminary plans for the expansion of the Floodway have been prepared and documented in the KGS Group Report of November 2001. Implementation will require more detailed planning, pre-design work and preparation of information for environmental licensing. The assumption has been made that environmental licensing for this project will hinge on a successful public consultation strategy. Subject to Canada's direction, Manitoba is prepared to coordinate all public consultation required to ensure appropriate public input to the development of a flood damage compensation policy for induced flood levels. In addition it is Manitoba's intent to submit any revisions to the Floodway Operating Rules to public scrutiny.

Manitoba intends to expedite the balance of the preliminary design and environmental assessment work required for this project. Currently estimated at 15 to 18 months duration, this preliminary work will include all the necessary engineering studies, field data collection, and preparation of documentation required to permit advancement to the stage of environmental license application. A work plan has been developed to facilitate efficient transition into the subsequent final design and construction phases, utilizing a conventional owner-driven process of construction management.

Preliminary work will be followed by final design and bid periods, and by project construction. However, in order to meet the fast track project schedule indicated in Appendix 6, several components of the project are scheduled for early construction, i.e. starting in 2004. They include the reconstruction of the West Dyke,

replacement/reconstruction of three bridges, relocation of the Greater Winnipeg Water District Aqueduct syphons and excavation of the Floodway pilot channel.

The total duration of all phases of the work is estimated to be six or seven years.

## **2. Project Management**

This is a large and complex project requiring extensive management and engineering effort. The key to the project's advancement will be immediate establishment of a dedicated advisory group to direct the effective execution of an overall plan. Establishment of a "Floodway Expansion Authority" is proposed to expedite and oversee the project through to completion. Members of the Authority would be selected based on their particular qualifications and on their ability to provide the long-term commitment required for this development. The structure of the Authority will be presented in separate discussions.

## **3. Economic Impacts and Opportunities**

Economic Impacts: Based upon preliminary cost estimates, an initial economic impact assessment for this project has yielded the following conclusions:

- Direct Manitoba expenditures for the \$642.2 million project are estimated at \$610.4 million (95% of the total) with the remaining \$31.8 million representing direct expenditures in the Rest-of-Canada. Note that the \$15.5 million escalation to account for inflation during the construction period has been excluded from the analysis. The above expenditures are for the total cost of construction. These expenditures are for construction materials, services related to construction, direct construction labour and contractor profits.
- Each of these result in further expenditures, be they for manufacturing, business operations or household expenditures. The sum of the direct and spin-off expenditures is termed Gross Expenditures. Gross Expenditures in Manitoba are estimated at \$1,048.6 million over the four-year construction period. In addition, Gross Expenditures elsewhere in Canada are estimated at \$502.0 million. Total Gross Expenditures in Canada are estimated at \$1,550.5 million. This is the gross monetary impact to the economy.
- Gross Domestic Product (GDP) at Market Prices removes the double-counting of expenditures present in the Gross Expenditures statistic, to present an estimate of the net monetary impact to the economy. In total, the project is estimated to result in a \$501.5 million impact to Manitoba GDP at Market Prices. The GDP impact to the Rest-of-Canada is estimated at \$312.8 million, and the total GDP impact for Canada is estimated at \$814.3 million. Therefore, for each \$1.00 in direct project expenditures (\$642.2 million), the impact to Canada's GDP is estimated at \$1.27, with \$0.78 (62%) estimated to occur in Manitoba.
- Total Manitoba Labour Income over the four year project is estimated at \$353.2 million, with an additional \$191.9 million estimated for the Rest-of-Canada. Therefore, the total

Labour Income impact to Canada is estimated at \$545.1 million. For each \$1.00 in direct project expenditures, the impact to Labour Income throughout Canada is estimated at \$0.85, with \$0.55 (65%) estimated to occur in Manitoba.

- The above Labour Income impacts are estimated to support a total of 13,900 person-years of employment in Canada during the 4 year period, hence on average about 3,500 full-time-equivalent jobs for four years. Total Manitoba Employment impacts are estimated at 9,500 person-years, with about 5,000 being direct impacts and 4,600 spin-off employment. Rest-of-Canada Employment impacts are estimated at 4,400 person-years, with about 200 being direct impacts and 4,100 spin-off employment.
- Total Tax Collections resulting from the project and its effect on the Canadian economy are estimated at \$201.7 million, spread out over the four year construction period: Total Manitoba Tax Collections are estimated at \$123.9 million, including \$50.0 million in Provincial Taxes, \$8.5 million in Local Taxes and \$65.4 million in Federal Taxes. Tax Collections in the Rest-of-Canada are estimated at \$77.8 million, including \$30.3 million in Provincial Taxes, \$7.6 million in Local Taxes and \$39.9 million in Federal Taxes.

**Opportunities:** The labour resources required for the Red River Floodway expansion project are diversified and will require an extremely varied work force. The Red River Floodway expansion project will provide the opportunity not only to educate and employ Manitobans but will also add to the health and well being of those individuals along with benefiting the economy for years to come.

Manitoba Advanced Education and Education Training and Youth will undertake to commit the training capacity required to provide the diversified labour resources for this project. The department is well positioned to provide the training and technical skills required for a project of this magnitude. In this regard, the Manitoba Advanced Education and Education Training and Youth strategy is intended to increase job opportunities and experience for young Canadians, and promote entrepreneurial skills and job creation for Aboriginal people. With the introduction of the Aboriginal Procurement Initiative Strategy, these programs are designed to provide for local employment, partner with private industry to increase staff technical skill levels and to provide increased employment income for lower income earners.

Opportunities will be provided for various interest groups to develop their own labour strategies, including: Manitoba Heavy Construction Association, Manitoba Hydro, Centra Gas, Manitoba Telephone System, Manitoba Trucking Association, Manitoba and Winnipeg Chambers of Commerce, organized labour, educational institutions and various Manitoba ministries such as Aboriginal and Northern Affairs, Family Services & Housing, Transportation and Government Services, and Intergovernmental Affairs.



#### 4. Public Consultation

Public consultation on the Red River Floodway and associated works will address public interest in the project and will focus on two major components: a) operation of floodway under the proposed expansion and compensation for adverse effects and b) inclusion of interested parties in the environmental aspects of the project. Although the specific discussions on these components are envisioned to occur separately, they will be coordinated through an independent stakeholder's facilitator. Two forms of consultation are envisioned, as follows:

- a) A compensation and mitigation specialists team will be gathered to address the public concerns associated with revised operating rules for the floodway and to develop a formula to mitigate flooding from the operation of the floodway above that which would occur naturally. This operating rules and compensation team will include experts on the operation of the floodway infrastructure, hydrological modeling, risk assessment, and compensation. This team will work with the municipalities and interested public upstream and downstream of the floodway on these issues. The purposes of these consultations are:
  - to ensure there is a common understanding of the floodway operation and agree upon any amendments to the operating rules and
  - to cooperatively develop specific criteria for the circumstances when compensation will be awarded and the level of that compensation.

Consultation will also be undertaken with landowners and municipalities in the areas where the groundwater elevation might be affected by construction of the expanded floodway. The purpose of these consultations will be to develop a mitigation plan for persons whose groundwater wells are effected.

- b) Public consultation on the environmental aspects of the project will be designed to maximize involvement of the municipalities, general public, and non-governmental organizations in the environmental review process. Key stakeholders will be contacted early in the schedule to agree on the consultation processes that ought to be utilized through out the project. The consultation processes will be designed to address the elements of the provincial and federal review processes, the scope of the project to be included in the environmental review, the scope of the environmental and socio-economic assessment, and to develop guidelines for the assessment. Participant assistance will be considered for the stakeholders to enhance their contributions. It is proposed that the environmental public consultation group would have access to the project decision-makers throughout the project.

#### IV. CONCLUDING STATEMENTS

A Framework Agreement between the Government of Canada, the Province of Manitoba and the City of Winnipeg on expansion of the Red River Floodway must be concluded as soon as possible.

To direct Floodway expansion a Floodway Expansion Development Board should be established. Discussions should begin immediately aimed at appointing the appropriate individuals to a Floodway Expansion Development Board.

The Province of Manitoba is prepared to take a number of actions regarding the Floodway expansion project including:

- Being the project proponent and lead implementation agency.  
  
When construction of this project occurs it will be on lands under the ownership of the Province. As such, Manitoba will be the project proponent and also the lead implementation agency.
- Acting as the lead party in completing a cooperative environmental assessment including harmonization with the Federal process.

As lead agency for the environmental review under the Canada-Manitoba Agreement on Environmental Assessment Cooperation, Manitoba will chair a Project Administrative Team (PAT) to administer the joint environmental assessment and approval process. A joint Technical Advisory Committee will provide advice to the PAT. Manitoba will prepare a cooperative environmental assessment schedule, coordinate public participation, and coordinate joint communication and media releases.

- Consulting with the general public and local governments on the scope of the project and scope of the environmental assessment.

Involvement and acceptance of this project by the general public and local governments is critical to its success. The Province intends to involve local governments and the public at an early stage by seeking input on the scope of the project and factors that should be included in an environmental assessment.

- Consulting with the general public on an acceptable compensation plan for all issues associated with the project.

Compensation for adverse effects from the operation of the Floodway above what would occur naturally is considered as mitigation for those effects. Manitoba will work with the potentially affected parties to develop a plan for fair and equitable compensation to parties that experience flooding beyond that which would occur naturally. Construction

of the Floodway expansion will also have some negative impact on the local groundwater regime. A compensation plan will be developed to mitigate this effect.

- Conducting a public review process for ratification of the new Floodway program of Operation.

Manitoba has recently accepted full responsibility for developing rules of operation for the Floodway. With the expansion of the Floodway a new program of operation will be needed. Manitoba intends to develop this program and solicit input from the public before finalizing a new operating regime.

- Accepting responsibility for operation and maintenance of the expanded Floodway.

Once the Floodway expansion is complete it will form part of the Province's flood protection system. As with all Provincial infrastructure ongoing operation and maintenance will continue to be the responsibility of the Province.

**APPENDIX 1:**

**1962 CANADA / MANITOBA AGREEMENT**

A G R E E M E N T  
BETWEEN THE  
GOVERNMENT OF CANADA

AND

THE GOVERNMENT OF THE PROVINCE OF MANITOBA

FOR

CONSTRUCTION OF

THE GREAT WINDMILLS FLOWWAY

Ottawa, Ontario.

Final  
(signed copy)



and agree as follows:

1. In this Agreement

- (a) "day labour" means the employment of workmen by the Province and the rental by the Province of equipment not owned by the Province together with operator or operators;
- (b) "excavation" means the removal of all materials on or below the existing ground surface from within the lines and grades shown in the plans and specifications approved or to be approved by the parties hereto and the transportation to and disposal of such materials in the areas designated for this purpose and shown in the said plans and specifications;
- (c) "Federal Minister" means the Minister of Northern Affairs and National Resources of Canada;
- (d) "Provincial Minister" means the Minister of Agriculture and Conservation of the Province; and
- (e) "works" means all preparation made, excavation and any other work done and the acquisition of all materials, equipment, properties and easements necessary to build and complete a floodway for the purpose of diverting water from the Red River upstream from the City of Winnipeg and returning it to the Red River downstream from the said City of Winnipeg in accordance with the plans and specifications approved and to be approved by the parties hereto, and includes the acquisition of lands for access roads, the construction of any necessary structures to control the water being diverted and the construction or alteration of all dykes, bridges, roads, railway works and other structures necessary for the performance of this Agreement, and such display signs as may be required by the Federal Minister.

2. The Province will carry out the works in accordance with the plans and specifications which shall be approved by the Federal Minister and the Provincial Minister.

(2) Should the performance of the works be delayed by reasons of any delay occasioned by the Federal Minister or by flood, fire, lightning, earthquake, cyclone, strike, war or an act of war, insurrection, riot, or act of God, or by any other cause which is beyond the control of the Province and of the contractors to whom a contract is awarded, the time herein fixed for the completion of the works shall be extended for a period equivalent to the time lost by reason of such delay.

5.(1) Subject to funds being voted by Parliament and to the terms and conditions of this Agreement, Canada will reimburse the Province,

(a) to the extent of  $37\frac{1}{2}$  per cent of the cost of the works, and

(b) to the extent of a further  $37\frac{1}{2}$  per cent of the cost of excavation in recognition of the international aspects of the Red River, and also because of the magnitude of the excavation made necessary because no alternative equivalent flood control measures are available,

but the total contribution by Canada shall not in any event exceed \$36,974,000.00.

(2) Should unforeseen and/or uncontrollable conditions, which are unanticipated in this Agreement, result in a substantial increase in the total cost of the works, the whole project will be reviewed by the two governments concerned.

6. Canada will not make any payment in respect of a contract for the works entered into by the Province unless

(a) if subsection (1) of section 3 applies to the contract

(1) before tenders were invited the form of advertisement for tenders, the tender forms and the specifications, plans and profiles and the proposed terms of the contract were approved in writing by the Federal Minister, and

7.(1) Subject to this Agreement, the cost of the works shall be the aggregate of expenditures, incurred by the Province in the following classes, since the 25th day of November 1960:

- (a) payments pursuant to contracts for the works entered into by the Province with other persons in accordance with this Agreement;
- (b) payments in respect of construction materials purchased by the Province that are necessary for and used in the works, to the extent that the cost thereof incurred by the Province did not exceed the aggregate of the current market price of those materials prevailing in the locality where and at the time when the Province acquired them and the actual cost to the Province of delivering those materials to the site of construction;
- (c) payments in respect of wages, salaries and workmen's compensation and unemployment insurance contributions of and for engineers, draughtsmen, and directly related employees of the Floodway Division and of the Bridge Office, Highways Branch, of the Province while exclusively engaged in carrying out the works and, in addition, their necessary transportation and living expenses while engaged in field operations exclusively for the purpose of carrying out the works;
- (d) payments in respect of the removal and relocation of obstructions such as power, telephone and telegraph lines, public utilities and other services, railway works, roads, bridges, buildings, trees, brush, debris and the like, that was necessarily incidental to the works;
- (e) payments by the Province for the purchase of lands, buildings and flood easements which may be required for the works;
- (f) payments in respect of the restoration and repair of real property destroyed or damaged in the course of the works, and in respect of the construction of walls or other structures necessary for the protection of the works or adjacent property;

- (a) the accounts and other information furnished by the Province are insufficient for the purpose of determining the true expenditures of the Province as defined in subsections (1) and (2); or
- (b) the expenditures by the Province in respect of the works, by comparison with market costs prevailing when the works were undertaken, are excessive,

the Federal Minister shall cause an appraisal to be made of the cost of the works in question at the time when the works were undertaken and that appraisal shall form the basis of the determination of the cost of the works.

8. Notwithstanding anything in this Agreement, the cost of the works shall not include expenditures by the Province in respect of

- (a) interest on moneys borrowed;
- (b) more than one year's interest on moneys payable by the Province;
- (c) taxes on land;
- (d) the administration costs of the Province and, without limiting the generality thereof, the wages, salaries and expenses of officers or servants of the Province except those provided for in section 7;
- (e) fencing the works, except the relocation of fences which have been removed;
- (f) the construction of the works to the extent that, in the judgment of the Federal Minister pursuant to the appraisal provided for in subsection (j) of section 7, such expenditures were excessive;
- (g) the installation of additional or improvement of any water works, sewers, electrical conduits or other public utilities; and
- (h) any matter, to the extent that the Province is reimbursed from any source other than under this Agreement in respect of that matter.

9.(1) The Province will within one month from the date of this Agreement submit to the Federal Minister a statement claiming payment on account of the cost of the works incurred and paid by the Province during the period from the

(11) 37½ per cent of the cost of excavation  
or, (b) \$ 36,974,000.00,  
then Canada's financial obligations under this Agreement shall cease.

(3) If Canada pays to the Province an amount that exceeds the amount payable pursuant to this Agreement, the Province will refund the excess, and Canada may, in addition to any other recourse, recover any such amount from amounts payable by Canada to the Province on any account.

12. Notwithstanding anything in this Agreement, no claim for payment in respect of the cost of the works may be made by the Province after one year has elapsed from the completion of the works, unless the Federal Minister otherwise agrees.

13.(1) The Province will maintain full records of all expenditures relating to the cost of the works together with all proper documents and vouchers relating thereto and will make such records, documents and vouchers available to the Federal Minister, the Comptroller of the Treasury of Canada or persons authorized by either of them for examination and audit, and will give to the Federal Minister, the Comptroller of the Treasury of Canada or persons authorized by either of them all reasonable assistance, in such examination and audit.

(2) The Province will keep intact, for a period of five years from the date of the completion of the works, all records, documents and vouchers specified in subsection (1) of this section.

14.(1) The Federal Minister may appoint representatives of Canada to report on all phases of construction of the works and they may make any inspections enquiries and tests that they consider necessary to assist them in reporting on construction and determining the cost of the works, and may discuss with the appropriate representatives of the Province any matter concerning the completion of the works in accordance with this Agreement.

(2) Where, in order to give effect to this Agreement, the Federal Minister considers it necessary to inspect or appraise any lands, or works, the Federal Minister may cause such inspections and appraisals to be made as he deems advisable and the Province will afford the Federal Minister and his representatives every facility for the purpose.



(3) Any changes which the Province may desire to make in the programs submitted in accordance with subsection (1) hereof shall be submitted to the Federal Minister for approval.

21. The Province will erect and maintain until completion of the works suitable signs at such locations, of such size and wording as shall be approved by the Federal Minister.

22. No member of the House of Commons shall be admitted to any share or part of any contract, agreement or commission with respect to the works or to any benefit to arise therefrom.

23. The Greater Winnipeg Floodway Advisory Board shall continue to operate under the Terms of Reference of the 25th day of November 1960.

IN WITNESS WHEREOF the Honourable Walter Dinsdale, Minister of Northern Affairs and National Resources, has hereunto set his hand on behalf of Canada and the Honourable George Hutton, Minister of Agriculture and Conservation, has hereunto set his hand on behalf of the Province.

SIGNED, SEALED and DELIVERED on behalf of Canada by the Honourable Walter Dinsdale, Minister of Northern Affairs and National Resources, in the presence of,

John Churchill

Walter Dinsdale  
Minister of Northern Affairs and National Resources

SIGNED, SEALED and DELIVERED on behalf of the Province of Manitoba by the Honourable George Hutton, Minister of Agriculture and Conservation, in the presence of

George Hutton

George Hutton  
Minister of Agriculture and Conservation.

**APPENDIX 2:**

**INTERNATIONAL JOINT COMMISSION (IJC) REPORT  
EXECUTIVE SUMMARY**

I n t e r n a t i o n a l

J o i n t C o m m i s s i o n

# Living with the Red

A Report to  
the Governments  
of Canada and  
the United States  
on Reducing Flood  
Impacts in the  
Red River Basin

## The International Joint Commission

L. H. Legault  
Chair, Canadian Section

Thomas L. Baldini  
Chair, United States Section

Robert Gourd  
Commissioner

Susan B. Bayh  
Commissioner

C. Francis Murphy\*  
Commissioner

Alice Chamberlin  
Commissioner

\* C. Francis Murphy participated in the Commission's work under the Red River flooding reference until the expiration of his term as a Canadian Commissioner on September 1, 2000.

NOVEMBER 2000



International  
Joint  
Commission

Commission  
mixte  
internationale

---

## International Red River Basin Task Force

### CANADIAN SECTION

Bruce Rawson, Co-Director  
Rawson Group Initiatives  
Ottawa, Ontario

Dwight A. Williamson, Manager  
Water Quality Management Section  
Manitoba Conservation  
Winnipeg, Manitoba

Dr. Slobodan P. Simonovic  
Professor and Director  
Natural Resources Institute  
University of Manitoba  
Winnipeg, Manitoba

Robert A. Halliday  
R. Halliday & Associates  
Saskatoon, Saskatchewan

Larry James Whitney, Manager  
Water Planning & Development  
Water Resources Branch  
Manitoba Conservation  
Winnipeg, Manitoba

Dr. David LeMarquand, Co-Secretary  
Western Economic Diversification Canada  
Ottawa, Ontario

### IJC Study Participants

#### CANADIAN SECTION

Edward Bailey  
Engineering Adviser

Fabien Lengellé  
Public Affairs Adviser

Dr. Murray Clamen  
Secretary

#### UNITED STATES SECTION

Charles E. Crist, Co-Director (1999–2000)  
U.S. Army Corps of Engineers  
St. Paul, Minnesota

Donald Herndon, Co-Director (1997–1999)  
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Vicksburg, Mississippi

David A. Sprynczynatyk  
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Bismarck, North Dakota

Kent Lokkesmoe  
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Dean, College of Business Administration and  
Distinguished Professor of Agricultural Economics  
North Dakota State University  
Fargo, North Dakota

John Gambel  
Senior Technical Advisor  
Mitigation Directorate  
Federal Emergency Management Agency  
Washington, D.C.

David Loss, Co-Secretary  
Army Corps of Engineers  
St. Paul, Minnesota

#### UNITED STATES SECTION

Lisa Bourget  
Engineering Adviser

James Chandler  
Legal Adviser

Frank Bevacqua  
Public Affairs Adviser

Dr. Gerald E. Galloway  
Secretary

---

# Executive Summary

The flood of 1997 will long be remembered in the Red River basin of Canada and the United States. Over 100,000 people had their lives disrupted for several months and some still suffer from the physical and emotional trauma of the flood. Economic damages in the two countries approached U.S.\$5 billion and flood recovery and mitigation costs continue to grow. Many of those who were not harmed by the flood recognize that their safety was preserved by only a matter of inches or centimeters. With great internal strength, basin residents on both sides of the border met the challenge of the flood but now look to governments to ensure that such destruction never again is visited upon them. At the request of Canadian Prime Minister Jean Chrétien and U.S. President William J. Clinton, the International Joint Commission undertook to analyze the root causes of the flood and to make recommendations as to how damage from major Red River floods could be mitigated in the future.

Since the summer of 1997, the Commission and its binational Task Force have been examining the flood and methods to reduce or eliminate the impacts of future major floods. In carrying out its responsibilities, the Task Force initiated the development of products that will be of continuing utility to the basin, including hydraulic models to aid in analysis of flood flows, high-resolution topographic and land use data for flood-prone areas and a virtual network to link those in the basin dealing with flood issues. The Commission has closely examined the work of the task force, conducted meetings and hearings in the basin, met with leaders at all levels in the public and private sector, and extended the analysis of the Task Force in some measure.

The Commission has come to the conclusions set out below:

- Flooding in the Red River basin is a natural hydrometeorological event. Although the 1997 flood was a rare event, floods of the same magnitude as 1997, or even greater, can be expected to occur in the future.
- The people and property of the Red River basin will remain at undue risk until comprehensive, integrated, binational solutions to flood problems are developed and implemented. Solutions for one part of the basin must take into account the impacts on other parts of the basin.

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*...what makes a community a place to live in is not the buildings, it's the people—the spirit and faith that are in those people. Water cannot wash that away, and fire cannot burn that away, and a blizzard cannot freeze that away. And if you don't give it away, it will bring you back better than ever.*

Grand Forks Mayor Pat Owens,  
April 22, 1997.

---

*It is hard not to be touched by the sadness and enormous impact that the flood wrought on so many lives. But the flood also demonstrated how crisis brings out the best in people and in communities.*

Winnipeg Mayor Susan Thompson,  
October 23, 1997.

---

Federal, state, provincial and local governments have many well-established and active agencies dealing with various aspects of flooding within their jurisdictions. Non-governmental organizations also fill important flood-related roles. There also is a need for basin-wide binational institutional arrangements to deal with the transboundary issues that will arise, and the Commission finds that this need for a binational approach is generally accepted within the basin.

The Commission proposes to assign certain flood-related activities to its International Red River Board after consultations in the basin and with governments. The Commission also strongly recommends that:

- Governments immediately take steps, on a binational basis, to begin development of a comprehensive flood damage reduction plan for the Red River basin.
- Governments work with the International Red River Board and existing and emerging bilateral organizations to ensure that appropriate arrangements are in place for coordinating and implementing measures for flood-preparedness and mitigation activities, and to implement the recommendations of the Commission found in this report to governments.

**APPENDIX 3:**

**KGS REPORT EXTRACTS (CD)**

**APPENDIX 4:**

**CLEAN ENVIRONMENT COMMISSION (CEC) REPORT  
EXECUTIVE SUMMARY**



Report to the Government of Manitoba

on

Public Meetings:

Flood Protection Options for the City of Winnipeg

Main Report

Terry Duguid, Chair  
Manitoba Clean Environment Commission

February 11, 2002

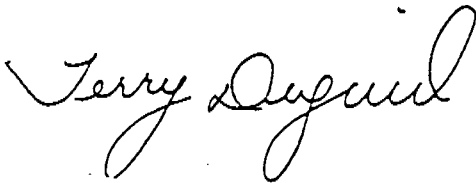
## *Chairman's Letter*

Dear Premier Doer:

At the request of the Government of Manitoba, the Clean Environment Commission conducted public meetings to gather the views of Manitobans on two flood protection options for the City of Winnipeg. The purpose of these sessions was to provide information on the two options, receive comments and concerns from the public and prepare a summary report.

We have done our best to provide a faithful and accurate summary of what the public told us. Please feel free to contact us should you have any questions related to the report and its contents.

Respectfully,



Terry Duguid, Chair  
Manitoba Clean Environment Commission

## *Executive Summary*

At the request of the Government of Manitoba, the Clean Environment Commission held public meetings on two flood protection options for the City of Winnipeg during January 2002. The flood protection options – an expanded Red River floodway and a detention structure at Ste. Agathe – are described in the November 2001 report by the KGS Group entitled *Flood Protection Studies for Winnipeg*.

Meetings were held in Winnipeg, Morris, Selkirk and Ste. Agathe from January 10 to 28, 2002. The purpose of the meetings was to provide information on the two flood protection options, receive comments and concerns from the public, and prepare a summary report to government. The public sessions were attended by over 1,000 individuals representing a wide range of interests including property and business owners, farmers, elected officials, organization representatives, government employees, professionals, academics and students. The majority were from the communities of Winnipeg, Ste. Agathe, Selkirk, Morris, East Selkirk, St. Jean Baptiste and St. Adolphe.

During these sessions many residents expressed a high degree of emotion over previous flooding, especially those living immediately south and north of Winnipeg. They spoke about how flooding had affected them personally and financially. The residents immediately north and south of the floodway, who experienced flooding, expressed anger and mistrust towards government and emergency measures officials for what they felt was unfair treatment and inadequate compensation. Some residents from outside Winnipeg expressed resentment for having to pay for the protection of those living inside the city without the same benefits.

The Ste. Agathe detention structure was strongly rejected by area residents at the Morris public meeting. Most at the Winnipeg, Selkirk and Ste. Agathe sessions believed that a decision had already been made to proceed with the expanded Red River floodway option and commented on that option accordingly. However, some participants at the Winnipeg meetings did argue for the detention structure option for its additional protection and lower cost.

The public gave a strong message of getting on with the job of protecting City of Winnipeg residents as well as all Manitobans living along the entire Red River Valley from flooding. They conveyed that the needs of the few living outside Winnipeg should not be sacrificed for the benefit of the many living inside the city. The compensation issue was a common thread at all

public meetings with consistent requests to settle outstanding flood damage claims and to put an effective compensation program in place before proceeding with either flood protection option. The public also expressed a desire to be involved at an early stage in the public participation and environmental assessment processes so their concerns can be addressed before the final design is complete and construction begins.

A total of 116 submissions and statements were either recorded from the four public meeting locations or were received by mail, fax or e-mail. Over 25 issues were identified from the public meetings and other submissions. The top four issues were: compensation, study terms of reference, floodway operation and other flood protection options.

1. Compensation was the most dominant issue raised at the public meetings. It was brought up at each meeting with emotion and resolve. Participants requested that compensation be addressed prior to consideration of any future flood protection options.
2. Substantial concern was expressed at the public meetings over the terms of reference for the KGS study. Participants questioned why the study tended to focus on flood protection options for the City of Winnipeg and not the entire Red River Valley. Residents living south and north of the city were particularly concerned about the narrow geographic scope of the study.
3. Operation of the Red River floodway was raised at each public meeting, particularly at Ste. Agathe and Selkirk. Residents living north and south of the City of Winnipeg expressed strong concern over the floodway rules of operation. They contended that operation of the floodway has resulted in repeated flooding of their properties.
4. Many participants commented on the need to consider other flood protection options. The options most frequently mentioned included constructing a 1 in 1,200 year "super" floodway, extending the floodway all the way into Lake Winnipeg, river dredging the lower Red River between Lockport and Lake Winnipeg and developing upstream water storage structures.

The remaining issue areas included property values, the regional economy, ice jamming, fairness to all valley residents, riverbank erosion, flooding north and south of the city, full cost of flood protection, KGS report credibility, flood protection funding, river management authority, public consultation, river dredging, agricultural interests, groundwater concerns, holistic approach, First Nation interests, flood prevention, summer water levels, aquatic ecosystem protection, recreation opportunities, emergency planning and the Mid-Continent Trade Corridor.

**APPENDIX 5:**

**VALUE ENGINEERING STUDY  
EXECUTIVE SUMMARY**

## **EXECUTIVE SUMMARY RED RIVER FLOODWAY EXPANSION VALUE ENGINEERING/VALUE ANALYSIS (VALUE) STUDY**

### **INTRODUCTION**

The City of Winnipeg was founded as a result of the rivers being the transportation route for the fur trade and railroads opening western Canada. Unfortunately, as we have discovered over the past 200 years, there is an inherent risk of flooding on the bed of glacial Lake Agassiz. The Red River Floodway is the single most important part of the infrastructure that exists to sustain the City of Winnipeg's future viability. The 1996 and 1997 floods clearly demonstrated that greater attention needs to be afforded to upgrading the flood protection infrastructure so that it is ready in advance of extreme flood events. We are now on the threshold of a new opportunity to improve flood protection for the inhabitants of the Red River Valley by Floodway Expansion.

KGS Group carried out a preliminary study to explore the issue of Flood Protection for the City of Winnipeg (CoW) and presented their findings in the Report titled "Final report on Flood Protection Studies for Winnipeg". The Floodway Expansion Design Concept outlined in the Report, expanded to include control of summer water levels in the City, and consideration given to operating the Floodway at water surface levels at the inlet above 778 feet, comprised the Value Study scope. The Floodway Expansion concept described in the Report was considered to be the "Base Case" for the Study.

The Project Vision was to protect The City of Winnipeg against flood damage from extreme events. The Project Mission was to upgrade the capacity of the Red River Floodway from the current design capacity to a minimum of 140,000 cfs, and to control Red River water levels through the City of Winnipeg to protect the city from basement flooding during extreme summer rainfall events and make the Forks Walkway usable.

The primary objectives of the Study were to identify project components/methods to provide the best overall value-for-money project, identify ways to reduce project risk in terms of cost schedule and overruns, identify early activities to realise flood protection benefits and generate consensus within the local consulting/construction industry and between government departments. The secondary objectives included reviewing unit prices for cost estimates, generating "Made in Manitoba Solutions", optimising operating and lifecycle costs, incorporating innovative concept(s), improving constructability aspects of the project, identifying modifications required to meet summer water level control, ensuring no interruption to the raw water supply to the City of Winnipeg, identifying new recreation opportunities and maintaining ones that currently exist.

### **WORKSHOP DELIBERATIONS**

As a result of our Value Study of the Floodway Expansion Project, the Value team endorses the general concept of expanding the Floodway channel to 140,000 cfs and raising the West Dike and West Embankment to a minimum of 784' to handle a 1 in 700-year flood event. We applaud the excellent efforts completed to date on the project by KGS. However, the team addressed some project issues not resolved by the current design, many of which were noted in the KGS documents and recommended for further planning and resolution. Among the most significant were summer

water level control in the City of Winnipeg, reliability and security of the inlet structure, timing of geotechnical, groundwater and environmental studies and approvals, compensation, recreational features and reliance on emergency raising of primary dikes by more than 2 feet for protection from a 1 in 700 year flood event.

Following extensive pre-workshop information gathering which included the formation of a trial vision, mission and scope, the Value Study workshop began with a presentation of the "Base Case" by the KGS team and analysis of the "Base Case" by the Value Study team. A creativity phase then generated over 180 ideas for value improvement, in terms of improved project focus, scope and reliability, mitigation of risk, improved scheduling, reduced operating or lifecycle cost, reduced environmental impact, identification of areas of innovation, improved constructability and generated "Made in Manitoba" solutions. As a result of judgement of these ideas, and development of trial proposals, the Value Team reduced these ideas down to 30 recommendations. The surviving trial proposals were further refined and grouped into a preferred Modified Base Case option. In addition, an Enhanced Protection option was developed including focused additions to the Modified Base Case. Finally, a City Infrastructure Modification option was also developed that can be added to either of the other options.

## INITIAL RISK REVIEW

An initial risk review was undertaken, where all risks associated with the major components of the project were reviewed and a Risk Register created. These included the upgrading of the Floodway, the raising of the West Dike, the upgrading of the City of Winnipeg Infrastructure and Floodway Management (including Project Development, Implementation and Operation). The risk study group brainstormed all risks to do with Management, Design and Construction, Operation and Third Parties which amounted to around 50 in total.

An initial review of the risks suggested that some 35 of the risks identified were likely to be significant. Some of them could involve fairly large costs (and related delays to implementation of the 1/700-year flood protection) if they were to occur.

It must be emphasised that this was a very preliminary review, so that any results are crude at this stage. It is normal with this type of study to review the results several times, adding risks and removing duplicates, gradually improving the confidence in the Risk Register. Future work on Risk Assessment should include:

- Investigate/Quantify Risks and Establish a Comprehensive Risk Register and Management Plan
- Investigate risk impact on cost and schedule
- Develop risk management plan as project develops
- Identify Roles and Responsibilities for Effective Risk Management

## ISSUES OF POTENTIAL CONCERN

The following items were raised several times during the course of the workshop. Many appear to have been resolved, with the identification of the Preferred Option. However these items can be quite contentious and are listed as a precautionary note for future reference.

- Uncertainty of emergency raising of city dikes
- Risk mitigation plans and structured contingency plan.

- Distinguish between operations and construction, and mitigation;
- Evacuation Plans & Evacuation Plan triggers based on environmental and flood forecasting conditions have not been developed.
- Lack of time to complete thorough pre-design planning and investigations/designs.
- Flood preparedness and continuing maintenance.
- Resistance to new methods and technology.
- Design horizon
- Maintenance Implication for future generations
- Potential failure of saturated city dikes
- Restricted access to fill materials
- Difficulties in extending city primary dikes
- In moving project along, be sure all necessary engineering studies and compensation/environment information are done. Additional studies on critical path include:
  - Dam Safety evaluation
  - Risk evaluation of inlet control structure
  - Additional topographic mapping
  - Review of hydraulic studies with additional mapping information
- Changes to operating rules.
- Challenge 778 ft. maximum HWL
- Priority/considerations over who gets protected or flooded first
- What is a "Super Flood"?
- What is the management plan for dealing with a flood greater than the 1 in 700 flood event (or Super Flood)?
- Raising of West dike and west bank: what height, what Implications.
- Current modelling is based on dated river cross-sectional information, which may not be reflective of current states or trends.
- Consider emergency raising of primary dikes with Jersey Barriers.

## GROUP DISCUSSION AND VE PROPOSAL TRACKING

A meeting was held August 19, 2002 with the Review Panel, the Planning Team, various members of the Technical Team and the Value Consultants. Following presentation of the workshop deliberations, the surviving trial proposals under each Issue Area was reviewed and comments made. The proposals approved at this time are listed below and those marked with an asterix were approved for future study only.

It should be noted at this time that, although expanding the Floodway appears to be a simple concept, the Project as a whole is quite complex with many extensively inter-related components requiring effective integration, timing and co-ordination. Further, these recommendations from the Modified Base Case, the Enhanced Option and the City Infrastructure Modifications are conceptual only and require further examination and engineering assessment. The potential cost savings are preliminary in nature and require verification at the detailed design stage.

The proposals include the following:

### Modified Base Case:

#### A Red River Floodway Channel



- Seed the lower channel with water tolerant vegetation
- Enlarge gaps in East Embankment and Richardson's Coulee
- Excavate upper sides of channel concurrent with lower flow channel where reasonable
- Increase soil investigations relating to "blow-out" avoidance
- Design side slopes of Floodway at 5:1 with designed surface layer at top of slope\*
- Cross-country ski/mountain bike park on West Embankment near Seine River Siphon / Expand & raise Spring Hill with excavation material
- Design pilot channel wider and shallower to reduce risk of "blow-outs"

#### B Inlet Structure

- Investigate means of providing backup gate system (ie: Bulkheads) downstream of existing gates - limit flows through Winnipeg to 80,000cfs\*
- Retain security expert to improve security at the inlet structure
- Provide Flow Regulation in Floodway channel: Remove existing earthen plug & install staggered pile "fence" for ice jam control\*

#### C Outlet Structure

- Extending outlet structure: use west retaining wall as concrete "pier"
- Construct flume for "Whitewater Park" at outlet structure\*

#### D West Dike

- Investigate alternate erosion control systems to protect the west dike (ie: soil cement)\*

#### E Highway Bridges

- Replace bridge decks at time of bridge retrofits.
- Utilize permanent steel sheet piles to upgrade bridge piers

#### F Railway Bridges

- Convert existing CNR Sprague Bridge to through girder bridge\*
- Remove GWWD Bridge & relocate GWWD facilities to Deacon Reservoir\*
- Utilize permanent steel sheet piles to upgrade bridge piers

#### G Project management

- Create Red River Valley Flood Protection Authority to own, manage, operate & maintain the Floodway
- Conduct necessary geotechnical, groundwater, and environmental studies as soon as possible\*
- Organize a Project Management Team with internal and external representation as soon as possible
- Include a recreation representative for the above Project Management Team
- Develop compensation plan in consultation with affected parties, the Province, and insurance industry

#### H WPCC Pumping Capacity Upgrade

- Perform infiltration/inflow analysis of CoW sanitary sewer system in south end & upgrade in lieu of funding upgrades to WPCC pumping stations\*

Modified Base Case - Enhanced Protection:**I Floodway Operating Rules**

Revise the Floodway operating rules and do associated works to reflect the reality and risks associated with raising 69 miles of primary dikes during major flood events\*. These revisions and works include:

- maintain the Red River level at 24.5 James during a 1 in 700-year flood event
- operate the forebay at approximately 780 feet (in emergency mode).
- raise the West Dike and West Embankment by approximately 3 to 4 feet
- enhance the impervious core of the dikes at the inlet structure

**J In-City River Level Management**

Provide additional control of flow into Floodway channel and revise the Floodway operating rules to hold City River summer levels to as low as possible without exceeding 760' upstream\*.

Control flow by installing box culverts (invert 742 feet, sill 750 feet) with control gates across the Floodway between the inlet and St. Mary's Road, in addition to the Floodway plug removal cited above under Modified Base Case.

City Infrastructure Modification:**K City Infrastructure Modifications**

The City Infrastructure Modification option recognizes that flood events result in long durations of high river stages during which there is considerable risk of widespread and costly flooding of basements and the City's combined sewer system during heavy rainfall events. It therefore recommends assessment of the capability of the City's combined sewer flood pumping stations to deal with rainfall and high river levels\*. This could result in a program to:

- upgrade the combined sewer flood pumping station capacities
- provide backwater valve/sump pump installations in individual sewer connections possibly through a homeowner subsidy program

**POTENTIAL FOR EARLY ACTIONS**

The following areas of early potential actions were identified:

- Remove Lac-du-Bonnet Bridge FW 2002
- Floodway Security F2002
- Start Project Build West Dike Using Local Borrow
- Start Excavation of Pilot Channel

**NEXT STEPS**

The following next steps were proposed following discussions of the Formal Presentation material at the August 19, 2002 meeting with the Review Panel:

- Prioritise/schedule KGS future studies/Develop Study Management plan.

- Advance Environmental work to secure funding. Note: Construction cannot advance until the Environmental Hearing Process is complete.
- Compensation measures should be addressed as federal funding process is linked to measures. Federal process is lengthy and iterative.
- Transportation issues:
  - Develop Management Plan for all Highway and Railway Bridges to minimise Capital and LCC costs. Explore use of salvage material from Lac Du Bonnet Bridge.
  - Address policy/position on Bridge Submergence:
  - Consider Risks & LCC
  - Determine highway and railway access requirements for routes leading to bridges.
- Investigate establishment of Red River Floodway Management Authority and Red River Floodway Expansion - Project Management Team. Consider continuity of VE Team Involvement.
- Determine the project "Owner". Consider establishing an "Owners' Technical Advisor" to review technical decisions/aspects of the project.

**Trial Schedule**

	2002	2003	2004	2005	2006	2007	2008	2009
<b>A1 Upgrade Floodway</b>								
A1.1 Channel Earthworks								
A1.2 Rail Bridges								
A1.3 Highway Bridges								
A1.4 Improvements at Floodway Inlet Control Structure								
A1.5 Hydraulic Structures - Upgrades								
Outlet Structure								
Other Hydraulic Structures								
A1.6 Transmission Lines								
A1.7 Other Crossings								
A1.8 Roadworks								
A2 Upgrade Flood Protection Infrastructure City of WPG								
A3 Raise Height of West Dike								
B1 Contingencies (Summation for all items)								
C1 Owner's Cost Engineering/Construction Management								
Investigation, Environmental Approval, etc.								
Design, Supervision, etc.								
C2 Escalation of Costs during Construction								
C3 Cost of Interest During Construction								
Public Consultation								

**APPENDIX 6:**  
**PROJECT SCHEDULE**



Mon 9/18/02 Page 1 of 2

**FIGURE 2**  
**FLOODWAY EXPANSION PHASE 1, 2 & 3 (PLANNING, DESIGN/BID, CONSTRUCTION)**  
**FAST TRACK SCHEDULE TO 2008**

ID	Task Name	2002	2003	2004	2005	2006	2007	2008
135	PTH 59 South Bridge							
136	St. Mary's Road Bridge							
137	Transmission Lines							
138	Outlet Structure							
139	West Dike							
140	Aqueduct Modifications							
141	Miscellaneous Structures							
142	City Infrastructure							
143	Floodway Inlet Structure							

Mon 9/15/02 Page 2 of 2

**FIGURE 2**  
**FLOODWAY EXPANSION PHASE 1, 2 & 3 (PLANNING, DESIGN/BID, CONSTRUCTION)**  
**FAST TRACK SCHEDULE TO 2008**

**APPENDIX 7:**  
**PRELIMINARY ECONOMIC IMPACT ANALYSIS**



FLOODWAY EXPANSION  
INITIAL  
ECONOMIC IMPACT ASSESSMENT

October 29, 2002

## FLOODWAY EXPANSION INITIAL ECONOMIC IMPACT ASSESSMENT

The Manitoba Bureau of Statistics (MBS) has been requested to do a quick assessment of the economic and tax impacts to Manitoba and Canada of a proposed expansion to the Winnipeg Floodway. The assessment is based on currently available expenditures information.

Economic impact estimates for the provincial and national economies have been produced using the MBS Economic Impact Assessment Models, which are built around Statistics Canada's Input-Output Tables for Manitoba and Canada. Tax Revenue impact estimates have been produced using the MBS Tax Revenue Impact Assessment Model, which utilizes relationships between economic measures and taxation levels, as well as information about the project under study.

Total projected expenditures for Floodway Expansion are \$657.8 million over four years. However, this figure has been inflated by \$15.5 million to project the real cost of the project in today's money. For the MBS analysis, this \$15.5 million has been removed from the Total Project Cost. As a result, expenditures and impacts are in constant 2002 dollars, and the Total Project Cost is estimated at \$642.2 million

This \$642.2 million construction expenditure has been summarized by different activities, such as earthworks, highway bridges, railway bridges, etc., as presented in the table on the opposing page. Also included in the \$642.2 million total is an estimated \$46.6 million for engineering and management fees, \$62.1 million for contingency and \$49.7 million in interest costs. The Appendix provides the information provided to MBS that was used for this study.

The methodology used by MBS for this initial assessment of the floodway expansion project was to code the different types of activities to particular construction commodities contained in the MBS Model, including Road, Highway & Airstrip Construction, Railway & Telecommunications Construction, Non-Residential Building Construction, Repair Construction and Other Engineering Construction.

In doing this, the model then distributes the money allocated to each construction type to the various goods and services, including labour, that is typical for that type of construction. This will include interest costs, management and engineering fees and contingency costs. Therefore, expenditures proposed for these three items have been folded back into the construction activities in the upper part of the table, as shown.

According to instructions provided to MBS, 5% of project expenditures, including 5% of the direct labour content has been allocated to occur outside Manitoba, in the "Rest-of-Canada". Therefore, of the total \$642.2 million project, \$610.4 million is estimated as direct Manitoba expenditures and \$31.8 million as direct expenditures elsewhere in Canada.

It is to be noted that for this initial assessment MBS made no adjustments to the commodity supply ratios inherent to the Manitoba and Canada economic impact models.

**Note, owing to certain methodological limitations of input-output analysis, all impacts presented should be treated as general estimates only, never as absolutes.** The models used cannot provide a complete or absolute measure of the impact of economic change. Also, the quality of the impacts derived with the models cannot exceed the quality of data and assumptions used in the process. Modification of key assumptions may significantly alter the results.

## IMPACT ASSESSMENT HIGHLIGHTS:

Direct Manitoba expenditures for the \$642.2 million project are estimated at \$610.4 million (95% of the total) with the remaining \$31.8 million representing direct expenditures in the Rest-of-Canada. Note that the \$15.5 million escalation to account for inflation during the construction period has been excluded from the analysis.

The above expenditures are for the total cost of construction. These expenditures are for construction materials, services related to construction, direct construction labour and contractor profits. Each of these results in further expenditures, be they for manufacturing, business operations or household expenditures. The sum of the direct and spin-off expenditures is termed Gross Expenditures.

Gross Expenditures in Manitoba are estimated at \$1,048.6 million over the four-year construction period. In addition, Gross Expenditures elsewhere in Canada are estimated at \$502.0 million. Total Gross Expenditures in Canada are estimated at \$1,550.5 million. This is the gross monetary impact to the economy.

Gross Domestic Product (GDP) at Market Prices removes the double-counting of expenditures present in the Gross Expenditures statistic, to present an estimate of the net monetary impact to the economy.

In total, the project is estimated to result in a \$501.5 million impact to Manitoba GDP at Market Prices. The GDP impact to the Rest-of-Canada is estimated at \$312.8 million, and the total GDP impact for Canada is estimated at \$814.3 million. Therefore, for each \$1.00 in direct project expenditures (\$642.2 million), the impact to Canada's GDP is estimated at \$1.27, with \$0.78 (62%) estimated to occur in Manitoba.

Total Manitoba Labour Income over the four year project is estimated at \$353.2 million, with an additional \$191.9 million estimated for the Rest-of-Canada. Therefore, the total Labour Income impact to Canada is estimated at \$545.1 million. For each \$1.00 in direct project expenditures, the impact to Labour Income throughout Canada is estimated at \$0.85, with \$0.55 (65%) estimated to occur in Manitoba.

The above Labour Income impacts are estimated to support a total of 13,900 person-years of employment in Canada during the 4 year period, hence on average about 3,500 full-time-equivalent jobs for four years. Total Manitoba Employment impacts are estimated at 9,500 person-years, with about 5,000 being direct impacts and 4,600 spin-off employment. Rest-of-Canada Employment impacts are estimated at 4,400 person-years, with about 200 being direct impacts and 4,100 spin-off employment.

Total Tax Collections resulting from the project and its effect on the Canadian economy are estimated at \$201.7 million, spread out over the four year construction period. Total Manitoba Tax Collections are estimated at \$123.9 million, including \$50.0 million in Provincial Taxes, \$8.5 million in Local Taxes and \$65.4 million in Federal Taxes. Tax Collections in the Rest-of-Canada are estimated at \$77.8 million, including \$30.3 million in Provincial Taxes, \$7.6 million in Local Taxes and \$39.9 million in Federal Taxes.

## MBS ECONOMIC & TAX REVENUE IMPACT ASSESSMENT MODELS:

Manitoba economic impact estimates have been derived from the MBS Economic Impact Assessment Model. The Worksheet Level of this model encompasses flow patterns for 299 industries, 725 commodities and 170 final demand categories (i.e., who buys a commodity for what purpose). The current model used for Manitoba is based on the 1998 Statistics Canada Input-Output Tables for Manitoba, which record in detail the inter-industry flow of goods and services within the Manitoba economy. Impacts to the "Rest-of-Canada" are derived by subtraction (i.e., Total Canada Impacts minus Total Manitoba Impacts).

Total Canada economic impact estimates are derived from an earlier version of the MBS Economic Impact Assessment Model, based on Statistics Canada's 1992 Input-Output Tables for the Canadian economy. The Worksheet Level of the Canada Model encompasses flow patterns for 217 industries, 627 commodities and 166 final demand categories. Both the Manitoba and Canada Models provide estimates of the Direct, Indirect and Induced Impacts of a project or activity on the economy.

**Direct Impacts** are impacts on firms which expand production to satisfy an increase in demand for a particular commodity. The **Indirect Impacts** are the "ripple effect", as the directly impacted firms require more inputs from other firms in order to satisfy the increased demand.

As directly and indirectly impacted firms expand production they require more staff thus increasing the income paid to wage earners. After withholding 28% of labour income for taxes and savings, the remainder of this income is spent, which increases the demand for other commodities. This "consumer effect" results in the **Induced Impacts**.

While economic impact models can be a useful component in the decision making process, they do have limitations (i.e., model is static, based on average patterns for technology and costs for commodities and industries, at a fixed point in time). Moreover, while data inputs, supply ratios and employment deflators can all be user specified for a particular project, there is never perfect knowledge. As a result, the model cannot provide a complete or absolute measure of the impact of economic change. **The resultant impacts should be treated as general estimates only and never as absolutes.**

**It should be noted that the level of direct expenditures within the Province of Manitoba is the primary factor in determining the magnitude of economic impacts to Manitoba. Expenditures made directly to suppliers outside of Manitoba do not have an impact on the Manitoba economy, except to the extent that Provincial Sales Tax may be collected on these purchases.**

Provincial, local and federal taxation estimates have been prepared using the MBS Tax Revenue Impact Assessment Model. The MBS tax model's structure is based on 2002 Manitoba Budget data, detailed unpublished 1996 Income Tax Data adjusted for the latest income tax rate changes, and MBS Manitoba Provincial Economic Accounts 2001 data.

The MBS Tax Revenue Impact Assessment Model utilizes output from the MBS Economic Impact Assessment Model (such as estimated GDP, Labour Income and Employment impacts), as well as information on average wage rates for direct and non-direct jobs. Federal and local taxes accruing in Manitoba are estimated, in part, by utilizing their average relationships to Manitoba provincial taxes.

The tax revenue estimates for the Rest-of-Canada utilize the relationship between Gross Domestic Product and tax revenue in other provinces. Total Canada tax impacts are the sum of Manitoba and Rest-of-Canada impact estimates. Tax revenue impact estimates have been adjusted for the project in accordance with information provided.

**As with the economic impacts, tax revenue impacts should also be treated as general estimates only. It is noted that the local tax revenue is the "softest" of the three tax estimates.**

## GLOSSARY OF TERMS:

### Direct Impacts

Direct Impacts (or Project Direct) are determined outside of the model. They are values that have been directly input to the MBS Economic Impact Assessment Model, such as Direct Labour Income and Direct Employment for the project.

### **OTHER DIRECT IMPACTS**

Other Direct Impacts are determined within the model. They represent the estimated impacts to Direct Suppliers for the Project (for the various materials and services required). This is the first level of economic activity resulting from Project Expenditures (i.e., the simulated first round of purchases in the MBS Economic Impact Assessment Model).

### **INDIRECT IMPACTS**

Indirect Impacts are the second level of economic impacts resulting from Project Expenditures. Indirect Impacts result when Directly Impacted firms require additional inputs from other firms in order to meet the demands of the Project, or to "restock shelves" in preparation for future demands.

### Induced Impacts

Induced Impacts are the "Consumer" or "Household" effect, which occurs as a result of wage re-spending. It is assumed that most of the Labour Income required at the Direct, Other Direct and Indirect impact levels is spent on consumable or household items. This is the third level of economic activity resulting from Direct Project Expenditures.

### **TOTAL DIRECT IMPACTS**

Total Direct Impacts are the sum of Direct Impacts and Other Direct Endogenous (i.e., Project Direct plus Other Direct).

### **TOTAL IMPACTS**

Total Impacts are the sum of Total Direct Impacts, Indirect Impacts and Induced Impacts.

### **TOTAL EXPENDITURES**

Refers to the Total Expenditures specified for the project or activity being assessed (such as Operations or Construction). Total Expenditures are the initial expenditures from which all other economic impacts ultimately result (be they in Manitoba, the Rest-of-Canada or the Rest-of-the-World).

### **DIRECT MANITOBA EXPENDITURES**

Direct Manitoba Expenditures identifies the volume of Total Expenditures by expected or estimated to be spent directly in Manitoba. Only Expenditures in Manitoba can impact Manitoba GDP, Labour Income and Employment etc. Direct Expenditures outside of Manitoba are a direct leakage from the economy, and do not impact Manitoba GDP, Labour Income and Employment levels.

### **DIRECT MANITOBA SUPPLY**

The value of Direct Manitoba Expenditures estimated to be produced, as well as purchased, in Manitoba. To yield high impacts relative to direct expenditures, the direct supply should

approach the value of direct expenditures. A relatively small direct supply value results in lesser impacts to the economy.

#### **GROSS EXPENDITURES**

Additional expenditures by businesses and persons are levered by the Direct Expenditures. The Gross Expenditures statistic provides a measure of these expenditures, which includes re-spending of the initial direct expenditures by suppliers and wage earners. It represents the gross monetary benefit to the economy.

#### **GDP AT MARKET PRICES**

A measure of the total value of goods and services produced in the economy, GDP at Market Prices is the net monetary benefit to the economy. This statistic removes the double counting of expenditures and expenditure leakages from the economy, which are included in the Gross Expenditures statistic.

#### **GDP AT FACTOR COST**

A measure of the total value of goods and services produced by industry. GDP at Factor Cost is equal to GDP at Market Prices minus the effects of Indirect Taxes and Subsidies.

#### **LABOUR INCOME**

The sum of all Wages, Salaries, Supplementary Labour Income and Net Income of Unincorporated Businesses. Any or all of these may be present in the Direct Expenditures and resultant Direct, Indirect and Induced Impacts.

#### **EMPLOYMENT**

The Employment estimated to result from the above Labour Income. Jobs are presented as "full-time equivalent person-years" (i.e. one job represents the equivalent of one person being employed on a full-time basis for a period of one-year).

#### **FEDERAL TAXES**

The sum of Federal Income Taxes (Corporate and Personal), Other Direct Federal Taxes and Indirect Federal Taxes, estimated to be collected in Manitoba.

#### **PROVINCIAL TAXES**

The sum of Provincial Income Taxes (Corporate and Personal), Other Direct Provincial Taxes and Indirect Provincial Taxes, estimated to be collected in Manitoba.

#### **Local Taxes**

An estimate of the total taxes, of any description, accruing to all Local Municipalities in Manitoba as a result of the project or activity being assessed and its spin-off activities.

**FLOODWAY EXPANSION - PROJECTED EXPENDITURES**

**(\$Millions)**

<b>Summary Data Provided to MBS</b>		<b>Reallocated Expenditures</b>	
Land Acquisition	6.0	Land Acquisition	6.0
Earthworks	162.0	Earthworks	246.2
Highway Bridges	36.3	Highway Bridges	55.1
Railway Bridges	45.6	Railway Bridges	69.3
Roadworks	1.7	Roadworks	2.5
Hydraulic Structures	19.9	Hydraulic Structures	30.2
Manitoba (Wpg) Hydro	6.2	Manitoba Hydro	9.5
Centra Gas	1.2	Centra Gas	1.8
Manitoba Telecom	0.3	Manitoba Telecom	0.5
Winnipeg Pipeline	1.2	Winnipeg Pipeline	1.8
Inlet Control Structure	30.1	Inlet Control Structure	45.8
Owner's Cost, Engineering & Site Supervision	46.6	These Items Reallocated to Above Construction Activities To Comply with Methodology	
Contingency	62.1		
Interest During Construction	49.7		
<b>SUBTOTAL</b>	<b>468.8</b>		<b>468.8</b>
Winnipeg Infrastructure	110.0	Winnipeg Infrastructure	110.0
Raising West Dike	63.4	Raising West Dike	63.4
<b>PROJECT TOTAL (excluding escalation)</b>	<b>642.2</b>	<b>PROJECT TOTAL</b>	<b>642.2</b>



# FLOODWAY EXPANSION: INITIAL IMPACT ESTIMATES

## TOTAL CANADA ECONOMIC IMPACT ESTIMATES

(\$MILLIONS)

	MANITOBA IMPACTS	REST OF CANADA	CANADA IMPACTS
Total Direct Expenditures	610.4	31.8	642.2
Gross Expenditure	1,048.6	502.0	1,550.5
GDP at Market Price	501.5	312.8	814.3
GDP at Factor Cost	459.0	270.4	729.4
Labour Income	353.2	191.9	545.1
<u>Employment (Person-Years)</u>			
Direct Employment	5,000	200	5,200
<u>Indirect &amp; Induced</u>	4,600	4,100	8,700
<u>Total Employment</u>	9,500	4,400	13,900

- Notes: (1) GDP at Market Prices is the total value of goods and services produced in Canada's economy.  
 (2) GDP at Factor Cost is the total value of goods and services produced by industries (i.e., GDP at Market Prices less indirect taxes plus subsidies).  
 (3) All Economic impact estimates presented are in 2002 dollars.  
 (4) Employment impacts are presented in terms of "Person-Years". A Person-Year is defined as one person being fully employed for a period of one year.  
 (5) Figures may not add to total, due to rounding.

## TOTAL CANADA TAX REVENUE IMPACT ESTIMATES

(\$MILLIONS)

	MANITOBA IMPACTS	REST OF CANADA	CANADA IMPACTS
Total Provincial Taxes	50.0	30.3	80.3
Local Taxes	8.5	7.6	16.1
<u>Federal Taxes</u>	65.4	39.9	105.3
<u>Total Taxes Collected</u>	123.9	77.8	201.7

Note: Figures may not add to total, due to rounding.

Data Source: Manitoba Bureau of Statistics  
 Economic Impact Assessment Model  
 Tax Revenue Impact Assessment Model

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