6. Public Consultation

6.1 Introduction

The Guidelines for the Preparation of an Environmental Impact Statement (EIS) for the Red River Floodway Expansion Project (EIS Guidelines) (Appendix A) required that the Manitoba Floodway Authority (MFA) provide the details of the overall public consultation plan for the Project. The EIS Guidelines also required that the EIS describe:

- the role of community contacts in the consultation program;
- the use of any communications tools employed;
- the frequency and outcome of any events employed; and
- the plans for any ongoing consultation following completion of the environmental assessment.

The MFA was also required to describe how concerns and issues raised by the public were incorporated into the development of the Project including its design, effect mitigation and monitoring (Project Administration Team, 2004).

6.2 Public Consultation and Involvement Plan (PIP)

According to the MFA, the Public Consultation and Involvement Plan (PIP) for the Project was intended to provide early and ongoing opportunities for potentially affected and interested parties to receive information on, and express their views about the Project and its effects, measures to mitigate Project effects and the environmental assessment process. The PIP was intended to assist in planning of the Project, both before and after filing of the EIS documents (MFA, 2004a).

The MFA developed the PIP to cover four broad stages or rounds of activity. Three rounds of consultation were completed prior to the EIS being filed and the fourth round was completed following submission of the EIS. A more detailed description of the MFA's public consultation activities is provided in the EIS and Supplemental Filings.

Round One consultation activities were undertaken from January to March 2004. During this round, activities focused on initiating dialogue about the Project, informing the public about the process and schedule for the environmental assessment, describing the Project, and identifying and confirming issues and concerns about both the consultation process and the Project.

Round Two activities were undertaken from April to May 2004. The activities focused on providing information and perspectives on key Project elements such as compensation,

recreation and economic opportunities, water levels, mitigation, floodway operating rules, summer operation and ongoing communications beyond the assessment process.

Round Three focused on presenting the initial findings from the EIS, with a particular emphasis on Project features, potential effects and proposed mitigation measures.

Round Four was undertaken after the EIS was filed in August 2004 and addressed the results provided in the EIS.

6.3 Approaches

The MFA employed a range of approaches for consulting with and involving the general public in the assessment of the Project. These included:

open houses – at 4 to 6 locations during each round of consultation;
stakeholder Workshops – during rounds 1, 3 and 4 with organizations identified as having a particular interest in the Project;
municipal Government Meetings – with various municipal governments in areas potentially affected by the proposed Project, during all four rounds;
individual Stakeholder Meetings – with various stakeholders during all four rounds of consultation;
electronic and Paper Communications – the MFA created a web site to provide current information about the Project and the environmental assessment, and a web site specific to the Project for ongoing communication purposes;
newsletters/Print Materials – providing general information about the Project and the environmental assessment, distributed to local households in the area potentially affected by the Project. Newsletters were prepared during all four rounds of consultation; and
presentations – by the MFA to various groups interested in the Project.

Issues identified through the MFA's consultation activities were recorded in an issues database. This enabled the MFA to follow up on issues to ensure that they were addressed during the development of the environmental assessment. The issues database was also made available to the public through the environmental assessment web site.

6.4 Key Public Issues During Development of the EIS

The MFA summarized the key issues heard during the first three rounds of public consultation into four main groups:

1. effects Related to Floodway Expansion
2. effects Related to the Existing Floodway and Flood Management
3. issues Related to the Floodway Expansion Environmental Assessment and the PIP
4. other Issues

A more detailed discussion of these issues is provided in the EIS and Supplemental Filings.

The MFA indicated that it had considered the key issues, comments and perspectives that arose during the PIP and where appropriate incorporated them into the design of the Floodway Expansion and the environmental assessment. The MFA notes the following changes to the Project design on the basis of input received through the PIP.

- elimination of Floodway deepening in response to concerns about lowering groundwater levels and contamination of wells;
- establishment of a groundwater mitigation fund to address concerns about unforeseen and unanticipated effects on groundwater;
- improvements to drainage drop structures to accommodate increased flows and future growth;
- twinning of Highway 15 to handle increased traffic flows;
- reduction in land acquisition requirements addressing concerns regarding reductions in the property tax base;
- discussions with Rural Municipalities regarding recreation opportunities and to address concerns regarding increased demands on emergency services and nuisance, vandalism and crime which may be associated with recreational use of the Expanded Floodway;
- adjust construction schedule to accommodate Springhill ski facility to address concerns over conflicting uses;
- re-use of excavated earth in response to requests from the public to access excavated earth from the Floodway Channel. MFA has established a series of principles to guide use of the excavated earth;
- involvement in design. MFA has consulted with local municipalities and residents to develop detailed plans regarding the raising of the West Dyke and to determine the best approach for drainage structures in the RM of Taché and the Cook's Creek Conservation District;
- additional analysis in response to issues and concerns raised during the PIP, MFA examined a number of additional areas, including;

    - implications on downstream water levels during a severe flood event of a choke point in the Red River near Lower Fort Garry National Historic Site;
    - potential for surface water intrusion into ground water when the Expanded Floodway is operating during a flood event, with particular emphasis on the area from Birds Hill to Lockport;
    - effects of sediment during construction and operation on the Red River and the need for dredging;
    - effects of expansion on Birds Hill aquifer and measures to minimize influence on ground water; and

- nature of ice jams downstream of the Floodway Outlet and effects on downstream ice jams of Floodway Expansion water levels and flows.

6.5 Key Issues Raised in Comments on the EIS, Supplemental Filings and the CEC Public Hearing

In August 2004, the MFA filed the EIS on the proposed Project and the EIS was made available for public comment. Following submission of comments on the EIS, the PAT requested a supplemental filing from the MFA to further clarify and receive more information on identified issues. The MFA provided its Supplementary Filings in November and December 2004. The Supplemental Filings were also made available for public comment.

The Manitoba Clean Environment Commission (CEC) initiated its public hearing process on February 14, 2005. The CEC process was conducted over 16 hearing days and concluded on March 10, 2005. Weekly summaries of the proceedings are posted on the Commission's web site and transcripts from the hearing are accessible through that web site.

Appendix B provides a summary of the comments received from the public, and federal and provincial review agencies on the EIS and Supplemental Filings, as well as those raised by participants at the CEC public hearing.

7. Aboriginal Communications and Consultation

7.1 Manitoba Floodway Authority

The MFA's public consultation and involvement program involved Aboriginal communities and people that might be affected by or have an interest in the Project. A special initiative was undertaken by the MFA and their environmental assessment team to contact potentially affected or interested Aboriginal communities and peoples, and follow-up with those who expressed a desire to be involved. Three First Nations (Peguis, Brokenhead, and Roseau River) and two Manitoba Métis Federation (MMF) locals (Winnipeg and South East Regions) were initially identified by the MFA as potentially being affected by the Project impacts or as having an interest in the Project (Manitoba Floodway Authority, 2004a).

Introductory letters were sent to the leadership of each organization informing them of the Project and the environmental assessment, and asking if they had any issues, concerns, question or interests relating to the Project. The letter invited them to contact a designated member of the assessment team with their concerns. A copy of the PIP newsletter and the study region map were included to assist in their deliberations. No responses were received to these letters which prompted implementation of a second procedure.

Each organization was contacted by telephone and asked if they had any issues related to the Project and if they were interested in some form of follow-up activity such as a meeting with the assessment team of MFA. Some of the organizations had not seen the introductory letters. The telephone contact process resulted in the Peguis First Nation and the Manitoba Métis Federation (MMF) requesting follow-up meetings. The Peguis agreed to a meeting with the study team and the MFA while the MMF requested a meeting with the MFA.

Representatives of the Peguis First Nation met with representatives of the assessment team and the MFA in April 2004. Information was presented about the Project and the environmental assessment. The First Nation identified various concerns about the Project including:

- potential effects on reserve lands and Peguis traditional activities by added water levels due to operation of the Project;
- potential effects of the Project on the ecological health of Netley Marsh (in particular potential impacts from herbicides, pesticides and fertilizers used in the Floodway) and the ability of the Peguis to use the Marsh for traditional and other activities in the future;
- potential effects on fish and fish movements;

- potential effects of the Project on Red River water quality and quantity in the next thirty years and how this might affect the Peguis' ability to use or develop their future reserve lands in the area;
- mitigation measures that address potential unknown and unanticipated effects that could impinge on the Peguis' resource use rights;
- potential economic opportunities for Peguis First Nation members on the Project;
- lack of consultation by the Province of Manitoba on the Manitoba Floodway Authority Act, and
- that any future agreements related to the Project do not abrogate or derogate Treaty and Aboriginal rights.

This meeting led to others and discussions between designated representatives of the Peguis and the assessment team and the MFA. An outcome of these discussions was creation and implementation of a key person interview program with Peguis members and Elders to gather information about local knowledge about the Peguis reserve and Treaty Land Entitlement lands near the Red River. In September 2004, the MFA met with representatives of the Peguis First Nation to provide an overview of the project and associated environmental effects, as provided in the EIS (which had been filed in August 2004). The MFA has indicated that it is committed to building a positive, ongoing working relationship with the Peguis First Nation and will continue to work with the Peguis on important Floodway-related topics.

In response to invitations from the MFA, the MMF economic development representatives participated in several meetings during the winter and spring of 2004 about discussions with respect to pre-project training for Aboriginal workers and how they would be engaged in construction of the Project. Representatives of the MMF met with MFA senior management in June 2004 to review the Métis people's rights related to the Project, review the status of the Project and identify MMF's expectations for involvement in the EIS and other aspects of the Project. This dialogue between the MFA and MMF will be maintained. Since the filing of the EIS and supplementary information, the MFA has continued dialogue with the MMF on ways to involve the Métis People. MFA has engaged the MMF to conduct three workshops for local Métis.

7.2 Cooperative Environmental Assessment Process

During the course of the cooperative environmental assessment process, First Nations and the MMF were notified of and provided opportunities to participate in the process. The draft EIS Guidelines were provided for review and comment in October 2003, the EIS was provided for review and comment in August 2004 and the Supplemental Filing was provided for review and comment in November and December 2004. The Peguis First Nation also received funding and participated in the Clean Environment Commission Public Hearing.

7.3 Responsible Authorities

In September 2004, an official of Infrastructure Canada attended a meeting of the MFA and the Peguis First Nation to provide an overview of the cooperative review process and the opportunities for participation by interested parties. The subsequent discussion focused on potential impacts of concern to the Peguis First Nation.

Canadian Environmental Assessment Agency and Infrastructure Canada representatives met with Peguis First Nation and Indian and Northern Affairs Canada in March, 2005 to obtain Peguis First Nation views on the EIS of the Project, the potential environmental effects on First Nation lands and interests, and appropriate measures for the management of those effects.

It was suggested that Peguis review the information provided by the MFA regarding increased flows north of the Floodway Outlet Structure. Peguis First Nation identified several additional concerns that are summarized below:

- The CEC public hearing would have benefited from participation by federal departments.
- There is concern that the Project will move water northward faster and thereby exacerbate flooding associated with ice jams.
- Protection of lands of cultural and spiritual interest including St. Peters Church and cemetery lands is important to the First Nation.
- There is concern about the potential destruction of medicinal plants along the riparian zone of the Red River that may be impacted by proposed shoreline protection works.
- The Peguis First Nation emphasized its interest in promoting economic opportunity for members through its land holdings along the Red River.
- It was noted that some of its members fish and trap in the Netley Marsh area.
- The Peguis First Nation reiterated concerns raised during the CEC public hearing that they should receive equal protection from flooding as that being given to the City of Winnipeg.

7.4 Key Issues Raised in Comments on the EIS, Supplemental Filings and the CEC Public Hearing

As noted above, in August 2004, the MFA filed the EIS on the proposed Project and the EIS was made available to First Nations and the MMF for comment. Following submission of comments on the EIS, the PAT requested a supplemental filing from the MFA to further clarify and receive more information on identified issues. The MFA provided its Supplementary Filings in November and December 2004. The Supplemental Filings were also made available to First Nations and the MMF for comment.

The Manitoba Clean Environment Commission (CEC) initiated its public hearing process on February 14, 2005. The CEC process was conducted over 16 hearing days and concluded

on March 10, 2005. Weekly summaries of the proceedings are posted on the Commission's web site and transcripts from the hearing are accessible through that web site. The Peguis First Nation received funding under the Participant Assistance Program to participate in the CEC public hearings.

Appendix B provides a summary of the comments received from the Aboriginal communities, the public, and federal and provincial review agencies on the EIS and Supplemental Filings, as well as those raised by participants at the CEC public hearing.

8. Summary of the Environmental Effects Analysis

8.1 Approach

The following chapters of the Screening Report provide a summary of the potential environmental effects, an outline of the proposed mitigation measures and the significance of any residual effects for the proposed expansion of the Red River Floodway. Cumulative environmental effects of the proposed project in combination with the effects other projects and activities in the Floodway Study Region over the foreseeable future of the Project are also presented. Chapter 8 considers the effects related to the physical environment including the water regime, groundwater, erosion and sedimentation, drainage, ice processes, climate air quality and noise and physiography, geology and soils. Chapter 9 considers the effects related to the aquatic environment, including surface water quality, fish and fish habitat and aquatic species at risk. Chapter 10 considers the effects related to the terrestrial environment, including vegetation, wildlife and wildlife habitat and terrestrial species at risk. Chapter 11 considers effects related to the socio-economic environment including resource use, economy, infrastructure and services, personal, family and community life and health. Effects related to heritage resources are considered in Chapter 12. Chapter 13 considers effects related to navigation. Cumulative effects are considered in Chapter 14 and effects of accidents and malfunctions, effects of the environment on the project and effects related to sustainability are considered in Chapters 15, 16 and 17 respectively. A summary of mitigation measures and follow-up actions is provided in Chapter 18 and conclusions are presented in Chapter 19.

For the purposes of the Screening Report, the environmental assessment has considered the environmental effects of the Project in relation to the environmental conditions that currently exist prior to the project being carried out. The existing environmental setting provides an appropriate baseline to identify and assess the potential effects of the proposed expansion. The existing environmental setting includes the existing Floodway in place.

The environmental effects analysis is based on information contained in the EIS and the Supplemental Filings, augmented with information subsequently obtained from the MFA and that presented at the Manitoba Clean Environment Commission public hearing.

Three phases of the Project were considered in this assessment: 1) construction, 2) operation (inactive) and 3) operation (active - Rules 1 to 3 and Rule 4). The operational phase of the project refers to the period following construction of the expanded Floodway. It consists of periods when the Floodway is inactive, that is flows from the Red River are not being directed through the expanded channel and periods when the channel is in use, pursuant to Rules 1 to 4, to divert flows from the Red River around Winnipeg. Mitigation measures and follow-up actions considered include those outlined in the MFA's EIS, Supplemental Filings and subsequent documentation, as well as additional measures proposed by the responsible and federal

authorities. The responsible authorities have considered the appropriateness and likely effectiveness of mitigation measures, the need for follow-up and the significance of any residual environmental effects.

Throughout the EIS and Supplemental Filings, the MFA have proposed the development of a range of plans and actions for mitigating, monitoring and follow-up, as a means of ensuring that the adverse effects associated with the Project are properly addressed. In order to ensure that these plans are developed in a comprehensive and coordinated way, that they achieve the results desired and that the responsible and federal authorities are able to review and respond to the plans in a timely way, the responsible authorities will require the MFA to develop an overall environmental management plan (EMP) for the Project. The purpose of the EMP will be to describe how all of the environmental commitments (including but not limited to mitigation, monitoring and follow-up) outlined in this screening report, the EIS, Supplemental Filings and other documents provided by the MFA will be met during all phases of the Project. The EMP will provide the MFA with a management tool for ensuring that the adverse environmental effects associated with the Project are addressed appropriately. Elements to be addressed by the EMP include:

- Construction Phase Environmental Protection Plans (CPEPP);
- Operation Phase Environmental Protection Plans (OPEPP);
- Environmental Inspection Plans;
- Monitoring and Follow-up Plans;
- Reporting Plans, and
- Any other conditions of the environmental assessment approval and other environmental approvals and related conditions as appropriate.

Further detail on the EMP and its component parts is provided in Appendix C.

8.2 Physical Environment

The EIS presented an assessment of the effects of the Project on the physical environment including the water regime, groundwater, erosion and sedimentation, land drainage, ice processes, climate, and physiography and soils. Further information on these elements is provided in the EIS and Supplemental Filings.

8.3 Water Regime

8.3.1 Introduction

The EIS Guidelines required the proponent describe the existing surface water regime and how it may be affected by the proposed project. The EIS Guidelines are provided in Appendix A.

8.3.2 Summary of Effects – Surface Water Regime

The MFA examined four large flood scenarios: a 100-year return period event (similar to the 1997 flood), a 120-year return event, a 225-year return event and a 700-year return event. The 1 in 100 year event is similar to and the 1 in 120 year event is greater than the 1997 Flood. The 1 in 225 is similar to the 1826 Flood and represents the maximum capacity of the existing Floodway. The 1 in 700 year event is larger than any flood historically and was selected as the Design Flood based on cost-benefit analysis. The expanded Floodway is not expected to change water flows and levels relative to those events that would occur in the existing Floodway for lower magnitude spring floods. In addition consideration was given to flows expected when the Floodway is operated in accordance with Rule 4 (non-spring emergency operation). Table 2 provides a summary of the predicted differences in water levels at key locations in the flood study region for the each of the four large flood scenarios. Proposed measures to mitigate adverse effects of the water levels are also identified.

8.3.2.1 Construction

The EIS and supporting documentation indicate that construction will not occur during the spring operating season in April and May and thus would not interfere with Floodway operations. As construction proceeds, the capacity of the Floodway will be increased from its current capacity of 2,550 m^3/s to a capacity of 3,960 m^3/s with the Expanded Floodway. The MFA and Manitoba Water Stewardship have indicated that operation of the Floodway in accordance with Rule 4 is unlikely during the construction period since the costs of delay of Floodway expansion exceeds the benefits of operation to prevent sewer back-up in Winnipeg. As a result, the MFA predicts that during the construction phase of the Project, there may be an increased risk of basement flooding in Winnipeg, however, the cost of increased risk of

basement flooding in Winnipeg over 5 year construction period is low compared to the flood protection benefits of the timely completion of the project. In addition, the likelihood of flooding of low-lying areas upstream of the Inlet will be reduced during this phase. The MFA concludes that these residual effects are of moderate magnitude, short duration, of low frequency.

The MFA is proposing the preparation of a Construction Phase Environmental Protection Plan (CPEPP) that will describe the surface water conveyance and management measures to be implemented during the Project's construction phase. The CPEPP will integrate both temporary and permanent measures representing the best available technologies that are economically achievable.

8.3.2.2 Operation – Inactive

The MFA indicates that the Project will not have any effect on the water regime in periods when the expanded Floodway is not in active use.

8.3.2.3 Operation – Active

The MFA predicts that water levels at the Floodway Inlet would remain the same as the existing Floodway for floods less than the 100-year return period as defined by Operating Rule 1 (see Table 2). Since the expanded Floodway would allow more water to be diverted through the Floodway Channel and less through the City of Winnipeg at the same water level at the Floodway Inlet, water levels in Winnipeg would be reduced by up to 0.3 m during the high range of Rule 1.

In the event of a 100-year return frequency flood, the MFA predicts that water levels at the Floodway Inlet would be 0.3 m lower, tapering to no effect on water levels at St. Agathe. Water levels in Winnipeg would be about 0.3 m lower and water levels downstream of the Floodway Outlet would be about 0.02 to 0.08 m higher.

For the 120-year return frequency flood, water levels from Morris to Ste. Agathe would be unaffected by the Project. Water levels at St. Adolphe would be approximately 0.3 m lower than would occur for a comparable flood with the existing floodway and 0.75 m lower at the Floodway Inlet. Within Winnipeg, the MFA predicts that the water levels would be approximately the same as the baseline condition. Downstream of the Floodway Outlet, water levels would be about 0.02 to 0.08 m higher than the baseline.

During a 1:225 year flood, the MFA predicts that water levels from Morris to the United States border would be unaffected. For communities immediately upstream of the Floodway Inlet (i.e. Grande Pointe, St. Adolphe, Niverville), water levels would be reduced by 0.9 m. At the Floodway Inlet, the water level would be reduced by slightly more than 1 m. Water levels in Winnipeg would be unchanged; however, the freeboard on the West Dyke would be increased and no bridges crossing the Floodway Channel would be submerged. At and downstream of the Floodway Outlet, water levels would increase by a maximum of 0.06 m, due to reduced ponding in the RM of Richot, upstream of the Floodway Inlet.

Table 2. Summary of Peak Water Levels Along the Red River Under Flood Scenarios

Table 2 – Summary of Peak Water Levels Along the Red River Under Flood Scenarios

Location		Maximum Water Level (ft)												Proposed Mitigation Measures
		1 in 100-Year Flood			1 in 120-Year Flood			1 in 225-Year Flood			1 in 700-Year Flood			
		Existing Floodway	Expanded Floodway	Difference (Exp-Ext)	Existing Floodway	Expanded Floodway	Difference (Exp-Ext)	Existing Floodway	Expanded Floodway	Difference (Exp-Ext)	Existing Floodway	Expanded Floodway	Difference (Exp-Ext)	
Emerson	Upstream of Floodway Inlet Structure	792.81	792.81	0	793.00	793.00	0	793.81	793.81	0	794.54	794.54	0	Sandbags to property owners downstream of the Outlet Structure during large flood events. Compensation under the Red River Floodway Act for artificial flooding during operation under Rules 1 to 3. Compensation by Manitoba Water Stewardship for flooding caused by Floodway operations under Rule 4. Purchase of low-lying properties subject to flooding due operations under Rule 4, south of the Inlet Control Structure. Lowering of the gates to mimic the natural reduction of river levels.
Letellier		787.27	787.27	0	787.29	787.29	0	788.30	788.30	0	789.08	789.08	0	
St. Jean Baptiste		784.37	784.37	0	784.04	784.04	0	785.00	785.00	0	785.59	785.59	0	
Morris		783.17	783.17	0	783.06	783.06	0	783.47	783.47	0	784.32	784.32	0	
St. Pierre-Jolys		781.26	781.26	0	780.90	780.90	0	782.20	782.20	0	783.01	783.01	0	
Rosenort		783.08	783.08	0	782.97	782.97	0	783.32	783.32	0	784.12	784.12	0	
Aubigny		781.20	781.20	0	781.13	781.13	0	781.47	781.47	0	782.21	782.21	0	
Brunkild		783.19	783.19	0	783.01	783.01	0	783.43	783.43	0	784.12	784.12	0	
Avonlea Corner		778.08	778.02	-0.06	777.74	778.02	0.28	778.79	778.35	-0.44	779.37	779.37	0	
Ste. Agathe		776.07	776.07	0	776.00	776.00	0	778.77	777.15	-1.63	779.26	779.26	0	
Niverville		773.82	773.44	-0.38	773.90	773.38	-0.52	778.42	775.80	-2.62	778.59	778.59	0	
St. Adolphe		772.59	772.14	-0.46	773.24	772.18	-1.06	778.31	775.40	-2.91	778.38	778.38	0	
Grande Pointe		770.92	769.75	-1.17	772.38	770.10	-2.28	778.13	774.70	-3.43	778.00	778.00	0	
Floodway Inlet (Turnbull Dr.)		770.52	769.56	-0.96	772.26	769.80	-2.46	778.07	774.57	-3.50	777.91	777.91	0	
James Avenue	Through Winnipeg	752.06	750.89	-1.17	751.99	752.27	0.28	752.27	752.30	0.03	760.56	755.30	-5.26	
North Perimeter Bridge		748.72	748.10	-0.62	747.97	748.23	0.26	748.52	748.59	0.07	755.58	751.54	-4.04	
St. Andrews Church		741.08	740.91	-0.16	740.94	741.31	0.36	742.75	742.91	0.16	747.70	746.92	-0.79	
St. Andrews Lock & Dam		738.81	738.91	0.10	739.01	739.44	0.43	741.37	741.57	0.20	745.47	746.00	0.52	
Red River at Floodway Outlet		738.42	738.58	0.16	738.68	739.07	0.39	741.11	741.31	0.20	744.82	745.70	0.89	
Lower Fort Garry	Dowstream of Outlet	729.53	729.59	0.07	729.66	729.92	0.26	731.27	731.40	0.13	734.06	734.48	0.43	
Selkirk Bridge		729.53	729.59	0.07	729.66	729.92	0.26	731.27	731.40	0.13	734.06	734.48	0.43	
PTH 4 Bridge		726.67	726.74	0.07	726.80	727.03	0.23	728.22	728.35	0.13	730.68	731.00	0.33	
Breezy Point		721.06	721.06	0.00	721.10	721.16	0.07	721.65	721.69	0.03	722.97	723.13	0.16	
Under Rule 4, water levels at the Inlet Control Structure are not allowed to exceed elev. 760 ft., in order to maintain water levels below the top of bank. The Floodway would not be operated until the river levels in Winnipeg are expected to rise to or above 14 ft JAPSD. The operation is not allowed to achieve a river level of less than 9 ft JAPSD, recognizing that when the river flows are decreasing that this level will eventually be reached.														

Source: MFA, 2004a

Notes:

Frequency relationships relative to natural flow a James Avenue

Water levels upstream of the Inlet Control Structure for the 1 in 225 year – existing Floodway are at 778 ft, however this level upstream of the Inlet for existing conditions carries unacceptable risk to the flood protection works.

Water levels in the City for the 1 in 700 year flood – expanded floodway are controlled at 2 ft above the 24.5 ft JAPSD which accounts for either permanent or emergency temporary raising of the Primary Dykes.

For the 700-year return period flood, the MFA predicts that water levels upstream of the Floodway Inlet would be unaffected. Within Winnipeg, water levels would be reduced by 1.5 m. At the Floodway Outlet, water levels are predicted to be 0.27 m higher, but would remain within the banks of the Red River. From Lower Fort Garry to Breezy Point, water levels are predicted to increase between 0.13 to 0.05 m. Water levels would be higher downstream since water is being conveyed in the expanded Floodway Channel instead of being partially stored in the Winnipeg floodplain.

Figures 8.1 and 8.2 in Section 8 and Annex F of the Supplemental Filings illustrate the geographic extent of flooding under the various scenarios considered.

The MFA proposes to provide additional sandbags to downstream properties affected by the incremental increase in water levels caused by the Project. In the event that the Project must be operated above natural water levels, compensation for flooding, both upstream and downstream of Winnipeg, will be awarded in accordance with *The Red River Floodway Act*. The MFA concluded that these residual effects are of short duration (1-2 months), very infrequent, fully reversible and of regional extent.

Manitoba Water Stewardship has adopted a formal rule (Rule 4) governing decisions to carry out emergency operation of the Floodway to reduce sewer back-up in Winnipeg when significant rainstorms are forecasted upstream while Red River levels are elevated above normal levels. The rule establishes that the operation of the Floodway would not be initiated until the Red River levels in Winnipeg were expected to rise to or above 14.0 feet James Avenue Pumping Station Datum (JAPSD). During operation, the water level at the Floodway Inlet is not allowed to exceed elevation 760 feet, to maintain water levels below the top of riverbank. Figures 13.1 and 13.2 in the Supplemental Filings, illustrate the maximum flooded areas when the Red River level at the Floodway Inlet is at 760 feet. Figure 13.3 in the Supplemental Filings illustrates in more detail, the land affected by this non-spring emergency operation.

The EIS includes an examination of the effects of past instances when the Floodway had been operated in non-spring emergency situations (2002 and 2004), prior to the adoption of Rule 4. In 2002, the Floodway was operated between July 5 and August 4. Raising of the Floodway gates at the Floodway Inlet structure resulted in artificial water levels upstream of the Inlet that reached a peak of 754.9 feet. Natural water levels were calculated to be 749.8 feet and normal summer water level is 734.9 feet. At the time, the natural water level was approximately 16 feet above normal summer levels and the use of the Floodway resulted in a water level approximately 5 feet above the natural level. As noted earlier, the top of the riverbank is at an elevation of 760 feet. Limited flooding occurred upstream of the Inlet Control Structure, principally in low-lying lands affecting market gardens and other croplands. Compensation was provided to property owners who suffered property damage as a result of the artificial flooding due to non-spring emergency operations in 2002.

In 2004, the Floodway was operated between June 10 and July 27. This resulted in artificial water levels upstream of the Floodway Inlet that peaked at 756.6 feet. The natural water level was calculated to be 749.8 feet and the normal water level expected during this period was 734.0 feet. Thus natural level was approximately 16 feet above normal and the artificial level was almost 7 feet above natural. Some flooding again occurred upstream of the Floodway Inlet in low-lying lands affecting market gardens and other croplands. Compensation was made available to local governments, individuals, farm and market garden operations, small business and non-profit organizations that incurred losses or damages as a result of the operation of the Floodway.

Use of the expanded Floodway during non-spring emergencies will be undertaken in accordance with Rule 4 and can be expected to result in effects similar to those experienced during the 2002 and 2004 events. Rule 4 also includes provision for mitigation of the adverse effects of artificial flooding through a program of compensation. This program, to be administered by Manitoba Water Stewardship, is intended to compensate property owners for damages incurred from flooding above natural levels caused by Floodway operation under the rule. Manitoba Water Stewardship has also sought approval from Manitoba Treasury Board for the purchase of low-lying lands (below top of bank) along the Red River south of the Inlet Control Structure that are currently being farmed as market gardens. Some property owners have requested this purchase.

Public Works and Government Services Canada (PWGSC) expressed a number of concerns regarding the impact of operation of the Floodway under Rule 4 on the operation and maintenance of the St. Andrew's Lock and Dam (SALD). Potential concerns include variation in flows that affect the ability of the SALD operators to react quickly enough to prevent damage to the structure. PWGSC indicate that there needs to be improved communication as to how and when the Floodway would be operated under Rule 4, particularly when the flows are receding from flood levels and approaching flows when at which the SALD begins regulation. MFA have indicated that there needs to be ongoing discussion between the operators of the Floodway and the SALD to ensure that there is appropriate coordination among these operations.

8.3.3 Proposed Mitigation, Monitoring and Follow-up

The MFA have proposed the following mitigation measures to address predicted effects to the surface water regime:

- Construction: CPEPP to address surface water conveyance and management;
- Operation – Inactive: no specific measures required;
- Operation – Active: additional sandbags for properties affected by higher water levels downstream; compensation under *The Red River Floodway Act* for properties affected by artificial flooding caused by the Project; compensation in accordance with Rule 4 for properties affected by artificial flooding caused by the

Project and purchase of low-lying property subject to flooding during operation of the Floodway under Rule 4.

MFA have also developed a conceptual level plan for Monitoring and Follow-up (M&F). Separate M&F plans will be prepared for each of the major components identified in the EIS Guidelines. MFA proposes that monitoring and follow-up in relation to the water regime would involve determining the extent of flooding during an event or other physical information about a flood as may be requested by the Manitoba Water Commission or other agency.

8.3.4 Responsible Authority Conclusion

Federal and Provincial departments and agencies, and members of the public made a number of comments regarding the surface water regime. Appendix B provides a summary of those comments by environmental category and issue. Many of the comments received related to the operating rules for the Floodway, the effects of summer operations and artificial flooding. The responsible authorities have considered those comments in assessing the effects of the project and in coming to a conclusion on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects to the surface water regime predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitment to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the surface water regime conclude that the effects are not likely to be significant providing the mitigation measures proposed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to the flow regime contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- In accordance with the EMP, the MFA submits to the RAs for review and approval prior to construction the CPEPP describing how flow regime and surface water conveyance and management issues will be addressed during construction. The CPEPP will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures;
- In accordance with the EMP, the MFA submits to the RAs for review and approval prior to operations of the Project, the OPEPP for addressing flow regime and surface water conveyance and management issues during operations. The OPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures;

- The MFA submits to the RAs for review prior to operation of the Expanded Floodway, the details of the compensation program for artificial flooding caused by non-spring emergency operation under Rule 4. This shall include how the compensation is to be administered and accessed.
- The MFA to develop for review and approval by the RAs a Monitoring and Follow-up Plan describing how the flow regime will be monitored during operation. The MFA should also continue to monitor flows and levels and confirm predictions made in the EIS are accurate. The results of this monitoring should be made available to public.
- The MFA to develop and submit for the review and approval by the RAs a plan for ensuring coordination of the operation of the Floodway and of the St. Andrew's Lock and Dam. This plan is to be developed in consultation with Public Works and Government Services Canada and Transport Canada.
- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required;
- The RAs also encourage the MFA and Manitoba Water Stewardship to advance its program for the purchase of low-lying lands (below top of bank) along the Red River South of the Inlet Control Structure that are currently being farmed as market gardens and which are flooded during operation under Rule 4 and to investigate and act upon cost effective means of protecting low-lying lands that are prone to flooding as a result of non-spring emergency operation under Rule 4.

8.4 Groundwater

8.4.1 Introduction

The EIS Guidelines required that the proponent describe local and regional hydrogeology and how it may be affected by the proposed Project. The EIS Guidelines are provided in Appendix A.

8.4.2 Summary of Effects - Groundwater

The EIS and Supplemental Filings identified potential sources of effects to groundwater as being related to the deepening of the Floodway Channel, temporary construction dewatering around bridge piers, the Winnipeg Aqueduct, and widening of the Floodway Channel, intrusion of Red River water carried in the Channel during flood events into the underlying aquifer and groundwater seepage to the low flow channel. Subsequent to submission of the EIS and Supplemental Filings, the MFA confirmed that the Project would be constructed without a requirement to deepen the Floodway Channel. The MFA has announced that it will not deepen the channel in response to the public consultation program. The capacity of the Channel will remain unchanged from that originally proposed.

8.4.2.1 Construction

The EIS predicts that during construction of the expanded Floodway, groundwater dewatering is expected to adversely affect residential wells in a number of areas.

Near the Highway 59 N Bridge, the MFA determined the drawdown to be less than 1 metre at the RM of East St. Paul wells. The MFA predicts that the effects on groundwater levels will occur for approximately 6 months, occur only during the construction phase, be reversible and local in the area affected. The MFA proposes to monitor and could implement additional mitigation measures such as grouting or recharge of the pumped water back into bedrock aquifer to create a hydraulic barrier to reduce the adverse effect.

At the Highway 15 Bridge, CNR Redditt and CPR Keewatin bridges, the MFA predicts that the dewatering activities will result in a drawdown in local residential wells near the bridges of 1.5 metres or less. The MFA predicts that the effects on groundwater levels will also be local, temporary, reversible and of short-term duration. The MFA proposes mitigation measures such as grouting of bedrock, dewatering one pier at a time, lower pumping rates and supplying an alternate source of water.

At the Winnipeg Aqueduct, the MFA predicts that construction dewatering activities may result in a temporary drawdown of 4 metres in the groundwater levels in nearby residential wells. The MFA predicts that the effects on groundwater levels would be local in extent and short-term in duration. The MFA proposes that these effects be monitored and mitigation measures such as grouting or recharge of the pumped water back into the bedrock aquifer to

create a hydraulic barrier be considered. MFA also suggests that field visits may be required to identify the wells that may be affected and temporary alternate supplies of water may be required. Pumping rates may be reduced as a result of monitoring. It is also proposed to discuss the mitigation options with the affected parties.

The MFA proposes to prepare a CPEPP to prevent groundwater effects as a result of construction. The Plan will be prepared following detailed design and it will present construction methods to prevent groundwater effects such as seepage, construction site dewatering, blowouts, aquifer interconnection and surface water intrusion situations, and monitoring and contingency plans. The MFA indicates that the CPEPP will describe:

- procedures for drilling and installation of boreholes, test holes, dewatering and water wells to protect groundwater resources form contamination and prevention of cross aquifer contamination;
- decommissioning of all boreholes, test holes and dewatering wells that are no longer in use;
- maintenance or alternative supply of potable water to supply adjacent lands;
- procedures to prevent blowouts during excavation;
- provide groundwater source protection in terms of both quality and quantity and recognize vulnerable or sensitive aquifer zones and wellhead protection zones; and
- decommissioning of bridge piles and piers.

The EIS also predicts a potential effect on groundwater quality associated with use of hydrocarbons, herbicides and other chemicals during construction. This effect may occur as a result of accidents or malfunctions during construction. The MFA proposes to mitigate these potential effects through adoption of good management practices for handling these materials. The Construction Phase Environmental Protection Plan (CPEPP) will be prepared to further describe these measures. The CPEPP will address procedures for proper storage, good fuelling practices, and spill response and cleanup. The MFA concluded that these effects would be small and local in extent.

8.4.2.2 Operation - Inactive

The MFA predicts that the widening of the Floodway channel through the Birds Hill/Oakbank area will result in a drop in the water table elevation of 2.6 m, tapering to 0.6 m at Oasis Road. A subsurface cutoff wall will be constructed by the MFA to reduce the effect of widening on groundwater seepage into the low flow channel during the inactive phase of the Project. The MFA also indicated that it had considered the installation of a liner to address groundwater seepage into the floor of the Floodway Channel. The MFA indicated that there were a number of practical problems with installing a floodway liner and that the pressurized nature of the aquifer would make it difficult to maintain the liner in place. The MFA also noted that construction of a liner would require deeper excavation in to the channel, increasing the risk to groundwater. As a result, the MFA concluded that the installation of a liner would be impractical and not cost-effective.

In order to address public concerns regarding potential impacts on groundwater, the MFA has announced a five-point program for groundwater protection. The program includes:

- No deepening of the Floodway Channel;
- Low Flow Channel protection – measures to strengthen, armour and fill in erosion spots to re-establish the grade of the Low Flow Channel;
- Environmental mitigation fund - $11 million fund to mitigate any unanticipated, isolated environmental effects, including groundwater protection;
- Ongoing monitoring – in partnership with Manitoba Water Stewardship and local authorities, adoption of a monitoring and adaptive management approach to identify and respond to any unpredictable adverse effects regarding groundwater. Key principles include:
    - a focus on sensitive spring areas;
    - focus on the bedrock aquifer, but also includes the sand and gravel aquifer;
    - consisting of multiple wells into bedrock or other granular zones;
    - establishment of secure wells for on-going monitoring;
    - facilitate both monitoring and pumping of affected groundwater if required.
- Community Liaison – establish a Community Liaison Committee to provide local residents with updates on the project as well as a venue to raise issues related to the expansion project.

The MFA also notes that it has adopted an overall approach to effects management based on the principles of adaptive management.

The MFA predicts that with the implementation of mitigation measures, that the effects of channel widening on groundwater are of long-term duration, local in extent and irreversible.

The MFA predicts that during inactive operations a drawdown of the groundwater levels of less than 0.5 metres at the CPR Keewatin Bridge and the Dunning Road Crossing locations is expected to occur. The MFA does not propose any specific mitigation measures, beyond the Groundwater Protection Plan described above. The MFA predicts that the effects are of long-term duration, local in extent and not reversible.

8.4.2.3 Operation – Active

The MFA predicts that during active operation of the expanded Floodway that the zone of surface water infiltration is expected to widen in proportion to the widening of the Floodway Channel in the northern third of the Floodway. The MFA predicts that no additional vertical intrusion of surface water will occur. The MFA proposes to implement the Groundwater Protection Plan described above. The MFA predicts that the adverse effects on groundwater during active operation will be temporary, local in extent and likely reversible.

8.4.3 Proposed Mitigation, Monitoring and Follow-up

As outlined above, the MFA have proposed a series of measures intended to address the potential effects to groundwater as a result of the Project. These include a range of measures to be implemented at bridge dewatering sites, CPEPP to address potential contamination due to hydrocarbons, herbicides and chemical spills and a five-point groundwater protection plan.

Separate monitoring and follow-up (M&F) plans will be prepared for groundwater to include post-construction groundwater level monitoring focused on areas where mitigation actions were installed and areas where existing groundwater discharge into the Floodway is taking place. Monitoring of groundwater quality would focus on the western side of the Floodway to verify movement and any effect of surface water intrusion. Follow-up would be taken depending upon the nature and extent of the need.

8.4.4 Responsible Authority Conclusion

Federal and provincial departments and agencies, and members of the public made a number of comments regarding groundwater. Appendix B provides a summary of those comments by environmental category and issue. Comments received related to the effects of the Project on both groundwater quantity and quality and the potential interactions between ground and surface waters. Contamination of groundwater from Red River water during flood events was of particular to concern to RMs north and east of Winnipeg. The responsible authorities have considered those comments in assessing the effects of the Project and in coming to a conclusion on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects to the groundwater predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitment to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects to groundwater which may result from the Project, conclude that the effects are not likely to be significant providing the mitigation measures proposed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to groundwater contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- The MFA develop and provide to the RAs for review and approval prior to construction, the CPEPP dealing with groundwater. The CPEPP shall include the site-specific

groundwater protection plans for all sites where groundwater effects are predicted, including but not limited to the Highway 59 N Bridge, the Highway 15 bridge, CNR Redditt and CPR Keewatin Bridges, the Winnipeg Aqueduct, Dunning Road Crossing and in the Bird's Hill/Oakbank area. These plans shall specify the specific pre and post-construction monitoring, monitoring in respect to floodway operations and mitigation actions that will be undertaken to protect groundwater resources from adverse effects as a result of the Project. The CPEPP shall also outline how the MFA, in consultation with Rural Municipalities, will identify sensitive groundwater areas along the Floodway Channel and develop a model for determining whether further mitigation measures are necessary to ensure these areas are protected from effects as a result of the Project. Use of a health-based risk assessment approach should be considered. The MFA shall report to the RAs how it will address sensitive groundwater areas and the results of the consultations with Rural Municipalities, prior to construction. The CPEPP will also include the MFA's plans for on-going and site-specific groundwater monitoring. This plan shall be provided prior to construction. The plan shall include how the MFA intends to consult with stakeholders during the implementation of the plan. The MFA shall also indicate how the MFA's groundwater monitoring program will relate to the proposed regional groundwater study. The RAs note that this study will be an important component in assisting in addressing cumulative effects associated with the project and support its development and implementation. The CPEPP will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures;

- The MFA will provide for review by the RAs detailed procedures for administration of the mitigation fund, including processes for determining how funds are to be accessed, when and how decisions will be made, contingency plans in the event the fund is exhausted prior to the adverse effects of the project being fully resolved and the MFA's plans for informing the public about the fund and its operation;
- ~~o~~ MFA develop and provide to the RAs for review and approval, procedures for responding to and addressing any complaints regarding potential effects on groundwater received during construction and operation of the Project;
- ~~o~~ In accordance with the EMP, the MFA submits to the RAs for review and approval prior to operations of the Project, the OPEPP for addressing groundwater issues during operations. The OPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures;
- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required.

8.5 Erosion and Sedimentation

8.5.1 Introduction

The EIS Guidelines required the proponent to describe the existing shoreline environment and the rate of shoreline erosion and recession based on long-term monitoring programs, and the nature and extent of existing sediment deposition and shoreline debris. The EIS Guidelines are provided in Appendix A.

8.5.2 Summary of Effects – Erosion and Sedimentation

The EIS and Supplemental Filings indicated that typical sources of effects of the Project related to erosion and sedimentation include:

- removal of soil during the construction of the expanded Floodway, creating the potential for temporary erosion and sedimentation during construction;
- erosion of the Low Flow Channel during use of the Floodway or during the inactive phase when it transports local runoff;
- potential for erosion of the spoil piles and channel side slopes from rain fall/runoff;
- erosion at the Inlet Control Structure and Outlet Structure during construction and operation,
- and
- increase in sediment carried downstream to Lake Winnipeg due to reduced flooding and sediment deposition in Winnipeg.

8.5.2.1 Construction

The MFA predicts that during construction there is a potential for incremental increases in Total Suspended Solids (TSS) in the Red River due to erosion caused by higher magnitude rainfall events. For smaller rainfall events, the EIS predicts that there will be no effect on TSS in the Red River. The MFA indicates that the risk of a five-year rainstorm event occurring during construction is anticipated to be 60%, resulting in a maximum potential increase in TSS of 400 mg/L. The chance of a 20-year rainstorm event occurring during construction is considered to be 18.5%, resulting in a maximum TSS of 700 mg/L. A Sediment and Erosion Control Plan is proposed as a component of the CPEPP. The plan will incorporate guidance from Manitoba Conservation and include the following elements:

- Maps showing the areas on the site to be protected, and the direction of surface water flows;
- Identification of areas requiring special protection, such as surface water bodies or areas susceptible to groundwater pollution;
- A description of temporary and permanent erosion control measures and sedimentation containment measures. This includes a description of materials to be used and installation procedures;

- Standard detail plans for erosion control measures and sedimentation containment measures;
- A discussion of maintenance measures;
- A description of the re-vegetation plan including nutrient and pesticide application;
- A description of emergency plans – responsibilities for identifying emergency situations, contacts for notification, materials available on site, and equipment available on site; and
- Identification of responsibility for plan implementation – an on-site person responsible for all aspects of the installation, maintenance and removal of erosion and sediment control works.

In addition, the MFA indicates in the EIS that the sediment and erosion control plan could include the following best management practices:

- Construction timing and sequencing will be coordinated to maximize excavation while minimizing the time of exposure for newly excavated slopes to less than 30 days before planting;
- Minimize disturbance to adjacent vegetated areas and base of Floodway for buffering suspended sediments;
- Implement surface roughening techniques; and
- Re-vegetate exposed areas directly after finished grade is established and minimize the amount of over-winter exposed surfaces.

General best management practices to be used to manage the effects of excavation include:

- Excavation should be completed from the top down and not from the inside out. This will maximize the vegetation buffer below the excavation;
- When excavating below 1:20 year summer Floodway levels (years 2, 3 and 4), excavate from the outside in and leave an earth plug until the end of the construction period. This will maintain the excavation in the dry and allow for containment of internal sediment during storm runoff;
- Implement slope roughening techniques on exposed side slopes to limit erosion; and
- A silt fence will be maintained around the perimeter of excavated areas.

Additional measures being considered include:

- Installation of silt fencing parallel to the benched areas, allowing 3 to 4 metres of buffer between the toe of the up slope and the line of the silt fence;
- Construction flow interceptor swales at regular intervals cross-slope;
- Permeable sediment barriers; and
- Temporary vegetation seeding.

The MFA proposes to review these possible measures during the preparation of the CPEPP.

At bridges and drop structures, the MFA proposes to place silt fences along the outside edge of the work areas and construct an erosion resistant pad with coarse granular or small rock-fill riprap.

Areas will be re-vegetated immediately after excavation and measures will be used to promote fast establishment of plant growth.

The MFA indicates that the magnitude of the predicted increase in TSS, after mitigation and as a result of construction, is expected to be less than the natural variation of TSS, to be short-term in duration and reversible.

The EIS also indicates that there is potential for an increase in TSS concentrations in the Red River in the event of a flood occurring during construction. If a 1 in 33-year or larger flood occurs, the sediment concentration is expected to exceed Manitoba's Water Quality Standards, Objectives and Guidelines. The concentration is expected to be within the range of concentrations historically experienced during flood events. MFA proposes to prepare a Sediment and Erosion Control Plan as a component of the CPEPP. The elements of the Plan are described above. The MFA indicates that the magnitude of the effect after mitigation is expected to be less than the natural variation of TSS, to be short-term in duration and reversible.

MFA predicts that there is potential for increased erosion and sedimentation at the Outlet Structure during construction. It is proposed to prepare a Sediment and Erosion Control Plan as a component of the CPEPP. The elements of the Plan are described above. At the Outlet Structure, the MFA also proposes a number of measures that may be used to mitigate potential erosion effects. These include:

- isolation of the construction area from the Red River;
- use of silt fences and low level weirs for filtration and sedimentation; and
- completion of the work before spring to avoid soil exposure during spring and summer.

Should spring flooding occur during construction, the MFA proposes the following additional measures:

- maintaining vegetation in the base of the Floodway Channel;
- building the Project in sequential segments to minimize the amount of time the given area of soil is exposed; and
- re-vegetating as excavation proceeds instead of waiting until excavation is complete.

The MFA predicts that the effects of increased erosion and sedimentation due to spring flooding during construction are expected to be short-term in duration, local in extent and reversible.

The MFA indicates that there is potential for sediment from the construction of the West Dyke to affect downstream waterways. It is proposed to prepare a Sediment and Erosion Control Plan as a component of the CPEPP. The elements of the plan are as described above. The MFA predicts that the effects are expected to be short-term in duration, local in extent and reversible.

8.5.2.2 Operation – Inactive

The MFA indicates that there could be erosion from the slopes of the Floodway and the disposal piles following construction of the Project when the Floodway is inactive . The MFA proposes to re-vegetate these areas immediately after excavation and the disposal piles will not be steeper than existing piles. The MFA concluded that the effects are small in magnitude, local in extent, long-term in duration and not reversible.

8.5.2.3 Operation – Active

The MFA indicates that there is potential for the Project to change sedimentation and riverbank erosion during active operation of the expanded Floodway Channel . During large flood events sediment that would have settled on the floodplain protected by the Floodway will be carried to Netley Marsh and Lake Winnipeg. MFA predicts the amount of sediment to be no more than 0.1 % of the total load entering Lake Winnipeg. No specific mitigation measures are proposed. The MFA predicts that the effect will be regional in nature, small in magnitude and permanent.

The MFA also indicates that the Outlet Structure may result in a slight increase in velocities on the west bank of the Red River, immediately north of the Floodway outlet. It is proposed to extend erosion control (riprap) on the west bank for a distance of 1,200 metres downstream of the Outlet Structure. The MFA indicates that the residual effects are expected to be short-term and infrequent. In addition, a slight increase in water levels in the region of the Outlet Structure for the larger infrequent events (>100 year return period) will only last for about 1 week. The MFA predicts that this will result in a negligible amount of additional infiltration into the low permeability clays along the riverbanks.

The MFA indicate that operation of the Floodway under Rule 4 may impact riverbank stability both upstream and downstream of the Inlet Control Structure. River levels upstream would be artificially raised above natural levels and downstream river levels would drop following the raising of the inlet gates. The MFA indicate that riverbank stability is controlled by numerous natural and man-made factors, including flood elevations, flow velocities, precipitation intensity and amount, runoff versus infiltration, vegetation cover, soil types and their susceptibility to overall slope movement and erosion and fill placement. The MFA indicate that isolating impacts that could be directly attributable to effects from Rule 4 operations as opposed to other influences is very complex and difficult.

During operations of the Floodway in the summers of 2002 and 2004, the gates were lowered in a controlled way (by approximately ½ foot per day) to mimic the natural reduction in river levels to reduce or eliminate the potential impacts on riverbank stability.

MFA is proposing to implement a long-term monitoring program to evaluate the influences that operations under Rule 4 (as well as other potential non-emergency summer operations) may have on riverbank stability, both upstream and downstream of the Inlet Control Structure. Such a program would form the basis of an adaptive management approach to addressing effects associated with the operation of the Project. The proposed monitoring program would be implemented over an extended period (minimum 10 years) to isolate and identify the potential impacts on bank performance that may be directly attributable to summer flood control. The proposed program would monitor the performance of the riverbank slopes at a number of sites under normal river flows, natural floods (both spring and summer), and summer controlled floods in an attempt to isolate and verify management strategies in respect of the impacts that could be directly attributed to the summer flooding versus natural conditions.

8.5.3 Proposed Mitigation, Monitoring and Follow-up

As detailed above, the MFA have proposed the following mitigation measures to address predicted erosion and sedimentation effects:

- Construction: CPEPP and detailed erosion and sediment control plans;
- Operation – Inactive: immediate re-vegetation, monitoring to ensure effectiveness;
- Operation – Active: no specific measures identified to address potential changes in riverbank erosion and sedimentation in Lake Winnipeg; rock rip-rapping downstream of the Outlet Structure to protect the west bank of the Red River, long-term monitoring and adaptive management program to address riverbank stability upstream and downstream of the Inlet Control Structure during operations under Rule 4.

Separate M&F plans will be prepared for each of the major components identified in the EIS Guidelines including erosion and sedimentation. MFA proposes that monitoring would be done to evaluate the effectiveness of the sediment and erosion control works. Monitoring would be a combination of visual inspections and possibly water quality sampling during flood events. Depending upon the nature and extent of problems identified during monitoring and the effectiveness of the mitigation measures, additional measures would be implemented to manage sedimentation and erosion associated with operation of the Project.

8.5.4 Responsible Authority Conclusion

Federal and provincial departments and agencies, and members of the public made a number of comments regarding erosion and sedimentation. Appendix B provides a summary of

those comments by environmental category and issue. Comments received in relation to erosion and sedimentation were primarily related to concerns regarding increased potential for riverbank erosion as a result of the Project. The responsible authorities have considered those comments in assessing the effects of the project and in coming to a conclusion on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects related to erosion and sedimentation predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitment to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects which may result from the Project, conclude that the effects are not likely to be significant providing the mitigation measures proposed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to erosion and sedimentation contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- MFA develop and provide to the responsible authorities for review and approval prior to construction, the Sediment and Erosion Control Plan. This Plan shall include site-specific erosion and sediment control plans for all sites where erosion and sedimentation effects are predicted. It must specify the specific monitoring and mitigation actions that will be undertaken to prevent erosion and sedimentation effects as a result of the Project. The Plans shall also describe how the predictive model will be verified with actual data and outline the actions necessary to adaptively manage the adverse effects, should results differ from predictions. The Plan will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures;
- The MFA provide for the review and approval by the RAs its plans for long-term monitoring of riverbank stability in the areas upstream and downstream of the Inlet Control Structure. The plan should also outline any actions to be taken to adaptively manage adverse effects associated with the Project, particularly with operations in accordance with Rule 4.
- In accordance with the EMP, the MFA submits to the RAs for review and approval prior to operations of the Project, the OPEPP for addressing erosion and sedimentation issues during operations. The OPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures;
- The MFA submits to the RAs for review and approval prior to operation of the Expanded Floodway, a Monitoring and Follow-up Plan for erosion and sediment control. The Plan shall describe how the operation of the Expanded Floodway will be monitored and any

corrective actions required, should monitoring identify effects unanticipated by this assessment.

- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required;

8.6 Drainage

8.6.1 Introduction

The EIS Guidelines required that the proponent describe the existing drainage environment and how it may be affected by the Project. The EIS Guidelines are provided in Appendix A.

8.6.2 Summary of Effects - Drainage

The MFA indicates potential sources of project effects on drainage are related to construction of new drop structures and changes in capacity of drop structures. The proposed Project does not include any new drainage structure discharging to the Floodway.

8.6.2.1 Construction

The MFA predicts that the replacement of existing drainage structures may result in effects on the existing drainage while the structure is repaired or replaced. Existing drop structures are proposed to remain operational while the replacement drop structures are constructed. In addition, the MFA proposes to schedule construction in the late fall or early winter when little drainage is taking place. As a result, the MFA predicts that the magnitude of effect will be low, local in extent, short in duration and temporary.

The MFA proposes to prepare a CPEPP to describe the surface water conveyance and management measures that will be implemented during the Project. The Plan will integrate both temporary and permanent measures representing the best available technologies that are economically achievable.

8.6.2.2 Operation – Inactive

The MFA indicates that during the inactive operation phase of the Project, no adverse effects are predicted.

8.6.2.3 Operation – Active

During the active operation phase of the Project, the MFA predicts that during extreme flood events of a magnitude of 1 in 250 years or higher, the three downstream drains will need to be closed to prevent backwater flooding. The MFA proposes to install temporary pumps to pump local drainage into the Floodway during these flood events. The MFA predicts that these effects would be infrequent and of short duration.

8.6.3 Proposed Mitigation, Monitoring and Follow-up

As detailed above, the MFA have proposed the following mitigation measures to address predicted effects to drainage:

- Construction: CPEPP for surface water conveyance and management measures, construction scheduling and maintaining existing structures in place while replacements are installed;
- Operation – Inactive no specific measures; and
- Operation – Active: temporary pumping at closed drains.

The MFA also indicates that plans for monitoring and follow-up with respect to drainage issues would be included in operation and maintenance plans for the Project. The MFA notes that either the MFA or Manitoba Water Stewardship would be responsible to address drainage infrastructure following implementation of the Project.

8.6.4 Responsible Authority Conclusion

Federal and provincial departments and agencies, and members of the public made a number of comments regarding drainage. Appendix B provides a summary of those comments by environmental category and issue. Comments received in relation to drainage were primarily related to concerns regarding the capacity of the drop structures and the adequacy of the structures to meet current and future drainage needs. The Cooks Creek Conservation District made a number of specific recommendations relating to existing and proposed new drop structures, including the ability to lower the outlets of the drop structures in future. The responsible authorities have considered those comments in assessing the effects of the project and in coming to a conclusion on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects related to drainage predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitment to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects related to drainage which may result from the Project, conclude that the effects are not likely to be significant providing the mitigation measures proposed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to drainage contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- MFA develop and provide to the responsible authorities for review and approval prior to construction, the CPEPP detailing surface water conveyance and management measures to be undertaken, including measures in respect of drainage. The CPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures;

- In accordance with the EMP, the MFA submits to the RAs for review and approval prior to operations of the Project, the OPEPP for addressing drainage issues during operations. The OPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures;
- The MFA submits to the RAs for review and approval prior to operation of the Expanded Floodway, a Monitoring and Follow-up Plan for the drainage. The Plan shall describe how the operation of the Expanded Floodway will be monitored and identify any corrective actions required, should monitoring identify effects unanticipated by this assessment.
- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required;

8.7 Ice Processes

8.7.1 Introduction

The EIS Guidelines specified that the EIS describe the existing environmental setting for the Project, including ice conditions and changes during the winter and variability from year-to-year. The EIS Guidelines are provided in Appendix A.

8.7.2 Summary of Effects – Ice Processes

The MFA acknowledges in their EIS that there is considerable uncertainty in predicting under what conditions ice jams will occur. Ice jams have historically occurred on the Red River before and since construction of the existing Floodway. The MFA could not determine any sources of effects from the Project that would affect ice-jamming.

8.7.2.1 Construction

The MFA predicts that construction of the Project would not have any effects on ice jams.

8.7.2.2 Operation – Inactive

The inactive operation phase of the Project would not have any effect on ice jams.

8.7.2.3 Operation – Active

The MFA indicates that the Project is expected to increase the travel times through the Floodway of water by approximately 1-2 hours during the rising limb of the spring flood hydrograph when ice jamming events have historically occurred. The MFA predicts that this will not have any effect on the frequency or severity of ice-jamming at and downstream of Selkirk. No mitigation measures are proposed.

8.7.3 Proposed Mitigation, Monitoring and Follow-up

None identified.

8.7.4 Responsible Authority Conclusion

Federal and Provincial departments and agencies, and members of the public made a number of comments regarding ice processes. Appendix B provides a summary of those comments by environmental category and issue. Comments received in relation to ice processes were primarily related to concerns regarding the potential interaction between the Project and ice-jamming downstream of the Outlet Structure and the potential for ice build-up at the Inlet Structure. The responsible authorities have considered those comments in assessing the effects of the project and in coming to a conclusion on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects related to ice processes including ice-jamming predicted by the MFA and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects related to ice jamming which may result from the Project, conclude that the effects are not likely to be significant. However, the responsible authorities do appreciate the concerns expressed by residents downstream of the Floodway Outlet regarding ice-jamming and would like to see the MFA continue to participate in efforts to educate, inform and advise these residents about ice-jamming. The RAs also encourage the MFA and other stakeholders to continue efforts to identify causes of ice jams and measures that might be employed to prevent their occurrence in the future.

8.8 Climate, Air Quality and Noise

8.8.1 Introduction

The EIS Guidelines specified that the EIS describe general climate conditions with sufficient data provided to predict the effect of the Project on climate and the potential effects of climate on the Project, over time, local air quality potentially affected by the Project, and ambient noise levels in the project area. The EIS Guidelines are provided in Appendix A.

8.8.2 Summary of Effects – Climate, Air Quality and Noise

The EIS examined the effects of the Project on air quality, noise, greenhouse gas emissions (CO_2) and climate change.

8.8.2.1 Construction

Dust

The MFA predicts that potential effects on air quality during the construction phase of the Project will be associated with emissions from construction vehicles and dust effects from vehicular movements along any temporarily established roadways. The MFA proposes to prepare a Dust Control Plan as part of the CPEPP. This Plan would outline dust control practices that will be implemented by the Contractors during construction. The plan is to include the following items:

- cleaning of roadways;
- measures to minimize dust from construction operations;
- hauling of excavated material and backfill;
- measures to address soil stockpiles or spoil piles;
- measures to address asphalt or concrete plants or recycling equipment; and
- measures to address demolition of existing structures.

The MFA predicted the residual effects related to dust during construction to be local in extent, short-term in duration and small in magnitude.

Greenhouse Gas Emissions

The MFA predicts in their EIS that the construction of the Project is expected to result in the emissions of an estimated 40 kilotonnes of CO_2. This represents an average of 10 kilotonnes of CO_2 per year. On an annual basis, this would result in the contribution of approximately 0.05% of the total yearly Manitoba CO_2 emissions. The MFA also examined the effects of changes in land uses as a result of the Project. The MFA predicts these effects to be local, of small magnitude and of short duration.

Noise

The MFA also predicts that construction of the Project is expected to increase noise levels. The MFA proposes to prepare an assessment and plan to address noise effects on neighbouring land users as part of the CPEPP. The MFA will undertake the construction activities in such a way as to minimize noise levels and identify a process for dealing with public complaints during construction. The plan will include:

- equipment maintenance and muffling systems;
- hours of operation; and
- work on statutory holidays and weekends.

The MFA indicates that the effects of noise will be temporary, local and of short duration.

8.8.2.2 Operation – Inactive

The EIS indicates that the inactive operation phase of the Project is not expected to have an effect on climate change, air quality or noise.

8.8.2.3 Operation – Active

The MFA predicts that the active operation phase of the project is not expected to have an adverse effect on air quality, noise or climate change.

8.8.3 Proposed Mitigation, Monitoring and Follow-up

As detailed above, the MFA have proposed the following mitigation measures to address predicted effects to climate, air quality and noise:

- Construction: CPEPP for dust control and noise protection and a process for recording and responding to complaints;
- Operation – Inactive no specific measures; and
- Operation – Active: no specific measures.

8.8.4 Responsible Authority Conclusion

Federal and Provincial departments and agencies, and members of the public made a number of comments regarding climate, air quality and noise. Appendix B provides a summary of those comments by environmental category and issue. Comments received in relation to climate, air quality and noise were primarily related to climate change and the desire for the Project to be carbon neutral. The responsible authorities have considered those comments in assessing the effects of the project and in coming to a conclusion on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects related to climate, air quality and noise predicted by the MFA, measures proposed by the MFA to mitigate those effects, the

MFA's commitment to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects related to climate, air quality and noise which may result from the Project, conclude that the effects are not likely to be significant providing the mitigation measures proposed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to climate, air quality and noise contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- MFA develop and provide to the responsible authorities for review and approval prior to construction, the CPEPP detailing dust and noise control measures to be undertaken during construction. Any assessments of noise or dust levels completed to support the CPEPP shall be provided as well. The CPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures;
- MFA develop and provide to the responsible authorities for review and approval, procedures for responding to and addressing any dust or noise complaints received during construction of the Project.
- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required;
- A report summarizing the complaints received and the actions taken in response to those complaints shall be provided in accordance with a schedule outlined in the EMP to the RAs for information.

8.9 Physiography, Geology and Soils

8.9.1 Introduction

The EIS Guidelines specified that the EIS describe local and regional soil, land use and geology and how they may be affected by the Project. The EIS Guidelines are provided in Appendix A.

8.9.2 Summary of Effects – Physiography, Geology and Soils

The EIS identifies that the primary source of effect on the physiographic environment is as a result in the change in footprint due to the Project.

8.9.2.1 Construction

The EIS identifies that the construction of the Project will result in the need to remove approximately 21 million m^3 of soil. This material is proposed to be disposed of in spoil disposal piles. The MFA indicates that specific mitigation practices for spoil disposal will be identified in the CPEPP. The Project will result in a permanent expanded footprint. The MFA indicates that these effects are expected to occur in a localized area, be long-term in duration and permanent.

8.9.2.2 Operation – Inactive

The MFA indicates that inactive operation phase of the Project is not expected to have any effect on physiography, geology or soils.

8.9.2.3 Operation – Active

The EIS indicates that the active operation phase of the Project is not expected to have any effect on physiography, geology or soils.

8.9.3 Proposed Mitigation, Monitoring and Follow-up

- Construction: CPEPP for spoil disposal;
- Operation- Inactive: none identified;
- Operation – Active: none identified.

8.9.4 Responsible Authority Conclusion

Federal and provincial departments and agencies, and members of the public made a number of comments regarding physiography, geology and soils. Appendix B provides a summary of those comments by environmental category and issue. Comments received in relation to physiography, geology and soils were related to the need to carefully study the area north of the Floodway Outlet to Lake Winnipeg. The responsible authorities have considered those comments in assessing the effects of the project and in coming to a conclusion on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects related to physiography, geology and soils predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitment to monitor and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects related to physiography, geology and soils which may result from the Project, conclude that the effects are not likely to be significant providing the mitigation measures proposed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to physiography, geology and soils contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- MFA develop and provide to the responsible authorities for review and approval prior to construction, the CPEPP detailing the mitigation measures to be implemented during spoil disposal. The CPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures;
- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required;
- The RAs note that there may be opportunities to improve flood protection in the flood study region through the use of excess spoil materials associated with the expansion of the floodway channel. The RAs encourage the MFA to actively explore the use of this spoil material to improve flood protection in the flood study region.

9. Aquatic Environment

The EIS presented an assessment of the effects of the Project on the aquatic environment, including surface water quality, aquatic habitat, lower trophic levels and aquatic invertebrates, fish and clam populations and aquatic species at risk. Further information on these elements is provided in the EIS and Supplemental Filings.

9.1 Surface Water Quality

9.1.1 Introduction

The EIS Guidelines required the proponent to describe the existing surface water quality watercourses, wetlands and other waterbodies and how it may be affected by the Project. The EIS Guidelines are provided in Appendix A.

9.1.2 Summary of Effects – Surface Water Quality

The EIS and Supplemental Filings identified potential sources of effects to surface water as being related to the use of fertilizers (containing phosphorus, nitrogen and potassium), herbicides (glyphosate and 2,4-D amine) or spills of chemicals during construction or maintenance. The potential for sedimentation associated with Project construction and operation was also evaluated.

9.1.2.1 Construction

The MFA predicts that the majority of construction-related impacts to surface water quality will result from mechanical disturbance of the Floodway Channel. Increased sedimentation is predicted to occur as a result of:

- In-stream modification of the Floodway Channel and/or deposition of riprap at selected sites;
- Runoff from newly exposed soils of the excavated Floodway side slopes during rain events;
- Increased suspended sediment from floodwaters flowing over newly excavated land in the Floodway during flood events in the construction years;
- Construction activities related to the extension of the Outlet Structure along the east bank of the Red River, and
- The deposition of riprap along selected shoreline sections of the Red River in the vicinity of the Floodway Inlet and Outlet Structures.

The MFA's analysis suggests that if severe events such as a 1 in 20 year rainstorm or a 1 in 50 year flood occurs without mitigation, then there could be large increases in the sediment concentrations in the Red River. During these events, the MFA predicts that the total suspended solids concentration is expected to exceed the Manitoba Surface Water Quality

Standards, Objectives and Guidelines. The increases would still be within the natural variation in sediment concentrations in the Red River and the MFA proposes the implementation of an extensive erosion control plan to ensure this potential effect is mitigated.

The MFA also considered the potential impacts on surface water quality from spills of hazardous materials used during construction. The MFA proposes the preparation of a Construction Phase Environmental Protection plan (CPEPP) to outline the appropriate construction management practices to be used to prevent spills from occurring and to outline any response and clean-up practices should a spill occur.

The MFA also considered the effects of herbicides and fertilizers used in the re-vegetation of areas disturbed by construction could be released to surface waters. The MFA examined the potential load that could enter the Red River, under worst case conditions where all of the herbicides and fertilizers proposed to be applied washed into the river. This analysis assumed that no plant take-up, soil binding, chemical decay or mitigation measures such as Best Management Practices or the implementation of the CPEPP.

In the case of herbicides, this analysis showed that even if the unlikely worst-case scenario occurred, the concentrations of glyphosate and 2,4-D amine would be well below the lowest surface water guidelines. In the case of fertilizers, the worst-case analysis suggests that the potential increase in annual nitrogen loadings would be about 33 tonnes or less than 0.1% of the mean annual nitrogen loadings in Selkirk. For phosphorous, the worst-case analysis suggested a potential increase of about 71 tonnes or less than 1.4% of mean annual phosphorous loadings in Selkirk. No surface water quality guidelines are specified for nutrients.

The MFA indicates that the application rates will be carefully reviewed after soil testing and the actual rates used will depend upon the species used, the ability to re-utilize topsoil and the timing of seeding. Expected application rates will create a much lower release of nutrients to the river. The MFA also propose the mitigation of the effects of herbicide and fertilizer release with the completion and implementation of the CPEPP. The CPEPP will specify the best management practices to be implemented during herbicide and fertilizer application. As a result the MFA predicts that the effects of construction on surface water quality will be adverse, small in magnitude, short-term in duration and regional in extent.

9.1.2.2 Operation – Inactive

Recreational vehicles use the bottom of the Floodway Channel when inactive. The MFA suggests that the deposition of materials from the use of recreational vehicles (i.e. ATVs, snowmobiles) has the potential to affect surface water quality, but indicate that any deposition would depend upon the extent of use and that this type of use occurs with the Existing Floodway. The MFA notes that any development of future recreational opportunities will need to include a requirement to manage any effects on surface water quality. The MFA indicates that no Project related effects are expected.

The MFA also examined whether mercury concentrations in the Red River would be affected by the Floodway, although it was unable to determine the rate at which the Floodway wetlands are mobilizing mercury, including the bio-active water soluble methyl mercury (MeHg). The MFA notes that the proposed modifications to the Low Flow Channel will result in reduced wetland occurrence, which should decrease water retention time in the Channel. As a result the MFA predicts that the Project is likely to result in a reduction in MeHg production.

Vegetation management/maintenance of the Floodway Channel and West Dyke will occur during this phase of the Project. The MFA indicate that vegetation management is typically a combination of mechanical (mowing) and chemical treatment and that a comprehensive maintenance manual, which will include channel maintenance activities, will be prepared following construction. The MFA indicate that future maintenance of the main channel base would likely follow past practices, including a five-year cycle of mowing any heavy growth in the fall and an application of an approved targeting broadleaf herbicide on the re-growth the following year. The approach proposed by the MFA for addressing vegetation management in drains would also see use of a targeting broadleaf herbicide, licensed for aquatic application. The proposed maintenance manual and OPEPP would outline the measures to be followed during these activities to ensure effects to surface water quality are avoided or minimized.

9.1.2.3 Operation – Active

The MFA suggest that surface water quality will not be changed during operation of the Project, compared to that which occurs with the operation of the Existing Floodway. The MFA also suggest that reduced flooding of industrial areas in Winnipeg will result in a positive effect on surface water quality.

9.1.3 Proposed Mitigation, Monitoring and Follow-up

As detailed above the MFA have proposed the following mitigation measures to address predicted surface water quality effects:

- Construction: CPEPP including Best Management Practices and detailed erosion and sediment control plan;
- Operation – Inactive: OPEPP and Maintenance Manual;
- Operation – Active: None specified.

Separate M&F plans will be prepared for each of the major components identified in the EIS Guidelines, including surface water quality as a component of the Fisheries and Aquatic Ecosystems component. The MFA proposes that monitoring would be done to evaluate the effectiveness of mitigation measures and to verify the accuracy of effects predictions. Follow-up would be implemented depending upon the nature and extent of the need.

9.1.4 Comments on the Environmental Impact Statement, Supplementary Filings and Clean Environment Commission Public Hearings

Federal and provincial departments and agencies, and members of the public made a number of comments regarding surface water quality. Appendix B provides a summary of those comments by environmental category and issue. Comments received in relation to surface water quality were primarily related to concerns regarding the use of herbicides and fertilizers, spills, recreational use of the Floodway Channel and sewage impacts. The responsible authorities have considered those comments in assessing the effects of the project and in coming to a conclusion on the likely significance of the adverse environmental effects.

9.1.5 Responsible Authority Conclusion

Responsible authorities, having considered the effects related to surface water quality predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitment to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects which may result from the Project, conclude that the effects are not likely to be significant providing the mitigation measures proposed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to the surface water quality contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- MFA develop and provide to the RAs for review and approval prior to construction, the CPEPP and Sediment and Erosion Control Plans. These plans should specify the actions being taken to protect surface water quality from impacts associated with construction of the Project. The CPEPP will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures;
- MFA develop and provide to the RAs for review and approval prior to the completion of construction, the Maintenance Manual and OPEPP. These plans should outline the specific actions to be taken with regards to on-going maintenance of the Project and how surface water quality will be protected during these activities. The OPEPP will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures;
- The MFA submits to the RAs for review and approval prior to operation of the Expanded Floodway, a Monitoring and Follow-up Plan for surface water quality. The Plan shall describe how the operation of the Expanded Floodway will be monitored and any corrective actions required, should monitoring identify effects unanticipated by this

assessment. The MFA should also indicate how the interactions between surface water and ground waters will be addressed through the monitoring program.

- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required;

9.2 Fish and Fish Habitat

9.2.1 Introduction

The EIS Guidelines required the proponent to describe the existing water quality, aquatic biological resources and associated habitat in watercourse, wetlands and other waterbodies and how they may be affected by the proposed project. The EIS Guidelines are provided in Appendix A.

9.2.2 Summary of Effects – Fish and Fish Habitat

A number of potential effects of the Project on fish and fish habitat have been identified including:

- Loss of habitat due to extension of culverts, reconstruction of drainage outlets, and elevation and extension of the west dyke embankment;
- HADD of fish habitat from the maintenance and reconstruction of drains entering the Floodway, the Floodway outlet, and the Floodway Low Flow Channel;
- Stranding of fish when floodwaters recede and flows are reduced;
- Effects on fish passage/movement with changes in operations or flows, particularly at the inlet and outlet of the Floodway;
- Mortality of fish from passage through the inlet and outlet structures
- Contributions of potential deleterious substances during construction and maintenance of the drains and Floodway Channel;
- Creation of new potential habitat;
- Increased erosion and bank instability upstream of the Inlet Control Structure;
- Increased erosion along the Floodway channel during construction and downstream of the Outlet Structure, and
- Changes in water velocities and water levels.

9.2.2.1 Construction

Red River Shoreline – West Bank in the Vicinity of the Outlet Structure

The MFA proposes to repair and upgrade 365 m of existing riprap and extend shoreline erosion control along the west bank of the Red River an additional 1,200 m downstream to control bank erosion caused by wave action due to the outlet discharge. Application of riprap to the bank will involve removal of all trees and shrubs currently growing between the low water level and the top of bank. Minor regrading of the bank may also occur. Geotextile fabric will be placed over the slope with riprap overlain on the fabric. The riprap is to be placed from 1 m above the design flood (700 year level 227.4m) to just below the low water level (218.5 m).

During final design the MFA will determine the specific extent of the proposed riprap or other shoreline erosion control techniques (i.e., revegetation using willow cuttings) that may be used on the Red River banks. For the purposes of this evaluation, conservative estimates of

effect have been used pending more detailed design. Conceptually, the Project may therefore involve up to 30,000 m^2 of riprap on the bank above the low summer water level along the 1,200 m of riverbank and about 4,700 m^2 of riprap below the low summer water level. The riprap below water would be placed along the 1,200 m worst-case scenario and the 365 m of existing riprap (assuming a 1-m depth of riprap to occupy a 3-m-wide area of river bottom).

The area affected by this activity is located immediately downstream of the St. Andrews Lock and Dam and is noted for its "*importance in sustaining … recreational fisheries, … their high productive capacity, the sensitivity of certain life stages of the fish species they support."* Therefore, this area is considered to represent critical habitat, as defined by DFO (1998). The results of the field surveys conducted in the area note the west bank of the Red River in this area to be a mixture of grass/herb and shrub/tree vegetation. The instream substrate near the bank varied from soft sand upstream to increasing amounts of gravel, until it was a cobble substrate at the downstream reach of the area.

For this assessment average annual high water level is assumed to be in the area directly below the zone where the terrestrial vegetation on the bank ends and above the silt bench along the shoreline). It is anticipated that vegetation will become reestablished over time and can be encouraged to do so with willow cuttings. Once revegetated, the upper shoreline area would be similar to the existing shorelines and fish utilization of these areas during high water events (spring melt, floods and after summer rainfall events) on the Red River is anticipated to be similar to the current vegetated shoreline. However, as this area is only intermittently wetted, and primarily during the spring melt, this riparian vegetation would only be available as a fish habitat for a short period of time, and generally represents marginal fish habitat.

Riprap applied below the waterline would alter up to 4,700 m^2 of critical fish habitat in the Red River. The most substantive potential structural change in the habitat would occur in the first 400 m downstream of the Outlet area, where sand/gravel types dominate the existing substrate. This potential change may be temporary, since sand substrates generally suggest a depositional area, in which case a layer of sand is expected to eventually cover the riprap and the habitat would return to a state similar to the pre-Project status. In the 800 m downstream of this area, the substrate is dominated by cobble and cobble-gravel substrates to which the modification to a cobble to boulder sized riprap substrate should present less of a disruption. Riprap can provide cover and feeding substrates similar to the cobble present.

In order to mitigate the alteration of this habitat, the MFA is proposing to time construction such that the potential contribution of sediment to the Red River is low (expected to be winter). Sediment and erosion control works are proposed by be installed to assist in reducing the potential for sedimentation during construction. In water construction timing windows for warm water species from July 1 to March 31 shall be observed as required by DFO (no in water works April 1 to June 30).

The shoreline stabilization works will infill habitat and will be considered harmful to the productive capacity of fish habitat. Appropriate compensation would be used to fully address this impact. Potential options and plans for habitat compensation are outlined in Section 9.2.4.

Inlet Control Structure

Construction of the erosion protection at the inlet structure to the Red River is out of water and therefore does not have the potential to directly destroy fish and fish habitat. Sediment can be contributed and therefore, sediment and erosion control measures should be in place prior to and during construction. The CPEPP will outline the specific measures to be employed. In addition, construction will be timed to coincide with low water periods to reduce potential interactions with the river.

Floodway Channel

It is proposed that the Low Flow Channel be regraded and riprapped over a significant portion of its length to prevent future erosion and to allow the channel to drain more efficiently. Temporary alteration of the Low Flow Channel during construction will require dewatering, where water remains or is permanent. Fish may be stranded when dewatering occurs and are proposed to be salvaged and relocated to appropriate habitat within the Low Flow Channel, the Red River or Floodway tributaries.

The upstream reach of the Low Flow Channel, within approximately 8 km of the Floodway Inlet, consists of a very shallow ditch a few metres wide and is considered ephemeral. The remaining downstream reach of the Low Flow Channel receives groundwater discharges, resulting in a more permanent flow. This portion of the Low Flow Channel is considered a Type B drain (in accordance with the draft DFO Drain Classification), with simple habitat and the presence of sport fish species. The outlet control structure limits connection of the Low Flow Channel with the Red River.

For the purpose of this assessment, it is assumed that the entire Low Flow Channel to be regraded and riprapped is composed of softer substrates. The remainder of the area is composed of the native gravel to cobble substrate. The Preliminary Design intends to maintain the current low flow channel width. Within the Floodway Channel, only the Low Flow Channel is to be considered fish habitat. Fish use of this area should not be actively encouraged due the intended function of the Floodway Channel and limited ability to support fish year round.

In the reconstructed condition the Low Flow Channel will remain a structurally simple man-made channel, and as a result the total area of either Drain Type E or B fish habitat present will remain unchanged. The Project is also anticipated to result in a minimum water depth in the Low Flow Channel (defined as the water depth as a result of groundwater seepage only, with no surface water inputs) of about 20 cm (i.e., 18 in.) in the lower reaches of the Low Flow Channel that could potentially be occupied by fish. Better drainage should encourage fish to move downstream through the outlet and reduce the stranding potential

associated with the pools. The aquatic habitat area in the Low Flow Channel to be potentially altered by the Project is estimated to be between 200,000 and 400,000 m^2.

Final calculation of the potential effects of the Project on the amount of aquatic habitat in the low flow channel will need to be completed once the Final Design is available. It is anticipated that, based on a worst-case interpretation of the Preliminary Design information, no net loss of the productive capacity for fish may be achieved by implementing appropriate mitigation and compensation measures. Appropriate compensation would be used to fully address this impact. Potential options and plans for habitat compensation are outlined in Section 9.2.4.

The CPEPP and Sediment and Erosion Control Plans to be prepared by the MFA will outline in more detail, the measures required to reduce impacts to fish and fish habitat during the reconstruction of the Low Flow Channel. These plans will include the water management measures required to deal with dewatering of the Low Flow Channel. The MFA proposes to schedule construction to avoid sensitive time periods

Temporary water control dams will be installed at 250 to 500 m intervals and dewatered between. Pumped water will be discharged downstream or to vegetated areas of the floodplain, filter bags or a splash pad if excessive turbidity is encountered.

Construction to widen the floodway embankment is to be undertaken in lifts with areas stabilized as soon as possible after completion. The construction will not be undertaken in the spring and the floodway will not be operated in the summer during the construction period to reduce the potential for erosion of the construction area.

Reconstruction of the Low Flow Channel will require access routes, which will alter the vegetation in the floodplain. Access points will be stabilized and their locations limited in construction plans to maintain the majority of the vegetation which currently provides stabilization of soils.

In water construction timing windows for warm water species shall be observed July 1 – March 31 as required by DFO (no in water work from April 1 to June 30).

Work near water that requires revegetation will be done during the growing season to allow establishment of vegetation prior to winter. Where disturbed soils near water cannot be revegetated prior to winter, temporary erosion control will be used until vegetation can be established during the next growing season.

Outlet Structure

To accommodate the increased design flow of the expanded Floodway Channel during a major flood event, the Outlet Structure is proposed to be enlarged. The width of the Outlet Structure would be increased by 60 m (for a total width of 100 m). Increasing the width of the

Structure requires the current Outlet Channel to the Red River also being widened by a similar amount.

The modified Outlet Structure will also incorporate energy dissipation structures that will reduce water velocities from the Outlet as they enter the Red River. The expanded Outlet Channel is expected to result in the modification of the east bank along the Red River for approximately 100 m downstream of the existing Outlet Channel. Historic records have noted this to be an area of Walleye spawning and the bathymetric survey suggests the presence of an underwater shelf (potentially suitable for walleye spawning) adjacent to the shoreline. The area is noted by the MFA in the EIS as representing critical fish habitat.

The current area between the Outlet Structure and the Red River is a man-made, mostly intermittent fish habitat that is connected to the critical habitats in the adjacent Red River during active operations and high-flow inactive operations. During these high water events the area should be considered to be a potentially important habitat that is utilized by fish for feeding, growth and migration, as defined by DFO (1998). During lower-flow events much of the area is dewatered and consists of a series of narrow channels through which the discharge from the Floodway Low Flow Channel passes to the Red River. During this period most of the area downstream of the structure becomes marginal habitat, with insufficient depth for many species.

Replacement of the existing structure with the new structure will increase the structure's footprint on the existing aquatic habitat by about 500 m^2. The important fish habitat in this area adjacent to the existing structure will be destroyed in the footprint area of this structure. The remainder of the expanded structure will occur on areas that are not currently fish habitat and no further habitat destruction will occur. This expanded area (about 25,500 m^2) is currently terrestrial habitat that will be available as new fish habitat that is likely to be a mix of marginal/important fish habitat similar to the existing Outlet to Red River area. Appropriate compensation would be used to fully address this impact. Potential options and plans for habitat compensation are outlined in Section 9.2.4.

The existing north side shoreline will be displaced further north by about 100 m and a riprapped shoreline similar to the existing recreated. Walleye spawning activity has been noted to occur along the eastern side of the Red River adjacent to the Floodway Outlet Field surveys detailed in the EIS suggest that this activity may be centered on a unique feature along this bank in the form of an underwater shelf or ledge. The current design is not expected to impinge on this area and thus no adverse effects are expected. The final design will be reviewed to ensure the conservation of this feature.

Temporary alteration of the outlet channel during construction will result in dewatering where water remains or is permanent. Fish may be stranded when dewatering occurs and will need to be salvaged and moved to the Red River. Construction to widen the floodway control structure is to be undertaken in phases maintaining discharge through the floodway. Control of

debris and sediment entry into the channel is important and the MFA propose to prepare a CPEPP to ensure that protection measures are developed and properly employed.

Construction of the new bank and channel downstream of the outlet structure to the Red River shall be undertaken so as not to alter the existing shelf along the east bank of the Red River.

MFA is proposing to complete a CPEPP, which will outline the range of measures to be implemented, including sediment and erosion control and water management measures. Manitoba timing windows (no in water work from April 1 to June 30) will be followed. Work near water that requires revegetation will be done during the growing season to allow establishment of vegetation prior to winter. Where disturbed soils near water cannot be revegetated prior to winter, temporary erosion control will be used until vegetation can be established during the next growing season.

Floodway Drains

Eight drains and associated drop structures flowing into the Floodway Channel are proposed to be expanded in size and drop structures replaced. Channels upstream of the floodway embankment will be relocated and widened to accommodate any increased flow. Each drain discharges to the floodway through an existing drop structure, which will be replaced, with the exception of Cooks Creek Diversion, which will be retained and repaired. Fish may be transferred downstream to the floodway but each drop structure represents an upstream barrier to fish movement. In addition, drainage ditches are located on the landward side and running parallel to the embankment. All of these ditches are Ephemeral in nature and mitigative measures would apply in accordance with DFO's draft Drainage Guidelines (2004).

The characterization of the drains, in accordance with DFO's draft Drainage Guidelines is as follows:

Drains Associated with the Floodway	**DFO Drain Classification**
Seine River	Type A – Complex Indicator
Centreline Drain	Type D – Simple Non-indicator species
North Bibeau Drain	Type E – Ephemeral
Cooks Creek Diversion	Type B – Simple Indicator Species
Kildare Drain	Type E – Ephemeral
Springfield Road Drain	Type E – Ephemeral
Shkolny Drain	Type D – Simple Non-indicator species
Ashfield Drain	Type E – Ephemeral

While no substantive alterations to the Seine River Syphon are proposed, the existing trash rack on the inlet to the Syphon will be replaced with a much larger trash rack. Primarily designed to improve safety near the inlet, the larger trash rack should also reduce the frequency of the rack becoming clogged with debris, improving flows in the Seine River downstream of the siphon. The MFA has made a commitment to the Save Our Seine community group to ensure that the maximum allowable flow enters the Seine River Syphon, with the overflow being delivered to the floodway. Currently, the majority of flow enters the floodway limiting baseflow contributions downstream.

The DFO Drain Maintenance Protocol (2004) notes that typical maintenance activities on Type E (Ephemeral Channels) do not require compensation, while similar activities on Type B and D drains may require a class authorization and/or consultation with DFO. DFO has noted that the small area of alteration upstream of the floodway on these drains would likely not be considered harmful, even on Type B or D drains, dependant on final designs. The area of alteration downstream, within the floodway occurs outside the low flow channel in an area not deemed to be fish habitat. Some ponding of water into the discharge channel may occur but it is not considered by DFO to be harmful or beneficial. A connection should be provided between the outlet channel and the low flow channel of the floodway to ensure that fish can move into the floodway if they are carried downstream.

Construction of drain outlet structures and new conveyance channels has the potential to carry sediment into the floodway. Many of these drains are seasonally dry and construction should be timed to coincide with dry conditions. The MFA is proposing to complete a CPEPP to ensure that the appropriate measures are implemented during construction. Sediment and erosion controls will be required prior to and during construction. The existing channels should be left in place to convey drainage until such time as the new channel and outlet structure are in place and stabilized. The design of the channel upstream of the outlet could include pools or other low velocity structures to provide refuge for fish in an attempt to reduce the potential for them to be carried to the floodway. In water construction timing windows for warm water species shall be observed July 1 – March 31 as required by DFO (no in water work from April 1 to June 30). When the original channel is abandoned, fish may be left stranded. Salvage operations should be undertaken with fish moved upstream, or into the low flow channel of the floodway as appropriate.

<u>West Dyke Drains and Culverts</u>

The MFA is proposing to raise and extend the West Dyke, increasing the footprint of the dyke and requiring the modification of a number of culverts or control structures, which convey overland drainage through, or perpendicular to, the West Dyke. The changes include:

- The extension of six uncontrolled culvert-type crossings;
- Modification of three larger control structures; and
- Construction of a control structure for the new Glenlea Drain.

In addition, raising of the West Dyke will result in the need to raise a number of road crossings. Raising the road crossing will increase the footprint width of the road and require that thirty-four (34) (parallel) culverts be extended. These culverts have the potential to act as barriers to fish movement either through improper installation or due to high velocities that are conveyed through the structure. Modeling of potential barrier effects to local fish species was undertaken by MFA and it was found that all of the existing culverts are potential barriers to fish under most flows.

A series of drainage ditches parallel to the West Dyke will also need to be modified when the dyke is raised. Using the terms contained in the Manitoba Drain Maintenance Protocols (Draft DFO 2004), the raising of the dyke and improvements to the flood drainage system will result in:

- 20 km of ditch maintenance (cleanout).
- 43 km of ditch reconstruction (relocation).
- 8 km of new drain construction (new Glenlea drain south of the West Dyke).

Five borrow pits in various locations will also be created to supply material for the Project.

Sixty-three (63) km, of ditches will be altered, disrupted or destroyed by the project. Based on the classification of the ditches using the DFO Drain Classification (2004), less than 5 km of these ditches involves work in Drain Type B areas. These works would likely require an application for authorization under the *Fisheries Act*. Based on an assumed width of wetted area of 3 m, a maximum of 15,000 m^2 of marginal fish habitat will be affected. Appropriate compensation would be applied to fully address this impact. Potential options and plans for habitat compensation are outlined in Section 9.2.4. The remaining 58 km of drains are considered ephemeral, and as such mitigation measures and best management practices would be required to protect downstream fish habitat.

Construction of 8 km of the Glenlea Drain will create new marginal fish habitat in the area. The Drain is considered a modification of the existing drainage network that drains toward the Red River. It is therefore anticipated that any use of this Drain (Type B Drain Classification) by fish is a displacement of productive capacity from other areas of the drainage network. The new drain is therefore not anticipated to add to the productive capacity of the fish habitats in the area and will not be considered a gain in habitat.

Five borrow areas will result in the creation of 150,000 m^2 of pit area, 70,000 m^2 along Ephemeral drains and 80,000 m^2 along Type B Drains, which can ultimately be turned into aquatic habitat. Appropriate compensation would be used to fully address this impact. Potential options and plans for habitat compensation are outlined in Section 9.2.4.

The design of the replaced or extended culvert crossings should include the requirement to countersink the culvert into the bed of the drain to ensure no barrier to fish movement. Given that modeling has suggested that the culverts may be posing a barrier to fish movement due to velocities, designs should also incorporate measures to decrease velocities where fish passage is required.

Maintenance and reconstruction of the ditches and extension of culverts has the potential to carry sediment into the local drains and ultimately to the LaSalle River. Many of these drains are seasonally dry and construction should be timed to coincide with dry conditions. Sediment and erosion controls will be required prior to and during construction. MFA notes the need to undertake ditch improvements in 1-2 mile segments, with stabilization provided immediately following completion. Provisions for maintenance of the vegetation and erosion controls until stabilization has been successful should be included in the detailed plans.

Wherever practical existing channels should be left in place to convey drainage until such time as the new drains are in place and stabilized. For fish bearing drains in-water construction timing windows for warm water species shall be observed July 1 – March 31 as required by DFO (no in water work from April 1 to June 30).

When the original drainage channel is abandoned or where dewatering is required, fish may be left stranded so salvage operations should be undertaken with fish moved downstream into waterbodies with more permanent flow conditions.

Seine River at Prairie Grove Road

Prairie Grove road currently crosses the Seine River a few hundred metres downstream of the Seine River Syphon discharge point. The roadbed will need to be raised at this point to accommodate the raising of the rail bridge crossing, resulting in a need to alter the current culvert crossing of the Seine River at Prairie Grove Road. The preliminary design concept involves removal of existing culverts and replacing them with a much larger culvert to allow for navigation. The result will be an increase in the wetted width of the river through the crossing and an expected reduction of velocities through the culvert, which should not impede upstream movement of fish. The presence of the Seine River siphon a short distance upstream provides a barrier to any further upstream movements of fish. While the road footprint may be increased depending on final design, resulting in some loss of fish habitat at the embankments, it is expected that the overall crossing will be improved with respect to fish habitat.

A conceptual design of this new crossing has been included in the submission to Navigable Waters and will need to be incorporated into the application for authorization under the *Fisheries Act* and an accompanying fish habitat compensation plan. Potential options and plans for habitat compensation are outlined in Section 9.2.4.

The construction of the crossing has the potential to carry sediment into the Seine River. Construction should be timed to coincide with low flow conditions. Sediment and erosion

controls will be required prior to and during construction. Detailed plans shall be provided for review and comment as part of the application for authorization under the *Fisheries Act*. Provisions for maintenance of the vegetation and erosion controls until stabilization has been successful should be included in the detailed plans.

During construction, flow in the Seine River must be maintained around the construction area. In water construction timing windows for warm water species shall be observed July 1 – March 31, as required by DFO (no in water work from April 1 to June 30).

When the original channel is abandoned or where dewatering is required, fish may be left stranded so salvage operations should be undertaken with fish moved downstream into waterbodies with more permanent flow conditions.

9.2.2.2 Operation – Inactive

Red River Shoreline – West Bank in the Vicinity of the Outlet Structure

There are no changes to the west bank of the Red River in the vicinity of the Outlet Structure that are expected to occur during inactive operations of the Expanded Floodway.

Inlet Control Structure

Under non-operation conditions, the gates on the inlet structure are down, and water passes over the structure with some potential to impede fish passage. Additional studies are underway by the MFA to track movements of fish through the floodway, Red River and inlet structure, Interim results of the tracking study found that walleye, northern pike and channel catfish all moved through the gates, when not in operation.

Floodway Channel

Future conditions of the floodway during inactive operation will be similar to the existing conditions. The intent to regrade the channel to encourage more efficient drainage may decrease fish stranding and encourage movement back to the Red River. Sufficient water depth needs to be maintained within the low flow channel to ensure opportunities for fish to move downstream freely.

Outlet Structure

Modifications to the Outlet Structure may make it slightly less suitable to pass fish downstream to the Red River as the discharge will pass through concrete dissipation blocks and be spread over a wider area with shallower water depth. Concentrating flow toward the centre of the outlet may maintain sufficient water depth to reduce this potential impact. The floodway outlet is a barrier to the upstream movement of fish into the floodway channel under existing and future conditions.

Floodway Drains

No change between existing and future conditions in the drains is anticipated.

West Dyke Drains and Culverts

No changes in operations during inactive operations are expected.

Seine River at Prairie Grove Road

The replacement of the existing culvert with a larger diameter culvert is expected to provide a positive benefit for fish under both operational and non-operational conditions. The commitment by MFA to ensure that the maximum flow through the Seine River siphon is delivered downstream will be a benefit to fish habitat during low flow conditions. No other changes to fish habitat during inactive operations are expected.

9.2.2.3 Operation – Active

Red River Shoreline – West Bank in the Vicinity of the Outlet Structure

Table 2 outlines the expected changes in water levels in the Red River with the Expanded Floodway. Water levels in the vicinity of west bank of the Red River, downstream of the Outlet Structure will increase slightly (up to 0.3m) over the four flood scenarios examined by the MFA. This increase is within the range of typical annual fluctuations. No significant changes to water velocities are predicted by the MFA under normal operating conditions.

Inlet Control Structure

Under operating conditions, the gates are raised and form a barrier to upstream fish movement. Fish can be carried downstream over the inlet structure. Spring operations have been ongoing for over 30 years and effects to fish under this operating condition have been considered as part of the baseline for the purposes of this assessment.

Concerns have been expressed regarding the potential for fish mortality when fish move through the inlet structure under high flows. Sources of mortality are likely related to indirect lethal injuries (i.e., bruising, lacerations and scale loss that result in fungal infections) and gas supersaturation. Indirect or delayed mortality of fish that pass through spillways may also be related to disorientation caused by extreme turbulence with subsequent predation by birds and fish downstream from the spillway. Velocities of less than 15 m/s do not typically result in fish mortality. Velocities are reported to be in the order of 8 m/s at the Inlet Structure during active operation.

The operation of the floodway during Rule 4 results in the raising of the gates at the Inlet Control Structure during non-spring time frames, which prevents upstream fish passage through the Inlet Control Structure. The MFA have determined that under this rule, the floodway could be operated 4 of every 10 years, although still subject to a review and decision on the part of the province. Many of the species in the river, including channel catfish, bass, and forage fish spawn in early summer and may be prevented from reaching suitable spawning grounds. Delayed migration can result in absorption of gametes, reproductive interference and recruitment failure. Locations of spawning areas were not defined as part of the baseline work

done for the EIS. Additional studies are underway by the MFA to track movements of fish through the floodway, Red River and inlet structure. The MFA has committed to developing a Fish Technical Experts Committee to explore issues with respect to fish passage at the Inlet Control Structure.

Floodway Channel

No changes to fish habitat are expected during active operation of the Expanded Floodway.

Outlet Structure

The modifications to the existing Outlet Structure to accommodate flows on the scale of a 1:700 year flood have incorporated chute blocks and baffle blocks (or baffle piers) into the structure. To reduce erosion and channel degradation due to turbulence and excessive water velocities (i.e., between 8 and 12 m/s), these blocks dissipate energy in the high velocity jet flowing over the ogee weir crest. The MFA notes that the incorporation of baffle blocks will reduce excavation and construction costs substantially relative to other proposed outlet design options that require a longer stilling basin to contain and reduce energy in high discharge flows. However the introduction of the chute blocks and baffle blocks raises potential for adverse impacts to fish (injury and mortality) that may be entrained in floodwater flows and passed downstream through the spillway.

Injuries to fish in violently turbulent, high water velocity environments result from a variety of sources. These sources include rapid changes in pressure, excessive shear forces that can cause tissue damage, rapid deceleration, and most importantly with the Floodway Outlet Structure, mechanical injury caused when fish strike solid stationary objects such as chute blocks and baffle blocks. An analysis of the scientific literature suggests that direct mortality and injury rates were less than 1% in environments where jet flow velocities were less than 13.7 m/s and a threshold velocity of 15.2 m/s was established as the upper safe limit for passing fish.

MFA suggest that water velocities will be reduced to much less than 15.2 m/s by energy dissipation appurtenances. As a result direct mortality that may result from high velocity strikes with chute blocks or baffle blocks will be minimized. Velocity magnitude contours for the 100m floodway outlet show maximum water velocities of 13 m/s over the ogee crest, that diminish to approximately 3 m/s directly in front of baffle blocks. Analysis of velocity magnitude contours with chute blocks shows water velocities approximately 10 m/s directly above the chute block, that appear to be more turbulent than the option with baffle piers Fish that strike the chute block would likely hit at an oblique angle with a downward velocity vector much less than 10 m/s. It is therefore unlikely that significant direct mortality will occur as a result of fish passage through the outlet structure after the floodway is expanded.

The velocity profiles suggest that higher velocities will be concentrated in the mid channel as they currently are, leaving the margins with slower water in the area of the walleye spawning habitat. No change to this habitat is expected.

Floodway Drains

Drainage improvements will result in less flooding of lands upstream of the floodway. The upstream barrier effect of the drop structures is an existing condition that will not change with the implementation of the Project. The discharge through the outlet control structures has the potential to cause fish mortality due to turbulence and physical damage to fish on the proposed dissipation structures. The evaluation of mortality effects at the floodway outlet, with much greater velocities, demonstrated that the potential for adverse effect was low. Given that many of these drains were found to be ephemeral, potential adverse effects due to increased velocity of flow are not expected.

West Dyke Drains and Culverts

The increased capacity of the reconstructed ditches and those that have been maintained should see an improved efficiency of water conveyance into the downstream drainage network, reducing the potential for stranding of fish. Existing barriers to fish passage have the potential to be corrected through reconstruction of the existing culverts.

Seine River at Prairie Grove Road

The replacement of the existing culvert with a larger diameter culvert is expected to provide a positive benefit for fish under operational conditions, expecting to reduce velocities and potentially improve fish movement. This is a relatively minor benefit however, as the syphon provides a barrier to further upstream movement.

9.2.3 Proposed Mitigation, Monitoring and Follow-up

As detailed above a number of measures have been proposed to address potential effects on fish and fish habitat. They include:

- Construction: CPEPP, construction scheduling and timing, fish habitat compensation, sediment and erosion control plans, water management plans, fish salvage operations, revegetation and drainage maintenance.
- Operation-Inactive: none specified.
- Operation-Active: Fisheries Technical Experts Committee to examine fish passage issues at the Inlet Control Structure.

MFA proposes to undertake monitoring in accordance with its M&F framework.

9.2.4 Responsible Authority Conclusion

Federal and Provincial departments and agencies, and members of the public made a number of comments regarding the fish and fish habitat. Appendix B provides a summary of

those comments by environmental category and issue. Issues raised included fish and mussel movements, fish stranding and fish mortality, fish habitat alterations and compensation and mitigation options. The responsible authorities have considered those comments in assessing the effects of the project and in concluding on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects to fish and fish habitat predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitments to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects to fish and fish habitat conclude that the effects are not likely to be significant providing the mitigation and compensation measures proposed or to be developed by the MFA, as well as the following additional management actions are implemented:

Fisheries Technical Experts Committee (FTEC)

The MFA is to establish and support a Fisheries Technical Experts Committee with membership/representation from a wide range of disciplines and jurisdictions related to fish and fish habitat. The FTEC would review and provide advice to the Project Oversight Committee on whether the mitigation measures identified in the screening report, EIS and Supplemental Filings, related to fish and fish habitat issues, have been adequately implemented. The FTEC would review and provide advice to the Oversight Committee on all of the plans developed to address fish and fish habitat issues. The FTEC would also examine and provide advice to the Oversight Committee on the further evaluation of fish passage effects and compensation options.

Habitat Compensation Options

The overall conclusion remains that the effects of the project on fish and fish habitat can be adequately mitigated for and that appropriate compensation measures are available to address residual effects such that the 'no net loss' policy of DFO can be achieved.

Detailed design has not been completed for the entire project. Therefore, final HADD determinations cannot be completed. Through the recent submissions (MFA 2005) worst case scenarios have been assumed and mitigation and compensation requirements determined. Details will continue to be developed through the EMP, CPEPP, and the applications for authorizations under the *Fisheries Act*.

Preferred fish habitat compensation priorities and options are listed in DFO (1998) and in order of descending preference are:

1. Create similar habitat at or near the development site within the same ecological unit.
2. Create similar habitat in a different ecological unit that supports the same stock or species.

3. Increase the productive capacity of existing habitat at or near the development site and within the same ecological unit.
4. Increase the productive capacity of a different ecological unit that supports the same stock or species.
5. Increase the productive capacity of existing habitat for a different stock or a different species of fish either on- or off-site.

A number of possible compensation options (listed below) have been suggested to date as a result of the public process associated with the Project, team input or by regulatory agencies. It is proposed that the Fisheries Technical Experts Committee (FTEC) undertake further evaluation of these options. The MFA will be required to undertake the additional studies necessary and provide the information to the FTEC in order for it to determine which options are possible and how they will best satisfy the 'no net loss' requirements of DFO. Possible options include but would not be limited to:

- Restoration of a cut-off part of the Seine River immediately upstream of the Seine River Syphon intake:
- Investigation of the replacement of the LaBarriere Park St Norbert Dam on the LaSalle River.

This dam is one of a series of dams on the LaSalle River which presents an impediment to upstream fish movement during all but very high-river flows (during which times the dams are overtopped and upstream fish movement occurs). The areas immediately downstream of other similar dams on the LaSalle River are known to be over wintering oxygen refuges, therefore the structure, if removed, would need to be replaced with structures, (such as pool and riffles features), that would preserve the winter habitat characteristics of the current dams. Removal of the LaBarriere Dam has the potential to allow access to Important fish habitats upstream of the structures (for about 5 km upstream to the next obstruction – the LaSalle Dam); use of those fish habitats by fish may result in the upgrading of habitats in the LaSalle River to Critical habitat types. The Project wetlands would also be expected to benefit by increasing potential fish access.

- Glenlea Drain Fish Habitat Demonstration Project. This could involve designing "fish friendly" features into the Drain as a demonstration Project for other drainage activities in the province.

It is unlikely that the habitat created by the Demonstration Project would satisfy the compensatory needs for Critical habitat, but it could be used to offset the needed Marginal habitat requirements.

- Fish Passage at the St. Andrews Lock and Dam or the Portage Diversion, have been identified as a potentially detrimental impediment to fish movement.

- Access wish lists of others including the City of Winnipeg Naturalist, Rat River and LaSalle River Conservation District Watershed Inventories to identify potential projects
- Create aquatic habitat in one or more of the borrow pits to be created during construction of the West Dyke (up to 150,000 m^2)
- Investigate possible options at Netley Marsh located at the confluence of the Red River with Lake Winnipeg.
- Cooks Creek – Seine River habitat enhancements.
- Conduct an aerial survey or "fly-over" of the area to document potential fish habitat compensation options available in the area, particularly for passage improvements.

It is likely that the LaBarriere Dam offers the greatest opportunity of the options presented to date to achieve a supplemental habitat creation of up to 4,700m2 of Critical habitat and 30,000 m2 of Marginal fish habitat equivalent.

Further site-specific investigations of the options will be required for inclusion in the Final Fish Habitat Compensation Plan. This Plan would form part of the applications for authorization submitted to DFO under the *Fisheries Act*. The MFA will complete the Final Fish Habitat Compensation Plan in consultation with DFO and submit it along with the required applications for authorizations under the *Fisheries Act*.

Fish Passage

To ensure that there are no additional impacts due to operation of the Floodway under Rule 4, it is the position of the RA's that unless scientific studies demonstrate otherwise, fish passage must be provided for at the Inlet Control Structure. This passage shall be assessed and designed in collaboration with the FTEC to meet the requirements of the species in the river and to maintain integrity of the flood protection structures. The MFA will continue the study of fish movement at the Floodway Inlet Control Structure and provides the results to DFO and the FTEC for review.

Environmental Management Plan

The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to fish and fish habitat contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report.

The MFA develop and provide to the RAs for review and approval prior to construction, the CPEPP dealing with fish and fish habitat. The CPEPP shall include the site-specific fish and fish habitat protection plans for all sites where effects are predicted, including but not limited to West Bank of the Red River (downstream of the Outlet Structure), Inlet Control Structure, Floodway Channel, Outlet Structure, Floodway Drains, West Dyke Drains and Culverts and the

Seine River at Prairie Creek Road. These plans shall specify the specific pre and post-construction monitoring, monitoring in respect to floodway operations and mitigation actions that will be undertaken to protect fish and fish habitat from adverse effects as a result of the Project. The CPEPP will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures.

In accordance with the EMP, the MFA submits to the RAs for review and approval prior to operations of the Project, the OPEPP for addressing fish and fish habitat issues during operations. The OPEPP will also include any contingency plans necessary in the event of a failure of any of the proposed measures.

The MFA submits to the RAs for review and approval prior to operation of the Expanded Floodway, a Monitoring and Follow-up Plan for the fish and fish habitat. The Plan shall describe how the operation of the Expanded Floodway will be monitored and identify any corrective actions required, should monitoring identify effects unanticipated by this assessment.

The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required.

9.3 Lower Trophic Levels and Invertebrates

9.3.1 Introduction

The EIS Guidelines required the proponent to describe the existing aquatic invertebrates and how they may be affected by the Project. The EIS Guidelines are provided in Appendix A.

9.3.2 Summary of Effects – Lower Trophic Levels and Invertebrates

The EIS and Supplemental Filings identified that effects from the Project on aquatic lower trophic and invertebrate communities is anticipated to be primarily related to changes in habitat as a result of construction activities such as the Floodway Channel excavation, Low Flow Channel reconstruction, Outlet Structure reconstruction, shoreline protection measures on the west bank of the Red River and various drain and culvert replacement and reconstruction along the Floodway Channel and West Dyke. Potential effects on clam species known to occur in the area are discussed more specifically in Section 9.4. Invertebrates that associate with the sediments and provide food for fish and other species will be destroyed during excavation. Others are associated with the water column, which may be affected by potential increases in suspended sediments arising from construction related run-off and riprap replacement.

9.3.2.1 Construction

The MFA predicts that due to the potential increases in suspended sediments arising from the construction activities that there is the potential for adverse effect to some lower trophic levels and aquatic invertebrates. MFA indicates that populations of lower trophic levels are expected to repopulate the aquatic environment shortly after the disturbance has ended and that the implementation of the CPEPP detailing the appropriate sediment and erosion control measures to be employed during construction will assist in minimizing sediment transfer to waterbodies and thus reduce the potential for adverse effect on aquatic invertebrates. MFA predicts that these effects will be small in magnitude, short-term in duration and site-specific in extent.

Disruption of aquatic habitat during construction is predicted to result in adverse impacts to aquatic invertebrates, as will the alteration of bottom substrate due to the reconstruction of the Low Flow Channel and in the Red River downstream of the Outlet Structure. Invertebrates will readily recolonize the disturbed area post construction. No specific mitigation measures are proposed and the MFA predicts these effects to be small in magnitude, short-term in duration and site-specific in extent.

The placement of riprap is predicted by the MFA to increase the potential habitat for attached algae, increasing attached algae presence in the Floodway. No other measurable effects from riprap placement are expected. MFA predicts this effect to be positive, moderate in magnitude, long-term in duration and site-specific in extent.

9.3.2.2 Operation – Inactive

The EIS and Supplemental Filings suggest that aquatic invertebrate populations are expected to recover form disruptions due to construction activities when the Floodway is in the inactive operations phase. The habitat-based effects as a result of construction are anticipated to persist in the long-term during the inactive operations phase. The inherent instability of the lower trophic levels and invertebrate communities associated with the Existing Floodway are expected to continue.

9.3.2.3 Operation – Active

No effects are anticipated.

9.3.3 Proposed Mitigation, Monitoring and Follow-up

As detailed above, the MFA have proposed the following mitigation measures to address predicted effects to lower trophic levels and aquatic invertebrates:

- Construction: CPEPP and sediment and erosion control measures;
- Operation-Inactive: None identified
- Operation-Active: None identified.

Separate M&F plans will be prepared for each of the major components identified in the EIS Guidelines. MFA proposes that monitoring would be done to evaluate the effectiveness of the potential revegetation of the riprapped areas in three to five years following construction. This would confirm the pattern of revegetation characterized to help direct future riprap-related shoreline stabilization projects.

9.3.4 Responsible Authority Conclusion

Federal and Provincial departments and agencies, and members of the public made a number of comments regarding lower trophic levels and aquatic invertebrates. Appendix B provides a summary of those comments by environmental category and issue. Issues raised related primarily to fish habitat alterations and compensation and mitigation options. The responsible authorities have considered those comments in assessing the effects of the project and in concluding on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects to lower trophic levels and aquatic invertebrates by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's commitments to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects to lower trophic levels and aquatic invertebrates conclude that the effects are not likely to be significant providing the mitigation and compensation measures proposed or to be developed by the MFA are implemented. Responsible authorities suggest that provisions be made in the fish and fish habitat related EMP, CPEPP, OPEPP and M&F Plans for inclusion of considerations related to lower trophic levels and aquatic invertebrates.

9.4 Aquatic Species at Risk

9.4.1 Introduction

The EIS Guidelines indicated that the EIS should describe whether any aquatic species found in the Floodway Study Region are listed in Manitoba's Endangered Species Act (MESA), by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or in the Federal Species at Risk Act (SARA). The EIS Guidelines are provided in Appendix A.

9.4.2 Summary of Effects – Aquatic Species at Risk

Four fish species known to exist in the Red River Basin are species of special concern listed under the *Species at Risk Act* (SARA): Bigmouth Buffalo, Chestnut Lamprey, Bigmouth Shiner and Silver Chub. In addition the Lake Winnipeg Physa Snail is currently being considered for listing under SARA. COSEWIC recently declared the Lake Sturgeon to be endangered in western Canada and a species of special concern in eastern Canada. COSEWIC is also reviewing the status of the Mapleleaf Clam. Two other potentially important commercial species, the White Heel Splitter and Threeridge Clams, have been found in the Red River.

9.4.2.1 Construction

Bigmouth Buffalo

Bigmouth Buffalo are not believed to inhabit the Floodway Low Flow channel, as the Red River more closely matches their preferred habitat. This species was not found during fish sampling efforts in the Floodway Low Flow Channel during baseline field studies. Therefore, proposed construction in, and alteration of, the floodway channel is not expected to impact Bigmouth Buffalo habitat.

The proposed bank stabilization in the Red River near the Floodway Outlet is also not expected to impact Bigmouth Buffalo habitat, as they are largely pelagic feeders in mid-channel areas with relatively low water velocities. Spawning habitat will not be impacted, as the construction area does not include vegetated areas prone to flooding. Therefore, the proposed construction is not expected to result in a change in productive capacity of the system for Bigmouth Buffalo.

Silver Chub

The silver chub is listed as a Species of Special Concern but are considered abundant in the Red River although they were not collected in any of the sampling efforts for this project. They are found in slow moving water over soft bottoms, a habitat that is readily available in the study area. Assuming that they will be found principally in the Red River and not in the tributary streams or floodway, then the stabilization of the west bank near the outlet has the primary potential to affect their habitat. However, the field inventory noted the presence of gravel and cobble shoreline where the riprap would be placed, suggesting that this shoreline may not provide preferred habitat for this species.

Big Mouth Shiner

Big mouth shiners are noted from the area but not in the main Red River and were not encountered in the sampling undertaken for the project in the main streams along the West Dyke. Shallow gravel bottomed creeks and small rivers with fast, permanent flow and little vegetation are preferred habitat, which is not readily available in the study area. Where such habitat may exist in the area, the extension of culverts and possible encroachment of road embankments may be the only potential interactions causing an adverse impact.

Chestnut Lamprey

Chestnut lamprey is found in most streams and lakes in southern Manitoba, but was not collected in any of the sampling efforts for this project. As a larva, its life is spent burrowed in the sand or mud substrate of fast flowing streams and rivers. It is unlikely that the lamprey are located in the floodway, but they may be associated with some of the drains crossing the West Dyke or in the Seine River. The extension of culverts and possible encroachment of road embankments may be the only potential interactions causing an adverse impact.

Lake Sturgeon

Lake Sturgeon are not believed to inhabit the Floodway Low Flow Channel, which is a waterbody that is substantively smaller than those that they are usually associated with. Therefore, proposed construction in the Floodway Channel is not expected to directly impact Lake Sturgeon habitat.

The proposed bank stabilization on the Red River near the Floodway Outlet will result in the loss of some fine-substrate (silt/sand) habitat generally associated with Lake Sturgeon feeding habitat. However, its replacement with coarse substrate (rip-rap) will likely provide habitat also suitable for feeding while increasing habitat diversity, and may provide habitat suitable for spawning, particularly during high flow events (i.e., during operation of the Floodway). If so, the proposed bank stabilization would likely result in a net benefit in terms of habitat for Lake Sturgeon in the Red River, as spawning habitat is likely more of a limiting factor for sturgeon populations than feeding habitat in the Red River system. The proposed bank stabilization is not expected to reduce the overall productive capacity of the system for Lake Sturgeon.

Mapleleaf Clam

The distribution of the Mapleleaf Clam in the Red River is not well known, and no studies were undertaken to determine its presence in the Floodway low flow channel. It is reported have affinity for vegetated habitats which is expected to preclude widespread colonization in the Floodway low flow channel and the Red River, which are generally devoid of submerged aquatic vegetation.

Changes to the shoreline on the west bank of the Red River for the bank protection could result in destruction of habitat potentially inhabited by the Mapleleaf Clam. However, as the preferred habitat of the Mapleleaf Clam is vegetated substrate in slow to moderate currents, the area of proposed construction at the Floodway Outlet (a steep bank with scouring currents and devoid of vegetation) has a low potential for use by this species. The potential for destruction or disruption of Mapleleaf Clam habitat is low as a result.

As the productive habitat for the Mapleleaf Clam is likely associated with a number of discreet habitats that are not found within the proposed construction areas for the Floodway Expansion Project, Project construction is not expected to impact productive capacity of the system for this species. Should they be found to occur in construction areas that might be impacted (such as the low flow channel), it is proposed that they be relocated before construction.

White Heel Splitter

Although the distribution of this species is not well documented, for the purposes of this screening report, construction within the Floodway Low Flow Channel and application of bank protection on the west bank of the Red River at the Floodway Outlet is assumed to result in impacts to the habitat potentially inhabited by the White Heel Splitter.

Should they be found to occur in the construction area, construction will be halted and the specimens relocated. Following construction, recovery of the habitat for the White Heel Splitter is expected to occur.

Threeridge Clam

The Threeridge Clam is typically found in rivers on or in a variety of substrata, although stable gravel shoals have been reported as preferred habitat. Although the distribution of this species is not well documented, for the purposes of this screening report, construction within the Floodway low flow channel and application of bank protection on the west bank of the Red River at the Floodway Outlet is assumed to result in the destruction of habitat potentially inhabited by the Threeridge Clam. Should they be found to occur in the construction area, construction will be halted and the specimens relocated. Following construction, recovery of the habitat in terms of suitability for the Threeridge Clam is expected, as the species is known to inhabit a variety of substrata including cobble.

In-water construction will be scheduled to avoid sensitive spawning time periods for species at risk (April 1 to June 30). Prior to and during construction in the Red River, floodway channel and at the outlet, a qualified biologist shall inspect the site to determine the potential presence of the three species of clam in the working area. Should they be found to occur in the construction area, construction will be halted and the specimens relocated outside the existing and future work zones, and to habitat of similar characteristics. Relocation will continue as long as new populations are uncovered.

9.4.2.2 Operation - Inactive

No changes from the existing conditions are expected.

9.4.2.3 Operation-Active

As indicated in the EIS, no effects from project operations on fish or clam populations are anticipated. The operation of the Floodway will not change with the Project and water level changes in the Red River will only occur during very infrequent events.

Water level changes downstream of the Inlet Control Structure during operations of the Floodway under Rule 4 could result in clams being exposed on shorelines for a temporary period. While clams are tolerant of fluctuating water levels and would be able to move to more favourable conditions, the extent speed and duration of the drawdown will determine whether this will occur. Rule 4 requirements indicate that Manitoba Water Stewardship is to examine whether it can minimize the rate at which river levels are changed both upstream and downstream of the Inlet Control Structure, in order to minimize impacts of the operation under Rule 4.

9.4.3 Proposed Mitigation, Monitoring and Follow-up

As detailed above, the MFA have proposed the following mitigation measures to address predicted effects to aquatic species at risk:

- Construction: CPEPP, construction scheduling and timing, sediment and erosion control plans, fish and clam salvage operations.
- Operation-Inactive: none specified.
- Operation-Active: fish and clam salvage operations.

Separate M&F plans will be prepared for each of the major components identified in the EIS Guidelines. Monitoring should be conducted to confirm the effects predictions and to ensure the effectiveness of the mitigation measures employed.

9.4.4 Responsible Authority Conclusion

Federal and Provincial departments and agencies, and members of the public made a number of comments regarding aquatic species at risk. Appendix B provides a summary of those comments by environmental category and issue. Issues raised related primarily to fish habitat alterations and compensation and mitigation options. The responsible authorities have considered those comments in assessing the effects of the project and in concluding on the likely significance of the adverse environmental effects.

Responsible authorities, having considered the effects to aquatic species at risk predicted by the MFA, measures proposed by the MFA to mitigate those effects, the MFA's

commitments to monitoring and follow-up, and the comments received from federal and provincial departments and agencies, and the public regarding the potential effects to aquatic species at risk conclude that the effects are not likely to be significant providing the mitigation and compensation measures proposed or to be developed by the MFA and the following additional management actions are implemented:

- The MFA develops and submits to the RAs for review and approval prior to construction the Environmental Management Plan (EMP) outlining how the commitments related to the aquatic species at risk contained in the EIS and supplementary filings and this screening report will be met during construction and operation of the Project, how monitoring and follow-up will be undertaken, the MFA's plans to adaptively manage any adverse effects and the MFA's plans for reporting progress and compliance with the terms and conditions outlined in this screening report;
- MFA develop and provide to the RAs for review and approval prior to construction, the CPEPP and Sediment and Erosion Control Plans. These plans should specify the actions being taken to protect aquatic species at risk from impacts associated with construction of the Project. The CPEPP will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures;
- MFA develop and provide to the RAs for review and approval prior to the completion of construction, the Maintenance Manual and OPEPP. These plans should outline the specific actions to be taken with regards to on-going maintenance of the Project and how aquatic species at risk will be protected during these activities. The OPEPP will also include any contingency plans outlining actions necessary in the event of a failure of any of the proposed measures;
- The MFA submits to the RAs for review and approval prior to operation of the Expanded Floodway, a Monitoring and Follow-up Plan for surface water quality. The Plan shall describe how the operation of the Expanded Floodway will be monitored and any corrective actions required, should monitoring identify effects unanticipated by this assessment.
- The MFA report on the on-going progress in implementing the project and in ensuring compliance with the commitments and terms and conditions in accordance with the provisions of the EMP. Reports would be provided to RAs for information in order to verify the accuracy of the effects predictions contained in the EIS and Supplementary Filings, the ensure the effectiveness of the mitigation measures being employed and to verify the use of adaptive management if required;