Proposed Floodway Expansion Project

EXECUTIVE SUMMARY OF ENVIRONMENTAL IMPACT STATEMENT

Submitted by:

Manitoba
Floodway Expansion Authority

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Solutions for a Sustainable Environment

InterGroup

August 2004

Proposed Floodway Expansion Project

EXECUTIVE SUMMARY

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Table of Contents:

Note to Readers

This Executive Summary uses concise language to summarize several complex subjects. Readers are referred to the full Environmental Impact Statement and supporting documents for a complete understanding of these subjects. All documents are available in the Manitoba Conservation Public Registry. The Executive Summary and Environmental Impact Statement documents are also available on the Proposed Floodway Expansion Project environmental assessment website at www.floodwayeia.com.

Executive Summary Preamble

This Executive Summary highlights results of the Environmental Impact Assessment for the Proposed Red River Floodway Expansion Project. Further detail is available in the Environmental Impact Statement (EIS) for the Project and supporting appendices:

Volume 1	Proposed Red River Floodway Expansion Project – Environmental Impact Statement
Volume 2	Technical Appendices
Volume 3	Public Consultation and Involvement Appendix

This EIS was prepared by TetrES Consultants Inc./InterGroup Consultants Ltd. (TetrES/InterGroup, or the EA Study Team) and supporting technical specialists in consultation with the Manitoba Floodway Expansion Authority (MFEA) and its engineering consultants. MFEA has reviewed and adopted this EIS for submission to Manitoba and Canada regulatory agencies in support of its application to Manitoba Conservation to develop the Floodway Expansion Project.

Background

Studies by the International Joint Commission (IJC) after the flood of 1997 concluded that Winnipeg is at risk of major floods larger in magnitude than the 1997 event, and that the potential damages in the City of Winnipeg due to such floods would be greater than $10 billion for a 1 in 500 year flood and as much as $17 billion for a 1 in 1000 year flood (1999 $Canadian). A wide array of alternatives to improve flood protection were examined and compared. The studies concluded that the preferred options to provide a major increase in flood protection for the City of Winnipeg were: (a) the Ste. Agathe Detention Structure and (b) the Floodway Expansion. Separately, the IJC investigated and rejected the alternative of upstream reservoir storage of either a large or micro scale.

The Province of Manitoba commissioned further studies to assess and compare the two preferred options from various perspectives. A series of consultations, including four public meetings of the Clean Environment Commission (CEC) in January of 2002, were held with the public regarding the alternatives. Meetings were also held to discuss Floodway operating conditions and to announce the development of legislation for financial compensation to property owners adversely affected by river water levels that are controlled above the "state-of-nature".

Based on these studies and consultations, the Province of Manitoba and the Government of Canada chose the Floodway Expansion, providing protection against a 1 in 700 year flood event, as the preferred flood protection alternative. A Value Engineering process was carried out in August 2002, which concluded that the proposed expansion approach was well developed. On December 8, 2003 signing of a Canada-Manitoba Cost-Sharing Agreement for $240 million was signed to begin work on the Floodway Expansion Project within its current overall scope. The planning process for the Project has continued to examine alternative means of carrying out the Project within its defined scope.

1.0 INTRODUCTION

The Red River Floodway Expansion Project (the Floodway Expansion or the Project) involves a major expansion of the Existing Floodway protection system (the Existing Floodway) designed to divert flood waters around the City of Winnipeg. The Existing Floodway was constructed between 1962 and 1968 and is located on the east side of Winnipeg. It is aligned in a general south-north direction with a length of approximately 48 km (29.5 miles) from its inlet south of St. Norbert, to its outlet north of Lockport. The Project will expand the existing flood diversion hydraulic capacity, generally by widening the Floodway Channel and modifying associated bridges and other infrastructure. Funding for the Project's development is being provided by both Manitoba and Canada.

The proposed Floodway Expansion Project will increase flood protection for people, mainly in the City of Winnipeg, against very infrequent catastrophic events. While the risk of these events occurring is low, their consequences are high. The Floodway Expansion will increase Winnipeg's reliable security against floods up to a magnitude of 1 in 700 years. An estimated 450,000 residents would otherwise be flooded during such events. This increased level of protection from the Floodway Expansion will provide economic benefits to all Manitobans and Canadians, yielding a net present value of net benefits of over $900 million (2001 $Canadian).

The Government of Manitoba has established the Manitoba Floodway Expansion Authority (MFEA) and charged it with the responsibility to design and construct the Project and then (through the Floodway Authority established pursuant to Bill 31) to own and maintain the Province's Floodway assets[1]. Operation of the Floodway after the Floodway Expansion development will continue to be the responsibility of the Manitoba Water Stewardship Department as it is an integral component of the overall Manitoba flood protection system.[2],

This Environmental Impact Statement (EIS) has been prepared in response to EIS Guidelines issued February 5, 2004, setting out the information required from MFEA by provincial and federal government agencies. Provincial and federal regulatory approvals are needed, after review of environmental impact assessment (EIA or EA) findings, before any construction activities can be undertaken. MFEA has been undertaking activities to allow for the decision to commence construction of the Project in the summer of 2005.

Public consultation and involvement is an integral part of MFEA's Floodway Expansion Project planning and environmental assessment, and has been particularly important in the selection of alternative ways of carrying out the Project, the consideration of mitigation measures, and the interpretation of the significance of effects associated with the Project.

The Environmental Impact Statement concludes that the Project, after the implementation of mitigation measures outlined in the EIS, is expected to create no significant adverse effects on the biophysical environment or related socio-economic environments. These conclusions reflect changes in design of the Project in response to potential effects identified during the course of preparing the EIS (e.g.,

[1] The Province's Floodway assets (Existing Floodway and Floodway Expansion) after development of the Project will include the Inlet and Outlet Control Structures, the Floodway Channel, Bridges and the West Dyke. Some elements of the Project relating to infrastructure improvements (e.g., work related to utilities that cross the Floodway) deal with assets that will not be owned or maintained by MFEA.

[2] Manitoba's overall flood protection system also includes the Shellmouth Dam and Reservoir, the Portage Diversion and City of Winnipeg primary dykes.

reduced channel deepening to mitigate effects on groundwater; reduced requirement for property acquisition), as well as mitigation measures that reduce or eliminate remaining potential adverse effects. Some residual adverse effects related to physical and biophysical changes from the Project are anticipated but are not considered to be significant. Given mitigation measures set out in the EIS, these conclusions apply to the Project when considered in combination with other past and known or planned future projects.

Overview of the Floodway Expansion Project

The prime purpose of the proposed Red River Floodway Expansion Project is to increase flood protection for people in the Red River Valley, primarily located in the City of Winnipeg and area, through expansion of the Existing Floodway. Current emergency operation of the Existing Floodway (governed by Operating Rules), potentially protects the City of Winnipeg to a flood of a 1 in 225 year return period; however, this operating condition is not considered reliable for the Existing Floodway due to inadequate freeboard along the West Dyke and the need to submerge existing bridges crossing the Floodway. The Floodway Expansion Project will greatly improve protection for the Winnipeg area from catastrophic floods materially greater than the 1997 flood (approximate 1 in 100 year return period), and provide Winnipeg reliable security against floods of up to the 1 in 700 year return period.

Existing Floodway and Floodway Expansion Components

In the event of a flood, the Existing Floodway diverts floodwaters from the Red River around the City of Winnipeg. In the recent past it has been necessary to use the Existing Floodway during spring runoff approximately two out of three years. The use of the Existing Floodway is controlled by raising the control gates at the Inlet Control Structure on the Red River, south of St. Norbert. This limits the amount of water that flows through the City of Winnipeg. The remaining water upstream of the Inlet Control Structure is diverted into the entrance of the Floodway Channel, where it is routed around the City of Winnipeg. The water that flows through the Floodway Channel re-enters the Red River through an engineered Outlet Control Structure located north of Lockport. The Existing Floodway is designed so that under most flood conditions the level of the Red River upstream is the same as would occur without the Floodway.

The Floodway Expansion Project will allow more water to be diverted around Winnipeg during flood events as a result of upgrades and improvements to five key components of the Existing Floodway. These five key upgrades and improvements are as follows (Figure 1):

- **Floodway Channel Expansion:** The Existing Floodway Channel will generally be enlarged through widening rather than deepening, in part to avoid adverse effects on groundwater in the area. Approximately 21 million cubic metres (27 million cubic yards) of earth will be excavated. The width may increase by approximately 110 m (350 ft). The depth will generally not increase but selected reaches of the Channel could be deepened by up to 0.6 m (2 ft), subject to final design. A key factor in achieving higher flow through the diversion is improving the hydraulic capacity by raising bridges. The new expanded Channel's reliable design capacity will be approximately 3,960 m3/s (140,000 ft3/s) of water flow when operated at its full capacity at 237.13 m (778 feet) above sea level (ASL) at the Inlet Control Structure. The existing Floodway capacity is about 2,550 m3/s (90,000 cfs) at the same elevation, although this is not a reliable capacity.

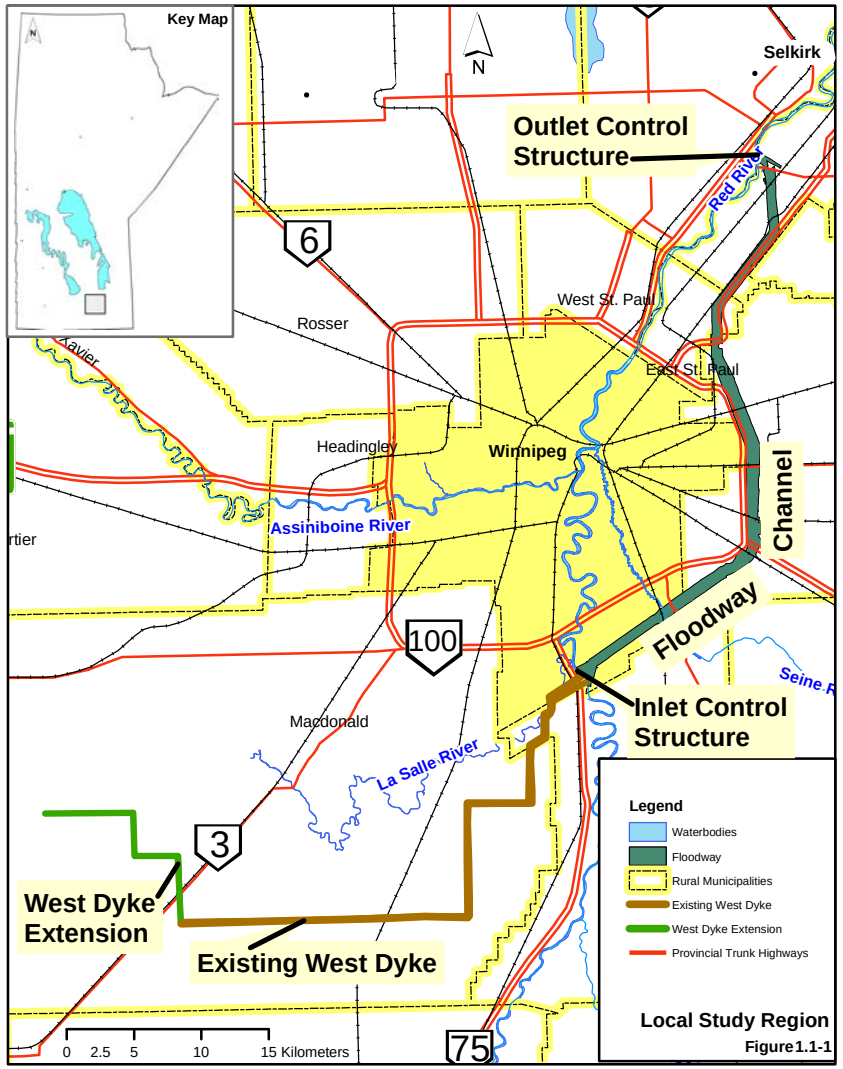
- **Bridges:** Seven bridges will be replaced and six bridges will be rehabilitated, including raising of the bridge girders above flood water levels where needed.

- **Upgrades to Inlet and Outlet Control Structures:** Upgrades are planned as part of the Project for the Inlet Control Structure, including an enhanced fire protection system, installation of additional riprap and other erosion control measures to protect the embankments of the Control Structure. The Outlet Control Structure and the channel that discharges water from the Existing Floodway back into the Red River will be widened to twice the existing size. Riverbank erosion protection in the Red River for approximately 1200 metres north of the Floodway Outlet Structure will be provided.

- **Services/Infrastructure:** As a result of the Floodway Expansion activities, modifications will be made to existing transmission lines, drainage structures, other utilities and other Floodway crossings such as the City of Winnipeg Aqueducts.

- **West Dyke Enhancement:** The West Dyke will be extended approximately 15 km (9 miles) and raised in height as part of the Project to increase the flood protection safety factor. The enhanced West Dyke height will provide protection against water levels of approximately 237.1 metres (778 ft) at the Floodway Inlet Control Structure plus an increased allowance for freeboard (space between the water level and the top of the dyke to accommodate wave and wind effects). The existing West Dyke currently extends approximately 45 km or 28 miles from the Floodway Inlet Control Structure south westerly toward high ground on the west side of the Red River Valley at Brunkild.

Figure 1 Local Study Region



Operation of the Project

The proposed Floodway Expansion will operate in accordance with the current Operating Rules of the Existing Floodway. Improvements in the design of the Floodway, such as the West Dyke Enhancement and improved erosion control at the Floodway Inlet, will assure that the present Operating Rules can be used safely.

The current Operating Rules are intended to control, to the extent feasible, water levels both in the City and upstream of the Floodway. These rules specify that the Floodway Inlet will control upstream water levels to a maximum design capacity level of 237.13 m (778 ft) at the Inlet Control Structure, while releasing up to about 2,265 m3/s (80,000 cfs) into the Red River through the City of Winnipeg. When water levels rise to the maximum design capacity level at the Floodway Inlet, all additional flows must be passed through the City of Winnipeg (i.e., releases then exceed 2,265 m3/s (80,000 cfs) and flooding will occur in Winnipeg).

Only under extreme conditions, when river water levels in Winnipeg threaten to overtop the Primary Dykes, are Floodway operations in spring currently allowed to exceed the "state of nature" upstream of the Floodway Inlet. With the Existing Floodway and current Operating Rules, such extreme conditions occur during a flood event of about 1 in 90 year magnitude or greater (which is less than the 1 in 100 year magnitude of the 1997 flood). Under the Floodway Expansion Project and current Operating Rules, such extreme conditions will occur during a flood event of about 1 in 120 year magnitude or greater, i.e., floods greater than 1997 flood.

Legislation recently passed by the Province of Manitoba (Bill 23) provides financial compensation for property owners to the extent that they are adversely affected by water levels above natural pre-Floodway water levels resulting from operation of the Floodway during spring floods. This legislation applies to operation of the Existing Floodway as well as operation of the Expanded Floodway.

Emergency conditions during the summer in 2002 and 2004, reflecting both high levels of the Red River in Winnipeg and the threat of severe thunderstorms, resulted in summer operation of the Existing Floodway to lower water levels within the City of Winnipeg to offset the potential extensive effect on sewer systems and related basement flooding (from sewer backup) caused by summer rain storm induced floods. During construction of the Project, operation of the Floodway during summer has the potential to cause serious disruption in construction activities resulting in material delays and costs. Accordingly, prior to construction of the Project, Manitoba/MFEA plan to define conditions under which emergency summer operation of the Floodway could be allowed to occur during construction, after due consideration of effects on construction schedules and tender documents.

Future summer operation of the Floodway after construction of the Floodway Expansion could also be used to protect infrastructure in the City of Winnipeg, and would not in any way be dependent on modifications associated with the Floodway Expansion.

Regulatory Review of the Projects

Environmental and Licensing Processes

Before the Project can be built, both federal and provincial regulatory requirements will need to be met and the necessary approvals obtained. In broad terms, federal and provincial regulatory requirements for the Project are coordinated through a cooperative assessment process which respects each government's relevant legislation. Manitoba's requirements for environmental licensing review are set out in The Environment Act (Manitoba). The Project is a Class 3 Water Development, as defined in the Classes of Development Regulation 164/88, under The Environment Act (Manitoba). Canada's requirements are set out in the Canadian Environmental Assessment Act (CEAA) and are triggered by the need for authorizations under the Fisheries Act and permits under the Navigable Waters Protection Act (NWPA). As well, Infrastructure Canada will be contributing federal funds to the Project and therefore has a decision-making role in the Project under CEAA. Accordingly, the Project requires a screening level environmental assessment under CEAA.

The Manitoba Minister of Conservation has determined that there will be public hearings for the Floodway Expansion Project which will be conducted by the Clean Environment Commission in accordance with Section 6(5) of The Environment Act (Manitoba). In addition, the federal Responsible Authorities (Infrastructure Canada, the Department of Fisheries and Oceans, and possibly others) will prepare a Screening Report for the Project that will be made available for public review and comment before any final CEAA determination is made.

Regulatory Activities to Date

On July 28, 2003, the Manitoba Floodway Expansion Management Authority (later named MFEA) submitted an Environment Act Proposal Form for the Project to Manitoba Conservation. This document was received by Manitoba Conservation and placed on the Public Registry. A Project Administration Team (PAT) and Technical Advisory Committee (TAC) of provincial and federal representatives were struck to coordinate the cooperative review of the Project.

In August 2003, the PAT released for public comment Draft Guidelines for the environmental assessment of the Floodway Expansion Project. After review of public comments by PAT, the Final Guidelines for the Project were released on February 5, 2004 and placed on the Public Registry. The Minister of Conservation has established a Participant Assistance Program to provide financial assistance to groups or individuals participating in the Clean Environment Commission hearing process.

2.0 PUBLIC CONSULTATION AND INVOLVEMENT

MFEA and the EA Study Team have developed a public consultation and involvement plan (PIP) outlining public consultation and involvement activities being carried out in 2004 for the Project. The Plan was provided to federal and provincial regulators in June 2004. MFEA is committed to developing and implementing ongoing communication with the public after the EIA process is complete.

Public Involvement Objectives

The purpose of PIP activities undertaken for the Project is to provide the public, and particularly those who may be potentially affected by the Floodway Expansion, with early and ongoing opportunities to receive information on, and express their views about, the Project. The PIP activities are also intended to assist in planning of the Floodway Expansion Project, both before and after filing of the EIS documents.

Stages of Public Involvement

Floodway Expansion Project public consultation and involvement activities in 2004 have been organized into four distinct rounds or stages, with the first three of these being completed prior to submitting this EIS:

- **Round One (January/March):** Round One initiated dialogue about the proposed Project, informed the public about the process and schedule for the environmental assessment, provided a description of the Project based on what was known at the time, and identified and confirmed peoples' issues/concerns about the proposed Project. Information obtained from Round One was provided to MFEA, the engineering design team and the EA Study Team early enough in their processes to influence the Project design and the environmental assessment.
- **Round Two (April/May):** During Round Two, MFEA provided information and perspectives on key Project elements to the public including: compensation, water levels, recreation & economic opportunities, mitigation, Floodway Operating Rules, summer operation and ongoing communication beyond the EIA process. This round was intended to provide the public with an opportunity to discuss key project features with the proponent.
- **Round Three (May/June):** Round Three related to the EIA and presented initial EIA findings, in terms of project features, potential effects and potential mitigation. By providing feedback on issues being assessed, public involvement helped focus the EIS.
- **Round Four (September):** Round Four will address the results set out in the EIS documents, including relevant enhancement, compensation, or mitigation measures that have been developed and incorporated in the EIS, and help interested parties and the public through the EIS documentation.

PIP activities have included municipal Councils, local citizen groups, environmental non-government organizations and local residents in the Flood Study Region (Figure 2), including RM's of Morris, Macdonald, Ritchot, Taché, Springfield, St. Clements, East St. Paul, St. Andrews and West St. Paul, in the Towns of Niverville and Morris, and in the Cities of Selkirk and Winnipeg. Three First Nations with a potential interest in the Project (Peguis First Nation, Brokenhead Ojibway Nation, and

Roseau River First Nation) and the Manitoba Métis Federation were invited to discuss the Floodway Expansion Project, and follow-up meetings and relevant environmental assessment activities have taken place, and will continue, with those who express an interest in being involved. To date, the Peguis First Nation and Manitoba Métis Federation have expressed such an interest. Opportunities have also been provided for individuals, organizations, and communities who may or may not be within the Flood Study Region to participate in the PIP.

How Public Input has Affected the Project

Key issues, concerns and perspectives raised during the Floodway Expansion public involvement program have been considered by MFEA and the EA Study Team and where appropriate, have been incorporated into Project design and the environmental assessment process. Notable changes in the Floodway Expansion Project that have been influenced by input received from the public include the following from the public:

- **Groundwater Protection:** Due to groundwater impact concerns, the extent of Floodway deepening was reduced from a maximum of two metres (six feet) to a maximum of 0.6 metres (two feet) in selected reaches of the channel, subject to final design
- **Mitigation fund:** MFEA will set aside a reserve fund to address unanticipated effects, such as potential impacts on groundwater supply, associated with the Floodway Expansion Project. Stakeholders will be involved in developing protocols for implementation of the fund.
- **Drainage:** Improvements were made to the design of agricultural drainage drop structures that are being replaced so they could accommodate enhancement of the local drainage systems.
- **PTH 15:** MFEA is designing for a four-lane structure to replace the existing two-lane structure in anticipation of this work being undertaken in the future.
- **Land acquisition:** Land acquisition requirements for disposal of excavated materials from the Floodway Channel were reduced from over 1000 acres to a maximum of 500 acres and may be further reduced reduced, subject to final design.
- **Recreation opportunities:** As part of the Project planning process, MFEA will undertake discussions with municipalities and interest groups about proposed Floodway recreation projects that would be located in their area.
- **Springhill Ski Facility:** Construction schedules will be adjusted so that the Springhill Ski Facility will not be required to relocate or close its operation during Floodway Expansion construction or operation.
- **Re-use of excavated earth:** MFEA will initiate a process to facilitate access to surplus excavated earth from the Floodway Channel.
- **Involvement in Design:** In response to concerns, MFEA is working with local municipalities and residents in developing detailed plans to raise the West Dyke and in determining the best approach to finalize design of drainage structures in the RMs of Taché, Springfield and, St. Clements, and the Cook's Creek Conservation District.

In addition, MFEA, its engineering consultants and the EA Study Team undertook additional analysis and studies in several areas to assess issues and concerns raised during the public involvement process. For

example, the potential for surface water intrusion into groundwater when the Expanded Floodway is operating during a flood event was examined, with particular emphasis on the area from Birds Hill to Lockport; a second example is examination of effects on ice jams in the Red River downstream of the Floodway, including an independent study that will be available before the end of summer, 2004.

The perception of unequal flood protection was noted for consideration in the environmental assessment, i.e., consideration of the effect of the Floodway Expansion Project on the perception of some people outside of Winnipeg that they are being treated unequally with respect to flood protection. In response to this concern, MFEA will encourage Canada and Manitoba to consider investments in rural flood protection – particularly north of Winnipeg.

As a result of public involvement, MFEA will develop a 3-D virtual-reality floodway simulation to demonstrate the Project's benefits, assist in the public's understanding of the Project and help to prepare for flood emergencies.

Many issues and concerns raised during the public consultation and involvement program were beyond the scope of the Floodway Expansion environmental assessment process as set out in EIS Final guidelines (e.g., issues related to flood management generally and to broadening the scope of the environmental assessment). These out-of-scope issues could only be addressed in a very limited way by MFEA and the EA Study Team.

3.0 OVERVIEW OF THE ENVIRONMENTAL IMPACT ASSESSMENT STUDIES

Environmental Impact Assessment (EIA) studies of the Floodway Expansion Project have been carried out in accordance with EIS Guidelines. Guidelines specify that potential environmental effects of the Project and their significance should be as defined in the CEAA, i.e., focusing on physical and biophysical effects of the Project and associated socio-economic effects which flow from environmental effects.

Project effects were predicted in the EIA studies by comparing (a) what is expected to happen with the Project, and (b) what would be expected if the Project were not developed (i.e., the "baseline", including current and ongoing effects of the Existing Floodway). Ways to reduce the main adverse effects (called "mitigation") and improve positive effects (called "enhancement" measures) were considered. In addition to considering existing projects like the Existing Floodway, cumulative effects also considered potential effects of the Project in combination with other existing and planned projects[3]. Residual effects (effects which remain after mitigation or enhancement measures are considered) were identified and the significance of adverse effects assessed. The EIS also described monitoring studies and follow-up measures that will be carried out if the Project is constructed.

The assessment approach focused on effects of Project construction (including site preparation) and Project operation (including maintenance) both during periods when the Floodway Channel would be inactive and when it would be in active use during Spring flood events. Spring flood conditions considered under active floodway operation regarding major flood events relevant to the Floodway Expansion Project (e.g., 1997 flood magnitude or greater) are both "infrequent" and of "short" duration – nevertheless, the assessment approach examined incremental effects of the Project under such conditions. For environmental assessment purposes, four different major spring flood conditions were examined to reflect a range of operating conditions:

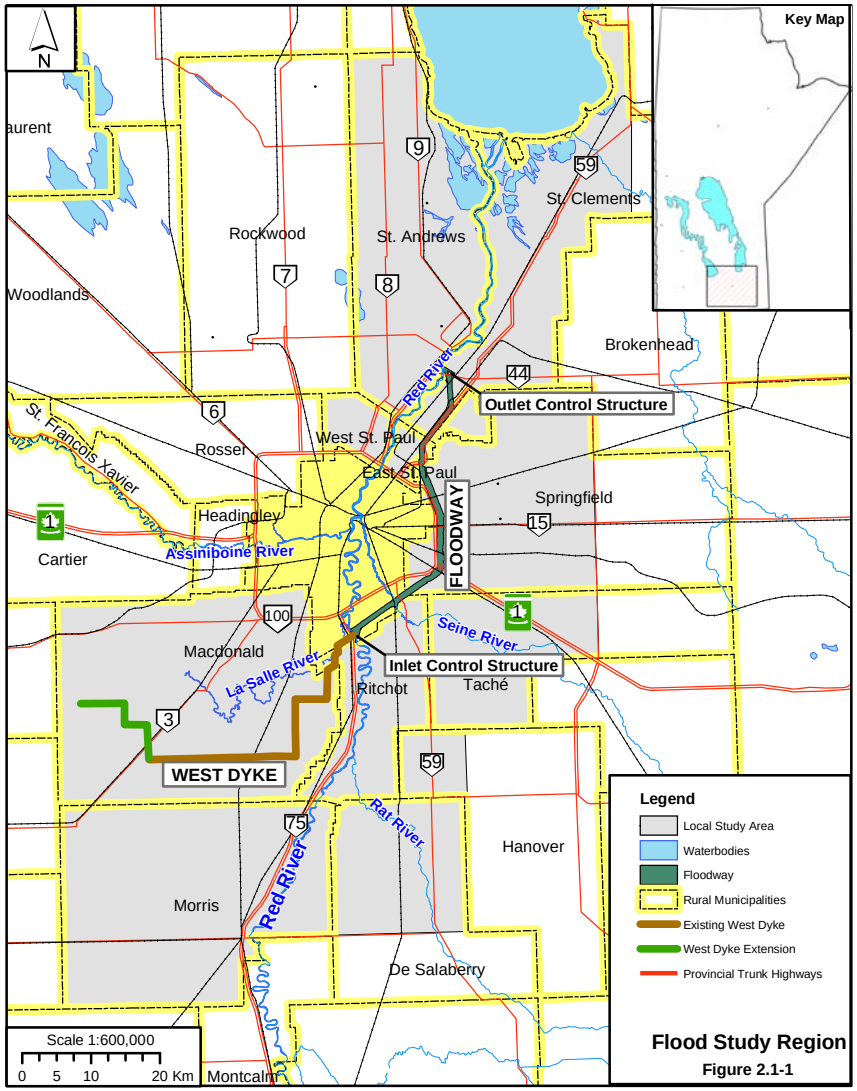
- 1 in 100 year return period flood (similar to 1997 flood and reliable secure design capability of Existing Floodway);
- 1 in 120 year return period flood (approximate flood level under Floodway Expansion when water levels upstream of the Floodway Inlet would rise above "state of nature" levels);
- 1 in 225 year return period flood (approximate maximum design capability of Existing Floodway - not reliable due to submergence of bridges and West Dyke freeboard infringement);
- 1 in 700 year return period flood (approximate reliable design capability of Floodway Expansion Project).

[3]Existing or past projects or activities (for example, the Existing Floodway, the Portage Diversion, the Shellmouth Dam, Seine River Syphon/Overflow, other existing infrastructure in the area of the Existing Floodway, groundwater conditions, flood response management and compensation, and population growth and ongoing regional development) were considered as part of the evolving "baseline" for the assessment. Future projects and activities considered in the cumulative effects assessment (CEA) included summer operation of the Floodway, City of Winnipeg flood protection infrastructure improvements, recreational developments related to Floodway Expansion, compensation legislation and administration, other infrastructure and regional developments, Devil's Lake drainage outlet and Shellmouth Dam upgrade. To be scoped into the CEA relating to assessing any specific environmental component, pathways of effects from other projects and human activities must overlap with the effects pathways identified for the Project with regard to the specific environmental component. Consistent with the EIS Guidelines and *CEAA,* CEA was done integrally and concurrently with all other elements of the EIA, without any explicit distinction between the CEA and other elements of the EIA. Many of the other future projects and activities considered were screened out as not having relevance to Project effects or as being hypothetical.

An overall Flood Study Region for the Project was defined for the EIA based on the maximum geographic extent to which the Project may be expected to have discernable biophysical effects related to water regime changes under any of the above spring flood conditions (see Figure 2).

Changes in operations of the Floodway Inlet Control Structure, including changes in summer operations, can occur under the Existing Floodway as well as the Floodway Expansion Project and cause environmental effects. For example, summer operation with or without the Project may have adverse effects on frequency of higher upstream water levels, bank stability, fish passage, and wildlife in the Channel. In general, the effects of such operation changes are not altered or affected by the Project. If such changes in Floodway operations are proposed in the future, an evaluation of the potential effects of the change will be required and potential opportunities to minimize potential adverse effects will be considered, as will the opportunity for other feasible mitigation measures.

Figure 2: Flood Study Region



Many of these projects were screened out as not having relevance to project effects or being hypothetical. The cumulative effects assessment (CEA) analysis for biophysical components indicated that small negative effects of the Project remained insignificant when the potential cumulative effects of other developments and activities were considered. The CEA analysis also concluded that consideration of socio-economic effects resulting from biophysical effects remained insignificant when considered in combination with other developments and activities.

Although changes in operations of the Floodway Inlet Control Structure, including summer operations, could have ecosystem effects on the fish community by impairing movements at critical times of the year (e.g. during spawning migrations), this aspect of the existing environment (i.e. existing Floodway Inlet Control Structure operation and it's effects to fish) is not altered by the Project. Accordingly, no potential cumulative effects will occur from the Project with regard to fish movement through the Inlet Control Structure.

If the summer operating regime of the Floodway is proposed to change in the future, an evaluation of the potential effects of this change in operation on wildlife in the Channel and potential effects on riverbank stability will require study. Potential opportunities to minimize potential adverse effects on wildlife will be considered, as will the opportunity for other feasible mitigation measures.

The EIS describes the nature of predicted residual environmental effects (i.e., adverse or positive) of the Project after implementation of mitigation measures and consideration of other past and current projects or activities that could overlap in time and space. Biophysical, socio-economic and cultural environmental components were selected for their direct importance and interest to regulators and stakeholders. Assessment of significance for biophysical and socio-economic residual effects considered criteria in the EIS Guidelines, focusing initially on duration, magnitude and geographic extent. The evaluation of significance also considered other components such as frequency, confidence and specific characteristics of the environmental component (such as resilience and ecological context). In accordance with the intent set out in the EIS Guidelines, environmental effects and their significance were identified as defined in the CEAA. Accordingly, only socio-economic effects caused by a change in the biophysical environment which, in turn, has been caused by the Project are "environmental effects" as defined in CEAA. The assessment approach considered scientific analysis of ecosystem effects along with local and traditional knowledge and available experience in determining the significance of potential effects.

Residual biophysical and socio-economic effects of the Project related to infrequent flood events were each examined separately from other effects (i.e., effects arising during construction or inactive operation of the Project) in order to recognize their special nature. Such flood events tend to be of very short duration and relatively rare in occurrence, however, it remains relevant to assess the significance of any residual effects of the Project related to such flood events (i.e., are such effects "short-term" or "long-term" in duration, and what is their spatial extent and magnitude).

Section 4 summarizes residual effects findings set out in the EIS.

4.0 SUMMARY OF RESIDUAL EFFECTS

While the Floodway Expansion is expected to have effects on the physical, aquatic, terrestrial and socio-economic environments, none of the anticipated adverse effects are expected to be significant, after taking into account project plans and mitigation measures including cumulative effects of future relevant projects. Monitoring and follow-up activities are described elsewhere in Section 6.3.

Residual Effects on the Physical Environment

Categories of the Physical Environment that were considered in assessing residual effects include water regime, groundwater, erosion and sedimentation, drainage, ice process, surface water quality, climate, air quality and noise, and physiography, geology and soils. The physical assessment was done relative to the EIS Guidelines provided and for topics of interest to the public. No significant effects on the physical environment are expected from the Project. Effects on the physical environment can be pathways to other biological and associated socio-economic effects.

Water Regime

In order to estimate and illustrate the effects of the Project on water levels and flows, four large flood scenarios were assessed. These four scenarios, the associated peak Red River discharges at James Avenue under natural conditions, and comments on magnitude, are shown in Table 1.

Table 1
Large Floods Used to Assess Effects of Floodway Expansion Project

Return Frequency	Natural Condition Flow at James Avenue		Comment on Magnitude
	Cms	Cfs	
1 in 100 year	4,600	163,000	Similar to 1997 flood
1 in 120 year	4,900	173,000	Larger than 1997 flood
1 in 225 year	5,900	208,000	Approximate design capability of Existing Floodway
1 in 700 year	7,700	272,000	Approximate design capability of Floodway Expansion Project

During construction, the probability of using the Floodway for emergency summer operations will decrease (such operation would disrupt construction and could delay completion of the Project once construction has begun). Therefore, water levels during summer construction periods may be higher in Winnipeg and lower upstream under some flood conditions, although the likelihood of this change in summer operation is difficult to predict due to the variability of weather patterns. The effect is of moderate magnitude, short duration, and low frequency, and is not significant.

Changes in water level due to active spring operation of the Expanded Floodway (the primary purpose of the Project) will vary, depending on the magnitude of flood and the geographic location. For the more frequent floods (less than 1 in 100 year), there is no effect on water

levels within the Flood Study Region other than a decrease of up to 0.3 m (1 ft) within Winnipeg. The major change in water levels occurs within the City of Winnipeg, providing improved protection against events greater than 1 in 225 year floods.

The Project is also expected to provide benefits upstream of the Floodway due to less frequent operation above natural water levels. When operating above natural water levels (for floods greater than 1 in 120 years return frequency), the Project will cause water levels to be about 0.9 m (3 ft) lower than the existing condition at the Inlet, tapering to 0 metres just upstream of Ste. Agathe. In the event the Project must be operated above natural water levels in spring, compensation for upstream flood damage will be provided in accordance with *The Red River Floodway Act*.

Downstream of the Floodway Outlet Structure, flood levels with the Project will be slightly higher than with the existing condition (2 to 4 cm or 1 to 1.5 inches) for most major floods of magnitude between 1 in 100 years and 225 years. This incremental difference is due to slightly increased flows which currently would be stored in the floodplain in the RM of Ritchot due to unnatural flooding. The greatest effect downstream is realized for a very large and low probability event such as a 1 in 700 year flood. Under those conditions, the water level at the Floodway Outlet Structure could be as high as 0.3 m (0.9 ft) above conditions with the Existing Floodway. At this flood magnitude at Lockport, the water level would still be within the banks of the Red River. Further downstream the effect is less, under the 1 in 700 year flood, decreasing to 0.13 m (0.43 ft) in the Lower Fort Garry to Selkirk area, and further decreasing to 0.05 m (1.5 inches) at Breezy Point.

For all areas, effects of the Project (whether beneficial or adverse) on the physical water regime environment alone (i.e., not considering related effects on the biophysical environment or on people) are expected to be of short duration (one to two months), very infrequent, fully reversible, unpredictable as to when they would occur, of regional extent and not significant.

Groundwater

In response to the public's concern with groundwater effects, the engineering team was able to redesign the Floodway Channel (compared to an earlier design concept) to eliminate potential long-term effects on groundwater levels and the need for associated mitigation efforts. This redesign maintained the same design capacity as initially provided with deepening of the Floodway by up to 2 metres (6 ft), and instead widened the Floodway and raised the bridges crossing the Floodway, while limiting any deepening to less than 0.6 m (2 ft) in a few selected areas.

During construction, temporary dewatering of groundwater is expected to occur at the Highway 59, the Highway 15 , CPR Keewatin, and CNR Redditt Bridges and the Winnipeg Water Aqueduct. Field visits may be required to identify wells that may be affected; temporary alternative water supplies may be required. Monitoring of wells will also be required and pumping rates may be reduced based on the results of the monitoring program. The effects would be short-term, lasting only during construction dewatering, and would be reversible as well as limited to a local area. Accordingly, the effects are not considered to be significant.

Potential effects on groundwater quality could occur during construction through the use of hydrocarbons, herbicides and other chemicals. Through the use of Environmental Protection Plans (EPPs), any potential adverse effects associated with chemical use are expected to have a low probability of occurring and would be mitigated when it occurred. The effect will likely be localized and not significant.

Widening of the Floodway could cause a small drop in the water table in some areas but it would not be noticeable outside the Floodway right-of-way. This will be a small adverse effect which is expected to be of long-term duration but in a local area and not expected to be reversible. Because it is not occurring outside the right-of-way, it is not considered to be significant.

There is potential for a drop in the water table elevation at the Bird's Hill/Oakbank Aquifer of 2.6 m (8.5 ft) tapering to 0.6 m (2 ft) at the right-of-way at Oasis Road. This would only occur if a groundwater interconnection is exposed to the Channel due to widening. Further investigation is underway and mitigation will be considered, if required, by using a subsurface cut-off wall to reduce the effect at the right-of-way (ROW) boundary to be negligible. The residual, small, adverse effect would be of long-term duration in a local area and would be considered irreversible. It is not considered to be significant.

When the Existing Floodway is being operated during a large flood event, there is a zone of water infiltration from the surface water into the groundwater. The zone of water infiltration is expected to widen with the Project in proportion to the Floodway widening in the northern third of the Floodway. No additional vertical intrusion of surface water into groundwater is expected. No mitigation is required as the effect is temporary, local and of small magnitude and may be reversible as the channel flow decreases and groundwater discharges back into the Floodway. It is not considered to be significant.

Erosion and Sedimentation

During construction there is potential for increased erosion and sedimentation at the Floodway Outlet. This effect will be mitigated through implementation of a sediment and erosion control plan. It is expected there will be no noticeable change in erosion and sedimentation in the Red River, and the effect is expected to be short-term and temporary, as the riverbank revegetates. This effect is not considered to be significant.

During construction of the Expanded Floodway Channel, for most floods or rainstorm conditions there will be no noticeable effect on total suspended solids (TSS) concentrations in the Red River. There is potential for an increase in TSS concentrations in the Red River in the event of large floods (1 in 33 years or larger) or major rainstorms (1 in 20 year rainfall). With no mitigation, the increased sediment concentrations due to the Project are expected to exceed the Manitoba Objectives; however, they will be within the range of concentrations currently experienced during floods. With the planned mitigation (i.e., a sediment control plan and appropriate construction sequencing to minimize exposure of the Floodway Channel), the magnitude of potential effect will be less than the natural variation of TSS in the River. These events have a low to moderate probability of occurring, would occur for only the duration of a flood event (approximately one month) and would be reversible, therefore not significant.

Since the Inlet Control Structure will be better protected, erosion will be reduced in this location. Erosion will also be reduced in the existing Low Flow Channel which is planned to be protected with rock rip rap. During large flood events, sediment that would have otherwise settled on the floodplain upstream of the Floodway will be carried to Netley Marsh and Lake Winnipeg (no more than about 0.1% of the total load of 1.8 million tonnes per year entering Lake Winnipeg). The effect is regional and permanent, but small in magnitude and therefore not considered significant.

Erosion and sedimentation control features built into the design of the Outlet Structure are expected to reduce downstream wave action to levels that are substantially lower than those that occur from the Existing Floodway in most locations. During a 1 in 700 year flood there will be a very slight increase in velocities on the West Bank of the Floodway immediately north of the Outlet; the potential for erosion will be mitigated by extending the erosion control measures (e.g., riprap or vegetation) on the West bank of the Red River by approximately 1,200 m (0.75 miles) downstream of the Outlet. This effect is expected to be short-term and beneficial, although infrequent. It is not a significant benefit.

Drainage Structures

During construction, potential adverse effects on drainage may occur while each structure is repaired or replaced. With mitigation (e.g., existing drop structures will remain in service while replacements are built), this effect is not expected to be significant.

Most existing drainage structures and associated channels within the Floodway right-of-way will be replaced or modified, and the hydraulic capacity of these drainage structures will be increased to accommodate current 1 in 100 year design flows; the ability to accommodate future upgrading of local drainage systems will be improved at four agricultural drainage sites. Substantial benefit will not be realized unless separate improvements are implemented by responsible agencies upstream. The Seine River Syphon will be maintained. A minor positive effect (investigation of improvements to enhance low flow characteristics during summer months) will occur in the local area and be long term, but not significant.

Improvement to local ditches and a new gated culvert through the West Dyke should improve drainage in that area.

Ice Processes

Compared to the Existing Floodway, the Project is expected to increase the travel times for water through the Floodway by approximately 1 to 2 hours during the rising limb of the hydrograph (i.e., the onset of flood flows when ice-jamming events historically occurred). This would theoretically reduce the water levels at a given time at Selkirk during the rising of the hydrograph; however, this will not change the existing ice jamming frequency at and downstream of Selkirk. The Project may have a theoretical benefit; however, it is minor and not significant.

Climate, Air Quality and Noise

Potential effects on air quality (from emissions of vehicles and dust from vehicular movement along any of the temporarily established roadways) are expected to be local, of small magnitude and of short

duration, therefore not significant. Potential increased noise effects (associated with construction equipment) are expected to be local, temporary and of short-term duration, and therefore not significant. The Project will result in greenhouse gas emissions during construction but it is not expected to have any significant effect on global greenhouse gases.

Climate change could result in decreased frequency in the amount of major spring floods, increased probability of rain-generated floods increasing the likelihood of summer operation for emergency conditions, and more summer flooding due to localized thunderstorms. Independent studies concluded that future climate variability will not change the reliability for the Red River flood protection system.

Physiography, Geology and Soils

The Project will result in a permanent expanded footprint, resulting in a permanent change in the local physiography. This change is unavoidable, however, the excavation and spoil berms are planned to remain within the existing right-of-way. This change will occur throughout the Floodway site area and will be continuous and long-term but not significant.

The excavation of the Floodway will expose additional faces available for Gypsum Rossette collection. The Project will result in a permanent change in physiography. The effect will change throughout the Floodway; it will be local and long-term but not significant.

Residual Effects on the Aquatic Environment

The Project is anticipated to have no significant residual effects on the aquatic environment, either by itself, or in combination with other projects, undertakings or activities in the area.

Surface Water Quality

During the construction phase, it is anticipated that short-term effects to water quality will result primarily from excavation activities and resulting disruption of surface vegetation and soils along the West Dyke ROW drainage ditches and channels and within the Floodway Channel. Increased suspended sediments in Floodway Channel drainage water that is discharged to the Red River, will be mitigated with the application of sound construction practices and appropriate erosion and sediment control (as noted under Erosion and Sedimentation). Routine monitoring of sediment discharge levels associated with construction activities, rainfall events or floodway use will be implemented and erosion and sediment management activities will be modified as necessary (adaptive management) to ensure discharges to the Red River are acceptable to government regulators.

The revegetation plan (a key component of suspended sediment mitigation) requires the use of both fertilizers and herbicides to promote quick establishment of suitable vegetative cover. These chemicals could potentially be leached into the Floodway Low-Flow Channel and be discharged to the Red River. The assessment assumed a worst case of 100% discharge to the Red River, and concluded that the potential concentrations in the Red River (even under these unlikely conditions) will not exceed regulatory criteria.

During the operations phase, the effects to surface water quality due to Project operation are expected to be negligible and are not expected to change compared to Existing Floodway operation. Should the Project result in enhanced recreation use of the Floodway Channel, potential future effects to surface water quality relating to these activities are possible. However, these potential effects on surface water quality resulting from enhanced recreational activities will be managed and will not be cumulative with any potential Project-related effect on water quality.

Aquatic Habitat

Effect of Project construction on aquatic habitat will be primarily associated with the alteration of bottom substrate by the application of riprap along the Floodway Low-Flow Channel (30-35 km of the 48 km length or 18-22 miles of the 29 mile length) and along the Red River shoreline (about 1.2 km (0.75 miles) of shoreline downstream of the Outlet Structure). Although fish occur in the Floodway Channel, that aquatic habitat is not good year-round fish habitat based on observations of fish-kills over-winter in the Low Flow Channel. The application of riprap along the Low Flow Channel to fill-in deep pockets and other erosion-prone habitat areas is expected to reduce the number of fish potentially attempting to over-winter, and thereby becoming stranded, in the Low Flow Channel. Aquatic plants are expected to re-establish along the Low Flow Channel due to consistent water flow from drainage etc., over several years, once a sufficient amount of sediment settles into crevices of the newly deposited riprap.

Since fish are present in the Floodway Channel (and Red River) and aquatic habitat will be altered in some areas, it is anticipated that the

Department of Fisheries and Oceans (DFO) will require habitat compensation for the alteration of the existing fish habitat. Supplemental documentation will provide details of the extent of riprap deposition in the Floodway Channel and shoreline stabilization activities along the Red River shoreline, and proposed fish habitat compensation activities to assure compliance with the "no net loss" DFO policy with respect to fish habitat.

Project operation is not anticipated to affect aquatic habitat beyond effects that occur as a result of the operation of the Existing Floodway.

Lower Trophic Levels and Aquatic Invertebrates

Effects of Project construction on lower trophic level organisms (phytoplankton, algae, and zooplankton) are expected to be primarily related to short-term changes in water quality as a result of increased suspended sediment from excavation activities. However, changes to suspended sediment are expected to be minor or within natural variation. Therefore, resulting effects on lower trophic levels are also anticipated to be minor.

Effects of Project construction on aquatic invertebrate communities are expected to be primarily related to the alteration of bottom substrate due to excavation and riprap deposition. The magnitude and nature of these effects are not predictable, but are likely to be neutral in nature.

Project operation is not anticipated to measurably affect lower trophic level and aquatic invertebrate populations and therefore any effects are expected to be not significant.

Fish and Clam Populations

Project construction-related effects to fish and clams will be primarily related to alterations in fish habitat due to excavation activities and riprap deposition in the Low Flow Channel. It is anticipated that some change to the fish and clam community in the Floodway Low Flow Channel may occur, but given the current occurrence of winter-related fish kills in the Low Flow Channel, these potential changes to the fish community dynamics will not be harmful (i.e. alterations of the Low Flow Channel should reduce the frequency which winter fish kill events occur by discouraging over-wintering in the Low Flow Channel).

The effects of the proposed alteration of the aquatic habitat in the Red River, due to riprap deposition along a limited shoreline area, could result in changes to fish and clam community dynamics in those altered shoreline areas. However, historic fish community studies on the Red and Assiniboine Rivers in the area do not demonstrate a substantive association between fish community and substrate type. The incorporation of detailed shoreline stabilization plans into the Fish Habitat Compensation supplemental documentation will assure application of the "no net loss" principle regarding any harmful alteration, disruption or destruction of fish habitat in affected areas. The application of "no net loss" principles should assure that the Project does not have a habitat-based cumulative effect on fish communities.

No Project operation-related alterations to fish and clam populations, beyond what occurs during Existing Floodway operations, are anticipated during Floodway Expansion operations.

Residual Effects on the Terrestrial Environment

With implementation of mitigation, the Project is not anticipated to have any significant residual effects on the terrestrial environment, either by itself, or in combination with other projects, undertakings or activities in the area in which the Project may have a cumulative effect. No residual effects are expected on Manitoba's Protected Areas.

Potential adverse effects of the Project on plants and wildlife are anticipated to extend primarily to the Floodway site and portions of the West Dyke that would be affected by construction activities. There will be long-term, positive effects associated with implementation of a revegetation plan that will have an associated increase in plant species diversity and, along the Floodway Channel, will replace existing plants with more flood-tolerant species. No species at risk or their habitat were encountered during site investigations in 2004 or during other information collection procedures.

Construction effects on Existing Floodway plant communities and wildlife are not expected to be significant. During construction, plant habitats and their associated organic soils will be temporarily disrupted by excavation equipment along the Floodway and West Dyke. Excavation activities may potentially affect birds (waterfowl and songbirds), mammals and other wildlife (e.g., amphibians) by temporarily disrupting foraging and breeding habitat. Many potential effects will be minimized through sequencing excavation to occur segment by segment over a period of four years, and by clearing and grubbing in the September to April period in the year prior to excavation. Potential adverse effects on plants and wildlife will be mitigated through the immediate implementation of the EPP and revegetation program following each phase of expansion. No effects are expected on plant or wildlife species at risk from the activities associated with construction.

Following the completion of the Floodway Expansion, the revegetation plan will result in the Floodway Channel supporting a more diverse and flood-tolerant plant community that generally provides improved wildlife habitat in the long-term. Vegetation management programs implemented during operations would minimize potential adverse effects through steps such as clearing willows in the September to April period, i.e., outside the breeding bird nesting season. There are currently no effects on species at risk from operation of the Floodway or West Dyke.

After construction, the habitats and communities are anticipated to recover over time. This localized effect is not anticipated to have a cumulative effect with any other anticipated project or activity in the region. No significant cumulative effects on plants or animals are anticipated to be associated with the active operation of the Floodway or West Dyke.

Widening of the Floodway will create a larger amount of "wet meadow" habitat than presently exists during Floodway operation. In addition, for a given floodwater level, active operation of the Floodway Expansion will result in a smaller amount of terrestrial habitat being inundated along the slopes of the Floodway and West Dyke.

In rare flood events not now protected by the Existing Floodway (up to 1 in 700 year flood), the Floodway Expansion would provide extra flood protection to terrestrial ecosystems in the Winnipeg area and north of the West Dyke. The presence of flood tolerant plant species should effectively reduce the extent of plant die-off in flood-exposed zones of the Floodway, creating a more water-resistant and resilient plant community along the Channel that also provides improved erosion control and wildlife habitat.

Residual Effects on the Socio-economic Environment

No significant adverse effects resulting from a biophysical effect caused by the Project, as per the CEAA definition of a socio-economic effect, are expected from the Project.

Resource Use

The Project is expected to have both positive and adverse effects on resource use in parts of the Flood Study Region, with the most pronounced effect occurring near the physical footprint of the Project; further removed from the Project site, effects are expected only during rare, extreme flood events (i.e. floods similar to the 1997 flood or larger).

During the construction phase, it is expected that there will be some short-term disruptions to resource use, particularly agriculture, and residential land use due to changes in traffic flow and other construction inconveniences, as well as temporary suspension of haying or cropping leases on Crown land on the West Dyke and Floodway Channel. With mitigation (e.g., maintaining reasonable access to the Floodway bridges and West Dyke during construction,) effects are expected to be minor and not significant.

During the operation-inactive phase, there would be a minor adverse effect on commercial resource use and residential land use due to acquisition of a small amount of land (approximately 175 hectares (430 acres) in total; affecting 2 to 3 residences in the vicinity of the St. Mary's bridge). This effect is therefore expected to be minor and not significant. A minor positive effect on drainage infrastructure is expected.

During the operation-active phase, it is expected that there will be residual adverse effects on commercial resource use as a result of somewhat higher water levels (less than 0. 3 metres (one foot)) downstream of the Floodway Outlet Structure. However, due to the extremely infrequent nature of these effects (i.e. occurring only in rare flood events), the small change in water levels is expected to have a minor effect on commercial resource use (not significant). For residential buildings, these effects are expected to be rare and small (resulting in a small number of additional residential buildings being flooded i.e. less than ten, and resulting in estimated increases in flood damages of ten per cent or less). To the extent mitigation was not fully effective during the flood event, MFEA is committed to ensuring that compensation is provided to those adversely affected from incremental flooding from the Project. Therefore this residual effect is expected to be minor and not significant with mitigation applied.

No discernible effect on property values as a result of change in flood risk is expected. Flood risk for areas protected by the Floodway Expansion and upstream of the Floodway Inlet Structure is expected to remain the same or to be somewhat lower. For areas downstream of the Floodway Outlet Structure, although flood water levels may be somewhat higher with the Floodway Expansion than for the same flood with the Existing Floodway, this effect is expected to be rare (i.e. occurring only in flood events larger than the 1997 flood) and small (less than 0.3 metres (1 ft) increase in water levels), and based on available literature it does not appear that any discernible changes to property values are likely.

During the operation-active phase of the Project, it is expected that there will be some residual adverse effects on water levels during a

flood event on lands currently held by the Peguis First Nation. These effects are expected to be rare (i.e. discernible only in flood events larger than the 1996 or 1997 flood) and small (approximately 0.1 metres (4 inches) or lower), and not to result in any discernable change in land or resource use by this Aboriginal community. Therefore this residual effect is expected to be minor and not significant.

Economy

The Project is expected to have predominantly positive effects on the economy in the Flood Study Region with the possibility for some local adverse effects that would need to be managed. Most positive employment, business, Gross Domestic Product (GDP) and other economy-related effects of the Project are expected to occur during the construction phase; these effects are not considered to be environmental effects under CEAA. Other, largely positive, effects are environmental effects under CEAA and are expected to occur during rare, large flood events when the Floodway Expansion Project is in operation; these benefits to the economy of the City of Winnipeg and Manitoba and Canada as a whole (i.e., protection of industrial, manufacturing, commercial, and retail infrastructure) are expected to be major (significant). Improved flood protection provides economic benefits to all Manitobans by protecting against potential flood damages in excess of $10 Billion.

Changes in flood protection between the City of Winnipeg and other communities in the Red River Valley due to the Project are not expected to put those other communities at a material competitive disadvantage for development. Flood protection is one of several considerations for those making investment and development decisions and each potential developer would have different perspectives on the relative importance of each factor. On balance, given the considerable improvements in flood protection throughout the Red River Valley since the 1997 flood and ongoing mitigation measures to communicate the high standard of prevailing flood protection in these areas, any change in flood protection between the City of Winnipeg and other communities in Flood Study Region is expected at most to have a small adverse residual effect on the developability of areas outside those protected by the Floodway Expansion Project.

Infrastructure and Services

Potential effects of the Project on infrastructure and services of communities in the Flood Study Region were examined, including effects on transportation and roads, water supply, utilities, police, fire and emergency services and other community services.

During the construction phase of the Project, adverse residual effects on transportation and roads (i.e., increased traffic on alternate routes and increased travel times with traffic detours) are expected to be minor (not significant). During the operation-phase, positive residual effects on transportation and roads during both the operation-inactive and operation-active phase are expected to be minor (not significant).

During the construction phase of the Project, adverse residual effects on water supply due to construction dewatering are projected to be short-term and not discernible following mitigation. Therefore these effects are expected to be negligible (not significant). Potential groundwater effects due to fuel or chemical spills during construction would be managed through an environmental management plan and are

expected to be negligible (not significant). During the operation-inactive phase, any potential effects on groundwater levels due to channel deepening (if it occurs at all, it is expected to be less than 0.6 metres (2 ft), and very localized) will be mitigated (e.g., improving existing wells, drilling new wells or providing access to alternate water supplies); therefore, a negligible (not significant) residual effect is expected.

During the construction phase, adverse residual effects on Police, Fire and Emergency Services (i.e., increased traffic on alternative routes during bridge construction) are projected to be minor (not significant). During the operation-inactive phase, improved access and traffic flow on the modified bridge crossings would provide minor (not significant), positive effect on Police, Fire and Emergency Services. During rare, extreme flood events, operation of the Floodway Expansion would result in lower water levels in the City of Winnipeg, which is expected to have a (moderate) positive effect on emergency response as a result of reduced demand for emergency services. Water levels upstream of the Floodway during rare, extreme events are expected to be either the same or lower, resulting in a (likely negligible) potential positive effect. Water levels near the Outlet Structure may be somewhat elevated during rare, extreme flood events. However, since these incremental effects are expected to be rare, short-term and small (less than 0.3 meters or one foot at most) any related effects on emergency services are considered to be minor (not significant).

During the construction phase any disruptions of access to some community facilities as a result of construction activities is expected to be negligible. During some flood events, operation of the Floodway Expansion could result in changes in water levels (i.e. small lowering of water levels upstream and small increases in water levels downstream). These effects on infrastructure and services are expected to be rare, short-term and minor (not significant).

Personal, Family and Community Life

The Project is expected to have both positive and adverse effects on the personal, family and community life of people in the Flood Study Region. The Project will have the most pronounced effect on the many people living or working in (and having various links with) the Winnipeg area by virtue of increased protection against effects of flooding, allowing Manitoba's economy, services and way of life to continue to function and grow. Adverse effects on people via biophysical pathways in the remainder of the Flood Study Region are expected to be limited to short-term effects during construction and during rare flood events (i.e., generally those larger than the 1997 flood). The operation-inactive phase of the Floodway Expansion is expected to have some positive effects on recreation in the immediate vicinity of the Project site. It is expected that personal, family and community life in the Flood Study Region would be affected by aspects of the Project which do not flow through biophysical pathways of changes (e.g., employment and business opportunities; concerns by some about the fairness of providing greater flood protection to Winnipeg than to certain other communities in the Flood Study Region).

Effects of the Project on personal, family and community life in the Flood Study Region are expected to combine with other relevant future actions that will be carried out in the Flood Study Region (including compensation legislation and administration related to Floodway operation, City of Winnipeg Flood Protection Infrastructure

Improvements, recreational developments related to Floodway Expansion, and the dredging of the Red River downstream of the Floodway Outlet Structure.)

During the operation-active phase of the Project in some rare extreme flood events (generally those between the 1 in 100 year flood to approximately the 1 in 225 year flood), it is expected that reductions in changes to upstream water levels will result in some decreases in artificial flooding and may reduce damages to personal property. There is potential for some small decrease in out-migration during post-flood recovery stages due to decreased flood damage in the RM of Ritchot; this effect is expected to be negligible. Changes in water levels North of the Floodway Outlet Structure are small and expected to have negligible effect on out-migration.

During the construction phase of the Project, there would be short-term disruption of recreation activities along the Floodway Channel. With mitigation (i.e., sequencing of construction such that effects would be limited to one or two seasons in any one segment) means that only minor (not significant) effects are expected. During the operation-inactive phase of the Project, residual positive effects may result from development of additional recreation opportunities along the Floodway Channel, as identified through the call for expressions of interest process; benefits are currently unknown but are expected to be minor (not significant). At the same time, however, a small number of local residents could potentially be affected through increased vandalism of property and disruption by additional recreation activities along the Floodway Channel by non-local recreationists. With mitigation (e.g., involvement of local residents in public consultation regarding proposed recreation enhancements), adverse effect are expected to be minor (not significant).

During the construction phase of the Project, there will be residual adverse effects on the way things look at the construction sites and disposal piles until vegetation is re-established. Effects would be felt most by individuals who live within view of the construction activities and Floodway structures. This effect is expected to be short term and minor (not significant). During the operation-inactive phase, there may be residual adverse effects on the way things look (aesthetics) for residents whose property adjoins the right-of-way of the West Dyke or Floodway Channel (e.g., higher berms). However, no concerns about the aesthetics of the Project were raised during interviews or public involvement processes. The effect is expected to be minor (not significant).

During the construction phase of the Project, minor effects (not significant) on commuters in managing work/family balance could result from somewhat increased travel time due to traffic disruptions, but these will be kept to a minimum through clear communication with commuters, construction sequencing and limiting of traffic detours.

During the construction phase of the Project, effects of any change in health as a result of changes in Emergency Medical Response to accidents in the affected municipalities, specifically in Springfield and St. Clements, is expected to be minor (not significant). During the operation-inactive phase of the Project, no effects on health as a result of changes in groundwater availability or quality are expected with mitigation (e.g commitment to rectify any effects on quantity or quality

of drinking water). During the operation-active phase of the Project, concern was expressed during interviews that feelings among residents of inadequate stakeholder involvement and inadequate compensation legislation would result in increased non-compliance with evacuation orders during a future, rare flood event. Any non-compliance with evacuation orders was felt to increase potential risk to safety of Emergency Responders and individual residents. However, this effect is expected to be rare (i.e. occurring only in flood events larger than the 1997 flood) and only pertain to a very small number of people.

During the construction phase of the Project, there will be a residual adverse effect caused by temporary suspension of agricultural activity (haying and cropping) along the West Dyke and Floodway right-of-way. This disruption is expected to be short-term and affect only a small number of producers and may potentially have a small effect on their daily farming activities. This effect on way of life is expected to be minor (not significant).

During the construction phase of the Project, short-term disruption to traffic on bridges over the Floodway Channel will have residual short-term adverse effects on daily routines and way of life for some local residents and commuters. These effects are expected to be small after considering mitigation measures. Therefore the effect is expected to be minor (not significant).

During the operation-active phase of the Project, the increased potential for some artificial flooding (less than 0.3 metres (1 ft)) during rare, extreme flood events (occurring only in flood events larger than the 1997 flood) north of the City of Winnipeg may affect personal properties and disrupt people's way of life. To the extent mitigation is not fully effective during the event, MFEA is committed to ensuring that compensation is provided to those adversely affected from incremental flooding from the Project. Due to the rare nature of these effects, the small change in water levels and the relatively small number of people who would be affected, it is expected that this adverse effect will be minor (not significant).

Several groups in the Flood Study Region raised concern about not being treated fairly because, with the Project, they would not receive the same level of flood protection as the City of Winnipeg or, in their view, fair compensation for artificial flooding. Manitoba believes their proposed legislation, provides an equal or better level compensation than other jurisdictions in Canada. This potential adverse effect is an indirect, non-biophysical effect and, therefore, not an environmental effect. (as defined for this EIA).

Residual Effects on Heritage Resources

The Project is expected to have no material effect on heritage resources in the Flood Study Region. One area for mitigative measures is identified during construction in a portion of the Floodway Village heritage site located at the west end of the south embankment of the Outlet Control Structure in an area currently crisscrossed with recreation vehicle trails.

The Existing Floodway may have affected heritage resources, and other future activities such as summer operation of the Floodway may also possibly have some effects on heritage resources; however, no new effects are generally expected from the Project in combination with such other activities or projects.

During the construction phase of the Project, excavation of borrow materials for the West Dyke is expected to come from ditches alongside the existing roads once the West Dyke turns away from the La Salle River and, since there are anticipated to be no heritage resource sites in these areas, effects are expected to be negligible (not significant). It is likely that there would be increased traffic near the Outlet Structure both from those working on the construction phase of the Project and interested visitors. Some heritage resources uncovered in vehicle ruts at the site would be protected with gravel or fill cover and, therefore, effects are expected to be minor (not significant).

During the operation-active phase of the Project, changes to water levels and flows could result in either more erosion in some areas or higher water levels in some areas where there are heritage resources. However these effects are expected to be rare (i.e., discernible only during flood events greater than the 1997 flood), small (i.e., a maximum increase in water levels of 0.3 meters at the Floodway Outlet in the 1 in 700 year flood event) and short-term (i.e., persist only during these rare flood events). It is also understood that the proposed modifications to the Floodway Outlet will minimize velocities at the Outlet Structure and that there would be rip-rapping in erosion-sensitive areas near the Floodway Outlet. Therefore, any operation-active phase effect on heritage resources in this area is expected to be negligible (not significant).

5.0 PROJECT SUSTAINABILITY

The proposed Project is an excellent example of sustainable development; a project that balances social and environmental benefits while protecting the welfare of future generations of Manitobans.

Through policy and legislation, Manitoba has adopted seven principles of sustainable development and six guidelines of sustainable development[4]. The Project meets each of these principles and guidelines, primarily through the following:

- the balancing of economic, environmental and social considerations in decision-making about the Project, including consideration of long term implications
- a considered series of studies after the 1997 Flood to examine the issues of flood protection and assess alternatives to address them
- the undertaking of an environmental assessment process to examine ahead of time the potential effects of the proposed Floodway Expansion Project, to identify possible mitigation measures to reduce adverse effects (including through changes in design during the planning phase of the Project), to consider cumulative effects and to identify monitoring and follow-up measures to adapt the Project as necessary
- the involvement of the public in studies to examine alternatives before selecting the Floodway Expansion Project, as well as in the environmental assessment process
- participation in the regulatory process, with an opportunity for the public and governments to formally review the EIS
- the approach to Project construction (e.g., emphasis on limiting environmental effects; rehabilitation of areas temporarily disturbed during construction; including the four 'R's' in tender documents).

Manitoba is also developing strategies under the Manitoba Land and Water Strategy; four of seven individual strategies (each consisting of a series of policies) have been adopted. The Project is consistent with relevant policies under Manitoba's Water Policies pertaining to water quality, conservation, use and allocation, water supply, flooding, drainage and education. The Project is also consistent with mineral policies (with respect to borrow areas) and with natural lands and special places policies. Forest policies are generally not considered relevant to the Project.

[4]The seven principles of sustainable development are integration of environmental and economic decisions; stewardship; shared responsibility and understanding; prevention; conservation and enhancement; rehabilitation and reclamation; and global responsibility. The six guidelines are efficient use of resources; public participation; access to information; integrated decision-making and planning; waste minimization; and research and innovation.

6.0 GOING FORWARD

Anticipated Regulatory Review Activities

The submitted EIS will be placed on the provincial Public Registries and the Federal Registry in order to be available for public review and comment. It is anticipated that a TAC meeting will be held shortly after the submission of the EIS to assist TAC members in their review of the submission and to receive comments from TAC representatives. After an initial 60-day public review period for the EIS submissions, it is anticipated that the PAT may request certain supplementary information from MFEA.

Copies of the submitted EIS will also be provided to all parties who have applied for funding assistance to participate in the Clean Environment Commission (CEC) hearing It is anticipated that decisions about these applications will be made by the Minister of Conservation so as to enable these parties to participate effectively in the 60-day public review and comment period.

Following PAT review of any supplemental information requested from MFEA, it is anticipated that the CEC will announce the final time frame for public hearings on the proposed Project. The CEC may develop procedures and draft schedules prior to this time.

After completion of the hearings, the CEC will release its report to the Manitoba Minister of Conservation. The Manitoba Minister of Conservation will make a decision regarding provincial licensing of the Floodway Expansion Project. Independent of this action, federal authorities will apply the provisions of CEAA and make a decision regarding the issuance of federal approvals such as Fisheries Act authorization for alteration of fish habitat and approvals under The Navigable Waters Protection Act. In this process, the federal authorities are expected to issue a Screening Report, for public review, before making any federal decisions. During this decision-making process, it is expected that both governments will undertake appropriate consultation.

Public Involvement

In the Public Consultation and Involvement Plan, one more stage of public engagement is planned prior to the CEC hearings. Round Four will address the results set out in the EIS, including any enhancement, compensation, or mitigation measures that have been developed and incorporated in the EIS designed to assist the public understanding .

Monitoring and Follow-up

Environmental Protection Plans (EPPs) will be developed after licensing and prior to construction, in accordance with the EIS Guidelines. The EPPs will set out commitments by MFEA to a program of environmental protection and monitoring of biophysical and socio-economic effects. These documents will be guides to MFEA (and contractors during construction) in implementing environmental protection and monitoring measures for the Project. Monitoring and follow-up commitments pertaining to relevant biophysical and socio-economic effects of the Project are discussed in the EIS.

Monitoring will be undertaken for the following reasons:

- To ensure compliance with environmental protection measures during both construction and operations phases
- To assess the effectiveness of mitigation and enhancement measures during both construction and operations phases
- To provide timely information to assist in management of effects, particularly in cases where actual effects are uncertain
- To confirm actual effects, identify any unanticipated effects, and provided appropriate mitigation as required.
- To confirm effectiveness of compensation and compensation mechanisms, and make adjustments if required.