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2.0 ASSESSMENT APPROACH

2.1 OVERVIEW OF APPROACH

The Floodway Expansion Project EIS describes an Environmental Impact Assessment (EIA) prepared in accordance with the EIS Guidelines. It sets out the information required by government agencies reviewing the Project pursuant to the requirements of *The Manitoba Environment Act* and the *Canadian Environmental Assessment Act (CEAA)*[1]. In accordance with the EIS Guidelines, the EIS identifies potential environmental effects of the Project and their significance, as defined in the *CEAA*, after consideration of full implementation of proposed mitigation (ways to avoid or reduce adverse effects or enhance environmental benefits), monitoring and follow-up measures.

The assessment process for the Project has emphasized consultation and involvement with potentially affected communities and interest groups (Chapter 3). Early and meaningful ongoing opportunities have been provided for different segments of the public to receive information on, and provide views and information about the Project and the environmental planning and assessment process. These consultations have contributed to mitigation of adverse environmental and socio-economic effects that could potentially be associated with the Project.

The starting point and focus for the EIS is the Floodway Expansion Project. Ultimately, the EIS Guidelines confirm that the scope of this environmental assessment is defined by what is needed to identify effects arising directly and indirectly from this specific new Project.

An overview of the Project, as well as Manitoba's existing flood protection system, is described in Chapter 4. The Floodway Expansion Project involves expansion of the existing flood diversion channel around the City of Winnipeg to achieve expanded protection against spring floods of up to approximately 1 in 700 year magnitude (Chapter 1, Section 1.4). Accordingly, the planning process for the Project started with a defined site and the Project as defined includes modifications to the Existing Floodway channel and associated existing infrastructure including the West Dyke, Inlet and Outlet Control Structures, bridges, and other infrastructure. The planning and environmental assessment process considered alternative means for carrying out the specified Project within the defined site (e.g., widening versus deepening of the existing channel, retrofit versus new higher bridges), and resulting refinements to the Project definition are noted in Chapter 4.

The assessment approach focused on effects of Project construction (including site preparation) and Project operation, including maintenance, both during periods when the Floodway Channel is inactive and when it is in active use during flood events. Spring flood conditions considered under active floodway operation related to major flood events (e.g., 1997 flood event or greater) are by definition both "infrequent" and of "short" duration – nevertheless, the assessment approach for the Floodway Expansion examines incremental effects of the Project under such conditions. For environmental

[1] The assessment's intent and scope is provided in Chapter 1 (Section 1.3) and the regulatory framework in Section 1.5.

assessment purposes, four different major spring flood conditions are examined to reflect a range of "Operation-Active" conditions:[2]

- 1 in 100 years return period flood (4600 m^3/s - similar to 1997 flood);
- 1 in 120 year return period flood (4900 m^3/s - larger than 1997 flood);
- 1 in 225 year return period flood; (5900 m^3/s or approximate design capability of Existing Floodway) and;
- 1 in 700 year return period flood (7700 m^3/s approximate design capability of Floodway Expansion Project).

There is no timetable or plan for final disposition or decommissioning the Project facilities. The design life of the facility before substantial refurbishment is 50 to 100 years. This is so far into the future that it is not feasible today, based on available information and agreements, to provide meaningful assessment of likely plans or their effects for rehabilitating the operational components and related infrastructure of the Project at the end of their operational life. When such plans need to be developed, MFEA would submit these plans as then required for regulatory review and approval prior to its implementation. Accordingly, the EIS does not provide any further assessment of Project final disposition.

In accordance with the EIS Guidelines and standard Environmental Impact Assessment (EIA) practice[3], the basic assessment framework for this EIS (including cumulative effects assessment) includes five steps:

1. Scoping: This step includes identifying issues of concern related to the Project, selecting environmental components to be examined in the EIA, identifying potential sources and pathways of effects from the Project to each environmental component, identifying spatial and temporal boundaries for assessing effects of the Project for each selected environmental component, and identifying other actions and effects pathways (i.e., other actions to be included to meet cumulative effects assessment requirements) that may affect the same environmental components. For the Floodway Expansion EIS, the EIS Guidelines provide considerable initial guidance as to scoping, including basic environmental components to be examined, i.e., physical environment, aquatic environment, terrestrial environment, socio-economic environment, and heritage resources. Public consultations and further analysis have been used to focus assessment of specific environmental components, to define effects pathways, and to identify temporal and spatial boundaries. Section 2.2 reviews the overall approach in the EIS to identify other actions to address cumulative effects assessment requirements.
2. Analysis of effects: This step involves collection of baseline data for each environmental component (i.e., data for that environment without the Project), and assessing the effects of the Project as well as all selected other actions (i.e., cumulative effects) on the selected environmental components. The EIS Guidelines specify that the assessment of each environmental component will involve "Description of the Existing Environment" or the baseline for the environment as scoped, and "Environmental and Socio-economic Effects and

[2] Flows in brackets are "natural" peak discharges on the Red River downstream of the Assiniboine River at James Avenue. See Section 5.3.1.1, Table 5.3-1.

[3] See Section 3.1 of Canadian Environmental Assessment Agency (CEAA). 1999. Cumulative Effects Assessment Practitioners Guide (Hegmann et al). Appendix 2B provides a copy of Section 3.1 of this guide.

Mitigation" or assessing effects, including cumulative effects, relating to each phase of the Project - and includes describing mitigation and habitat enhancement measures to manage or avoid adverse effects.

3. Identification of mitigation: This step sets out recommended mitigation measures. In accordance with the EIS Guidelines, the EIS includes this step as part of the effects analysis.
4. Evaluation of significance – describing residual effects: This step evaluates the significance of residual effects (i.e., adverse effects after consideration of full recommended mitigation) likely to result from the Project. Evaluation of significance must be carried out in accordance with *CEAA*, and may involve comparing such residual effects against thresholds for an environmental component (e.g., specified goals or targets, standards or guidelines, carrying capacity, or limits of acceptable change), or to land use objectives and trends. The EIS Guidelines set out criteria to be used to evaluate the significance of adverse effects for the Project, and require that the EIS describe residual effects and their significance. The EIS addresses significance under the assessment of residual effects (rather than as part of "effects and mitigation"). Section 2.3 reviews the overall approach in the EIS for evaluation of significance.
5. Follow-up: This step sets out recommended monitoring and effect management measures. The EIS Guidelines set this out as a specific requirement for addressing residual effects.

In accordance with the above framework, the assessment approach addresses expected environmental effects of the Project separately for each of the environmental components specified in the EIS Guidelines, namely the physical environment (Chapter 5), aquatic environment (Chapter 6), terrestrial environment (Chapter 7), socio-economic environment (Chapter 8) and heritage resources (Chapter 9).

For the purpose of assessing the environmental effects of the proposed Project, the current environment with the Existing Floodway and the projected future evolution of this environment without the Project is considered as the baseline. The Existing Floodway, originally constructed in the 1960s and its subsequent operation since 1968, represents a disrupted environment throughout the site and region relevant for assessing the Floodway Expansion Project. Potential environmental effects of the Project on this existing environment are predicted separately in the EIS for each environmental component during construction and operation by comparing:

a. what would be expected without the Project (i.e., the "existing environment" or baseline expected for each environmental component with the Existing Floodway and without the Project, including as relevant consideration of other projects or activities that have been or will be carried out without the Project); and
b. what is expected to happen with the Project (i.e., each environmental component as modified or impacted by the Project based on direct and indirect effects pathways from the Project to the environmental component, including as relevant consideration of other projects or activities that have been or will be carried out in combination with the Project.).

For each of the environmental components (Chapters 5 through 9), the assessment examines:

- approach and methodology addressing scope issues and includes categories of assessment, sources of effects, scope of geographic and temporal assessment boundaries, and overview of other specific methods of approach;

- existing environment baseline analysis and includes review of current and evolving future environment as affected by the Existing Floodway. As stipulated in the EIS Guidelines, each "existing environment" component is described only to the extent needed to predict the effect of the Project on that environment as set out in the EIS Guidelines. Cumulative effects assessment (CEA) forms an integral part of this assessment of baseline conditions (see Section 2.2 regarding CEA approach). Assessments consider the specified range of inactive and active spring flood condition;
- effects and mitigation describes quantitatively and qualitatively both positive and adverse environmental effects likely to result from the Project after consideration of proposed mitigation measures beyond those already included in the Project Description (Chapter 4). In accordance with *CEAA* and the EIS Guidelines, the scope of this assessment includes socio-economic effects arising from the biophysical effects of the Project. As set out in the EIS Guidelines, cumulative effects assessment (CEA) forms an integral part of this assessment (see Section 2.2 regarding CEA approach). Assessments are provided at distinct phases of the Project (construction and operation), and consider the specified range of inactive and active spring flood conditions;
- residual effects and their significance describes summaries of the nature and extent of any residual environmental effects of the Project after full implementation of proposed mitigation, and characterization, with rationale as to whether adverse residual environmental effects are significant or insignificant, as defined in the *CEAA* (see Section 2.3 regarding determination of significance). Included as part of mitigation are any plans for responding to any known or predicted residual effects, and procedures for identifying and responding to effects that were not predicted or foreseen; and
- monitoring and follow-up which is a description of the proposed monitoring and follow-up activities should the Project proceed.

Temporal and geographic study area boundaries for Project effects are identified separately for each environmental component, as appropriate, as part of the scoping for each assessment chapter (Chapters 5 through 9) based on predicted links between the Project and each environmental component.

The time periods examined in the assessment include the Project construction period (2005-2009), and the operations period (after 2009) as required to assess duration and/or timing of specific effects related to the Project. As noted, a range of spring flood conditions is examined for both construction and operation periods without attempting to predict what specific flood conditions might apply in any specific year.

During issue identification consultations, the study area was divided into six zones to assist in identifying differences in issues and effects in different parts of the overall study area[4]. Subsequently, definition of the spatial or geographical boundaries was amended to reflect the assessment of biophysical and social-economic effects assessed. Highlights of the overall approach adopted in the EIS are as follows:

[4] The six zones are: Zone 1 – Upstream of the Inlet Control Structure (reflects backwater effects during operation of the Floodway Expansion); Zone 2 – West Dyke (reflects effects related to expansion of the West Dyke); Zone 3 – Protected Zone (prime beneficiaries of protection from the Existing Floodway and the Floodway Expansion); Zone 4 – Floodway Channel (reflects required right-of-way and Outlet); Zone 5 – East of Floodway (reflects areas east of Floodway Expansion Channel which could be potentially affected by some expansion options); Zone 6 – Floodway Outlet and Downstream (reflects areas downstream of the Floodway Outlet, including Town of Selkirk, which could be affected by the Expansion Project).

- Geographic Boundaries – Flood Study Region: An overall Project **Flood Study Region** is defined for all environmental components based on the maximum geographic extent to which the Project may be expected to have discernable biophysical effects (Figure 2.1-1). As described in Chapter 5, the Flood Study Region broadly extends through the Red River Valley from just north of the Town of Morris in the south to the southern tip of Lake Winnipeg in the north based on the extent to which water levels and flows may be affected by the Project during different flood events. On the east, the Flood Study Region extends to Highway 12 and then follows the southern boundary for the RM of Taché. On the west, the Flood Study Region extends to the eastern border of the RM of St. Francis Xavier and includes the West Dyke expansion in the RM of Macdonald. The area of expanded Flood protection from the Project is within this Flood Study Region, extending through the City of Winnipeg and certain other adjacent areas.
- Geographic Boundaries – Specific Environmental Effects: Aside from major flood events, the geographic scope for Project effects on the biophysical environments (physical, aquatic, and terrestrial) and heritage resources during construction and most years of operation are typically restricted to the site **footprint** area (the expanded **right-of-way** and any other required land acquisition areas) and certain other areas located adjacent to specific elements of the Project. In contrast, socio-economic effects related to construction benefits extend throughout the Flood Study Region and the overall economies of Manitoba and Canada.

The assessment approach considers scientific analysis of ecosystem effects, along with local knowledge and available experience in determining environmental and socio-economic effects and their significance. A wide range of information sources were used to conduct the assessment approach (Section 2.4).

As set out in the EIS Guidelines, a Project sustainability assessment is provided in Chapter 10 of the balance between the environmental/ecological, social, economic, cultural and human health benefits and opportunities and impacts of the Project.

2.2 CUMULATIVE EFFECTS ASSESSMENT APPROACH

Cumulative effects assessment (CEA) in the EIS is done concurrently with all other elements of the EIA, without any explicit distinction in the EIS between the CEA and other elements of the EIA. As reviewed below in Section 2.2.1, this approach is consistent with the EIS Guidelines and *CEAA*. Sections 2.2.2 and 2.2.3 below review other projects and activities specifically considered as part of the CEA.

2.2.1 CEA Requirements and Overall Approach for the EIS

The EIS Guidelines (Section 7) indicate that *"Cumulative effects assessment (CEA) shall form an integral part of the environmental and socio-economic assessment. The cumulative effects assessment shall examine all effects that are likely to result from the Project when they are anticipated to occur in combination with other projects or activities that have been, or will be carried out."*

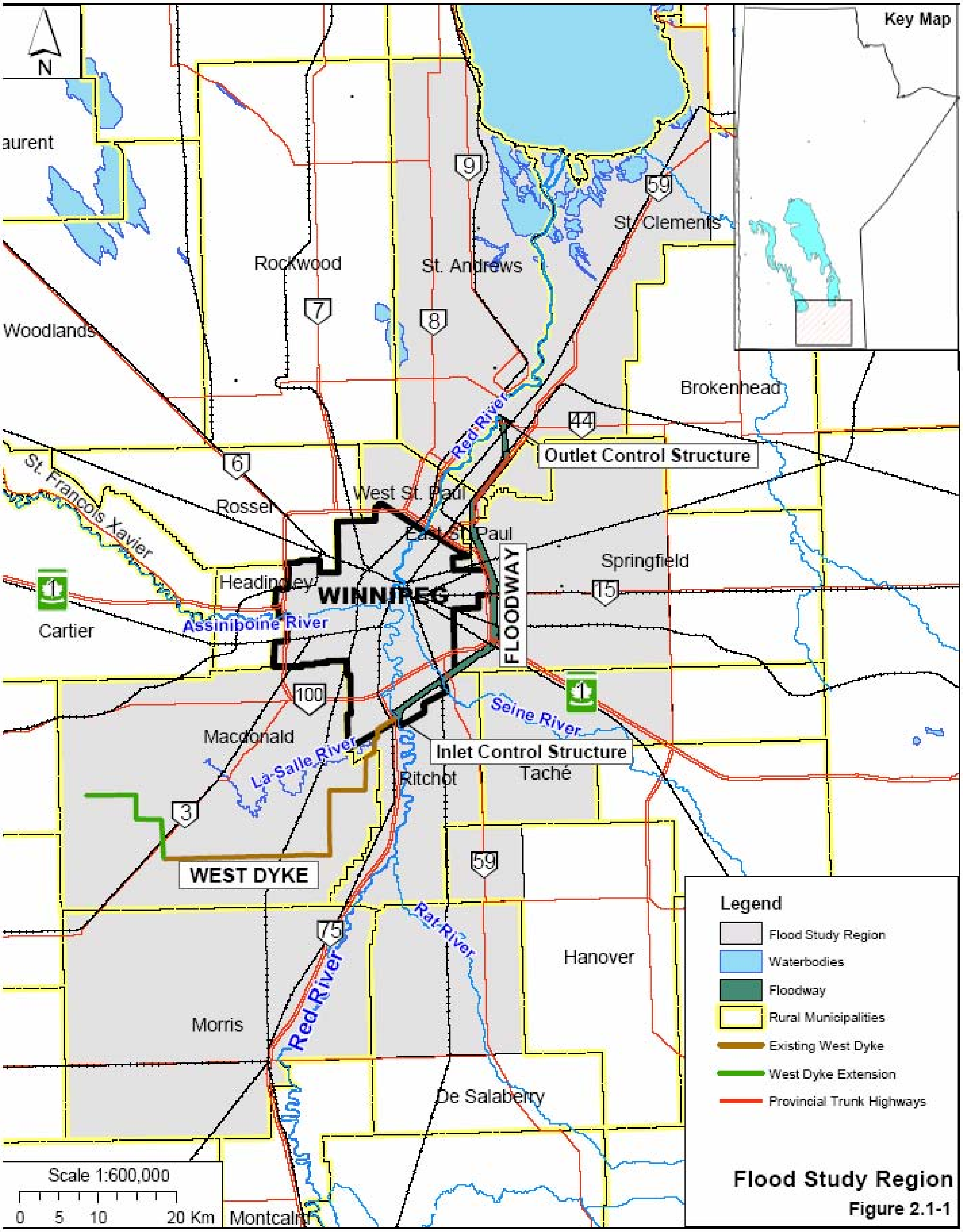

Figure 2.1-1
Flood Study Region

The EIS Guidelines are consistent in this regard with requirements under *CEAA* that came into force in 1995. Section 16 of *CEAA* states that every screening or comprehensive study of a project, and every mediation or assessment by a review panel, shall include consideration of the following (among other factors):

a. *"the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out"; and*
b. *"the significance of the effects referred to in paragraph (a)".*

The Canadian Environmental Assessment Agency (CEAA) provides guidance on CEA practice, including its Cumulative Effects Assessment Practitioners Guide (Hegmann et al. 1999, referred to in the EIS as the "CEAA CEA Practitioners Guide"). Section 2.1 of the CEAA CEA Practitioners Guide (see Appendix 2A) provides the following overall guidance as to definitions and CEA relationship to EIA:

"Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions.... [...This definition is intended specifically for single-project assessments as opposed to regional planning (in which case there is not necessarily a single project that serves as the starting point and focus of the assessment), and borrows the broad definition of 'environment' as used in the [CEAA].] A CEA is an assessment of those effects."

"CEA is an environmental assessment as it should always have been: an Environmental Impact Assessment (EIA) done well."

"Action: Any project or activity of human origin."

Section 3.1 of the CEAA CEA Practitioners Guide (see Appendix 2B) includes the following general guidance as to the CEA framework practice, confirming that the CEA ideally forms an integral part of the overall environmental assessment (as set out in the EIS Guidelines) and that the ultimate goal of CEA remains the assessment of effects specific to the Project (rather than the separate assessment of effects as such from other specific projects or activities):

"Ideally, all aspects of a CEA [reference here is to the five step basic EIA assessment framework noted earlier in Section 2.1 of this EIS] are done concurrently with the EIA, resulting in an assessment approach that makes no explicit distinction between the two parts."

"With the exception of the consideration of future actions, the above [three fundamental CEA requirements for a single project under regulatory review] are identical to the requirements for a good EIA (the consideration of the effects of other actions is not necessarily new to CEA, as the existing environmental setting of a project has typically recognized other actions at least within the EIA's study area)."

> *"... an assessment of a single project (which is what almost all assessments do) must determine if that project is incrementally responsible for adversely affecting a VEC [valued ecosystem component] beyond an acceptable point (by whatever definition). Therefore, although the cumulative effect on a VEC due to many actions must be identified, the CEA must also make clear to what degree the project under review is alone contributing to that total effect. Regulatory reviewers may consider both of these contributions in their deliberation on the project application"*[5].

CEA scoping requirements recognize that cumulative environmental effects must qualify as "environmental effects" of the Project as defined in *CEAA* (e.g., must fall within the spatial and temporal boundaries applicable for Project effects, must be caused at least in part by the Project), and must be "*likely* to result from the project when they are anticipated to occur *in combination with other projects or activities* that have been, or *will* be carried out." (italics added for emphasis). In essence, to be scoped into the CEA relating to assessing any specific environmental component, effects pathways from other projects and human activities must overlap with the effects pathways otherwise identified for the Project with regard to the specific environmental component.

In identifying **future projects** or activities (i.e., human actions that "will be carried out") to be included in the CEA, the following additional considerations have been noted:[6]

- at a minimum, otherwise eligible projects or activities that have already been approved must be taken into account;
- it would be prudent also to consider otherwise eligible projects or activities that are already in a government approvals process (e.g., projects for which as EIS has been prepared for public review), since environmental assessments can take a long time to complete and approvals for other projects and activities may be given during the assessment of the project in question;
- other eligible projects or activities not subject to a formal government approvals process should be included if there is a high level of certainty that they will occur; and
- the environmental effects of uncertain or hypothetical projects need not be considered.

Scoping for the CEA aspects of the EIA was conducted through a combination of internal sessions with members of the EA Study Team and literature reviews. Eligible past, current and future activities that could potentially overlap with the Project were identified (see Sections 2.2.2 and 2.2.3). A description of these activities, along with their spatial and temporal scale and additional assumptions and analysis regarding how they were addressed in the EIS, is further discussed as required for each specific environmental component (Chapters 5 through 9).

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[5] The Guidelines for preparation of an environmental impact statement for the Project (February 5, 2004) do not reference the requirement to identify or consider valued ecosystem or environmental components (VECs) in the EIS. The term "VEC" is not used in this EIS.

[6] See *Addressing Cumulative Environmental Effects, A Reference Guide for the Canadian Environmental Assessment Act (Federal Environmental Assessment Review Office. 1994) (Appendix 2C provides Sections 1 to 3 of this Guide).* This guidance remains consistent with that provided in the Section 3.2.4.1 of the CEAA CEA Practitioners Guide (Appendix 2D) which references future actions under three types: "certain" (action will proceed or there is high probability it will proceed), "reasonably foreseeable" (action may proceed, but there is some uncertainty about this conclusion - these may be considered to the extent that the action is likely and could have a significant cumulative effect with the project under review), and "hypothetical" (considerable uncertainty over whether the action will ever proceed).

2.2.2 Past and Current Projects and Activities

Past and current projects and activities (i.e., actions that "have been carried out") were considered to form an integral part of the existing biophysical/ecological environment against which predicted effects are assessed. As such, these past and current projects and activities, along with their projected future levels, are properly accounted for in the assessment of Project effects. This approach is consistent with Section 3.1 of the CEAA CEA Practitioners Guide (see Appendix 2B) and was explicitly recognized as follows in Section 3.2.4.1 of that document[7]:

> *"In practice, past actions often become part of the existing baseline conditions. It is important, however, to ensure that the effects of these actions are recognized."*

In recognizing such effects it is relevant to consider ongoing trends, i.e., future effects as well as past and existing effects from actions that have been carried out. Past and current projects and activities considered in the baseline setting conditions are reviewed in Chapter 4 and include the following:

- The Red River Floodway (Existing Floodway): The Existing Floodway was constructed by the Province of Manitoba between 1962 and 1968 and includes the Inlet Control Structure, the Floodway channel, the dykes and the **Floodway Outlet Structure**. The purpose of the Existing Floodway is to divert flows from the Red River around the City of Winnipeg during spring flood events; the biggest such spring flood event to date diverted by the Existing Floodway was the 1997 flood, and available experience from that event is noted as relevant throughout the EIS. The construction of the Existing Floodway separated portions of the rural **municipalities** of Springfield, East St. Paul and St. Clements and resulted in substantial changes to **groundwater** levels in these areas; the West Dyke as developed and utilized to date has also separated portions of rural municipalities in its area. The operation of the Existing Floodway at Rule 2 creates artificially high water levels for certain areas upstream of the Inlet Control Structure as reviewed in Chapter 5. There is also public concern that the operation of the Existing Floodway leads to higher water levels, ice jams and erosion downstream of the Outlet Structure. The Existing Floodway was also operated in 2002 and 2004, under an emergency condition, during summer to lower water levels within the City of Winnipeg to offset the potential extensive effect on sewer systems and related basement flooding (from sewer backups) caused by summer rain storm induced floods.
- The Portage Diversion: Located upstream of the City of Portage la Prairie and constructed between 1965 and 1970. The Portage Diversion is used to divert flows from the Assiniboine River to Lake Manitoba. The Portage Diversion provides flood protection benefits to the reach of the Assiniboine River from Portage la Prairie to the City of Winnipeg and those areas along the Red River downstream of the **confluence** of the Assiniboine River with the Red River.
- The Shellmouth **Dam**: Located northwest of Russell and constructed between 1964 and 1972. The Shellmouth Dam is used to regulate flood levels and to augment low flows. The Shellmouth Dam provides these benefits to the reach of the Assiniboine River to the confluence with the Red River, including the Cities of Brandon, Portage la Prairie and Winnipeg.

[7] (See Appendix 2D) The 1994 FEARO Reference Guide (see Appendix 2C) on *Addressing Cumulative Environmental Effects* also noted: "For example, most [existing environmental assessment reports] examine the baseline environmental conditions, which include the cumulative environmental effects of past and existing projects and activities."

- Seine River Syphon/Overflow: These facilities were constructed with the Existing Floodway. The Syphon is to convey a portion of the Seine River flow underneath the Floodway Channel and into the urban Winnipeg reaches of the Seine River. The Overflow is intended to route flow from the Seine River to the Floodway Channel when the capacity of the Syphon is exceeded. The functionality of these facilities was questioned during the 1997 flood. Some of these concerns have been addressed by construction of the Grande Pointe Diversion Drop Structure which provides an outlet for the Seine River water diversion before it reaches the Grande Pointe community.
- Other existing infrastructure in the area of the Existing Floodway: The Existing Floodway area includes many existing road and rail facilities (including bridges over the Existing Floodway), local drainage inlet structures, utility crossings and other utility facilities, and other existing infrastructure. Where relevant, the EIS considers trends in use of these existing facilities, as well as known plans for changes or other developments related to these facilities.
- Groundwater Conditions: Groundwater conditions in some areas near the Existing Floodway reflect effects from the Existing Floodway as well as annual declines during summer months for wells when consumptive use increases.
- Flood Response Management and Compensation: The EIS notes existing flood response management and compensation, reflecting on experience arising from the 1997 flood to the extent that this may assist in assessment of the Floodway Expansion Project.
- Population growth and ongoing regional development: The EIS considers population changes and ongoing regional development as it normally affects communities within the Project Flood Study Region, including Winnipeg and the **Capital Region**.

2.2.3 Future Projects and Activities

For the purpose of CEA related to the Project, projects and activities considered under "future actions" reasonably likely to proceed are those which are expected to have effects that potentially overlap in a significant way with effects of the Project and also:

- have been approved;
- have been officially announced by the proponent or are otherwise directly associated with the Project;
- are currently in a government approvals process (e.g., an EIS is available for public review); or
- for which there is very strong indication that they will start to be carried out before completion of the Project's construction phase (i.e., between 2005 and 2009). This time frame was chosen to address projects likely to be carried out which might otherwise be ignored. Beyond this planning horizon, it is considered that the likelihood of projects and activities, or their possible effects, remain hypothetical for CEA purposes.

The types of effects stemming from future activities and projects are predicted based on best available information and professional judgement. In most cases, the detail known about future projects and activities and their possible interaction with the Project is such that only a general description of anticipated cumulative effects is possible. For this reason, and in accordance with the EIS Guidelines, each section addressing cumulative effects includes, where relevant, discussion of the assumptions and analyses used to develop the conclusions reached, as well as the level of confidence in the data used to develop the analyses based on available project description information and level of commitment about when the development will proceed.

The future projects and activities included below are those considered likely to proceed in the foreseeable future and are considered, where relevant, in either the baseline setting conditions or (where related to the Project) in the analysis of Project effects:

- Summer Operation of the Floodway Expansion: Summer operation of the Floodway Expansion will not occur during construction except under emergency conditions[8]. Summer operation occurs currently under certain conditions, and any future summer operation would not in any way be dependent on modifications associated with the Floodway Expansion. Future summer operation after construction of the Floodway Expansion could also be used to protect infrastructure in the City of Winnipeg. During times of elevated summer water levels, water would be passed into the Floodway Expansion to lower water levels in the Red River through the City of Winnipeg. Summer operation with or without the Floodway Expansion may have adverse effects on frequency of higher upstream water levels, bank stability and fish passage.
- City of Winnipeg Flood Protection Infrastructure Improvements: These improvements include permanent upgrading of the primary dykes and other infrastructure in the City of Winnipeg. In the absence of these works, the flood protection offered by the Floodway Expansion could be compromised in certain areas if temporary measures are not taken.
- Dredging of the Red River Downstream of the Outlet Structure: This involves renewal of the dredging program downstream of the Outlet Structure at key locations for navigation. It is anticipated that such a program, if and when it proceeds, would have primarily positive effects on sedimentation related only to navigation.
- Recreational developments related to Floodway Expansion: Development of recreational opportunities is being planned in the Floodway Expansion Project right-of-way.
- Compensation Legislation and Administration: The Manitoba Government has passed new legislation (Bill 23, passed in June 2004) to address compensation related to spring operation of the Existing Floodway and the Floodway Expansion.
- Other infrastructure and regional developments: Other planned infrastructure and regional developments are considered as required, including: twinning of a portion of the Perimeter Highway (this project calls for use of Floodway spoil pile material on the west bank of the Existing Floodway Channel); Winnipeg Water Treatment Plant; Manitoba Hydro Riel Station; and currently established rural residential **development plans**.
- Devil's Lake Drainage Outlet: The state of North Dakota plans to create an outlet to Devil's Lake to reduce water levels by discharging water from Devil's Lake into the Red River basin.
- Shellmouth Dam Upgrade: The proposed project will increase storage capacity in Lake of Prairies in order to enhance water availability downstream along the Assiniboine River while at least maintaining the current level of flood protection.

[8] Emergency conditions during summer in 2002 and 2004, reflecting high levels of the Red River in Winnipeg and the threat of severe thunderstorms, resulted in summer operation of the Existing Floodway. During construction of the Project, operation of the Floodway during summer has the potential to cause serious disruption in construction activities resulting in material delays and costs. Accordingly, prior to construction of the Project, Manitoba/MFEA plan to define conditions under which emergency summer operation of the Floodway could reasonably occur during construction, after due consideration of effects on construction schedules and tender documents.

Other possible future activities were not included as there are no known plans currently in place for potentially significant future developments in the context of this CEA in the areas physically affected by the Project.

In dealing with uncertain future projects or activities potentially relevant to CEA of the Project, it is important to note that any such project would typically be subject to its own regulatory review and approvals. Issues related to the cumulative effects of such new future developments in combination with the Project can therefore be best and most properly assessed when or if new government approvals are sought for such projects.

2.3 DETERMINING SIGNIFICANCE OF RESIDUAL ENVIRONMENTAL EFFECTS

Predicted residual environmental effects of the Project after implementation of mitigation measures are set out in Chapters 5 through 9 of the EIS for each of the biophysical, socio-economic and cultural environmental components selected for their direct importance and interest to regulators and stakeholders. As required in Section 8 of the EIS Guidelines, the description of residual effects includes a characterization as to whether residual environmental effects "are significant or insignificant, and the rationale for such characterization". In accordance with the intent set out in the EIS Guidelines, environmental effects and their significance are identified as defined in the *CEAA*. In accordance with the EIS Guidelines, the assessment approach has considered scientific analysis of ecosystem effects along with local knowledge and available experience in determining the significance of potential effects.

As explained in the relevant CEAA guide, "*Deciding whether a project is likely to cause significant adverse environmental effects is central to the concept and practice of environmental assessment….The concept of 'significance' cannot be separated from the concepts of 'adverse' and 'likely'*"[9]. In considering significance, "environmental effects" are defined as set out in *CEAA* which restricts socio-economic and heritage resource effects, for example, to those arising from biophysical effects of the Project[10].

Determining "significance" involves scientific analysis and interpretation. The CEAA Guide, for example, states:[11]

> *"….public input into the determination of significant adverse environmental effects must limit itself to questions related to scientific analysis and interpretation…Issues that are not directly linked to the scientific (including traditional ecological knowledge) analysis of*

[9] See Appendix 2E which provides a copy of *Determining Whether a Project is likely to Cause Significant Adverse Environmental Effects: A Reference Guide for the Canadian Environmental Assessment Act (Federal Environmental Assessment Review Office.1994).* The Guide also notes: "*The 'likely' applies to the environmental effects of the project that are both adverse and significant."*

[10] *Ibid.* The Guide explains that under *CEAA*, for example, environmental effects include socio-economic and heritage resource effects caused by a change in the "environment" (as defined, this includes changes to the physical and biological environments, i.e., aquatic and terrestrial environments) which in turn is caused by the project, e.g., resource use or job losses due to a loss of fish habitat. However, if a socio-economic or heritage resource change is not caused by a change in the environment, but by something else related to the project (e.g., effects caused by employment or purchasing related to the project), the socio-economic or heritage resource effect is not an "environmental effect" within the meaning of *CEAA* and cannot be considered in the determination of significance and related matters.

[11] *Ibid.* The Guide notes that public concerns and values not eligible for consideration in the determination of significance are given prominence elsewhere in the EA process, i.e. under *CEAA,* serious public concerns can warrant referral of the project to a public review through either mediation or a public panel review.

environmental effects, such as long-term unemployment in a community or fundamental personal values, cannot be introduced into the determination at this step."

Mitigation measures and strategies (e.g., access management plans to manage potential adverse effects related to recreation activities in the Floodway Expansion right-of-way following construction) can be important in the assessment of residual effects. When such measures are key to determination of significance, the likelihood of insignificant residual effects may be affected by the nature of the mitigation measure. Possible options include (a) integral parts of the Project design, (b) a specific "no net loss" habitat regeneration measure approved by a specific regulatory agency, and (c) other measures to manage specific risks (including adaptive management strategies that identify and respond in the event of unexpected adverse effects or when mitigation measures may not be effective).

Evaluation of significance of residual effects may involve comparing such effects against thresholds for an environmental component (e.g., specified goals or targets, standards or guidelines, carrying capacity, or limits of acceptable change) or to land use objectives and trends. As noted in Section 3.5.3 of the CEAA CEA Practitioners Guide, however, the assessment of cumulative effects is often hindered by a lack of specific thresholds - and (Section 3.5.2 of the Guide) the significance of a Project effect may decrease if the surrounding environment without the Project is already heavily disturbed and environmental components are already compromised (e.g., thresholds have already been exceeded)[12].

As set out in the EIS Guidelines (Section 7), the following criteria are used in the EIS to evaluate the significance of adverse residual environmental effects:

- nature of the effect (positive, neutral, or negative/adverse);
- magnitude of the effect (size of the effect, e.g., small, moderate or large);
- duration of the effect (how long the impact would last, e.g., short term or long-term);
- frequency of the effect (how often would the impact occur, e.g., once, sporadic, or continuous [on regular basis and regular intervals]);
- reversibility of the effect;
- temporal boundaries (when the effect would occur, e.g., short term or long term);
- spatial boundaries or geographical extent of the effect (would the effect be limited to the project site, to a local area, or to a regional area);
- ecological context (sensitivity to environmental disturbance – for biophysical environmental effects); and
- non-compliance with legislation, regulations and policies.

With respect to the assessment of significance for biophysical effects (Chapters 5, 6 and 7), three key initial assessment components are used as follows:

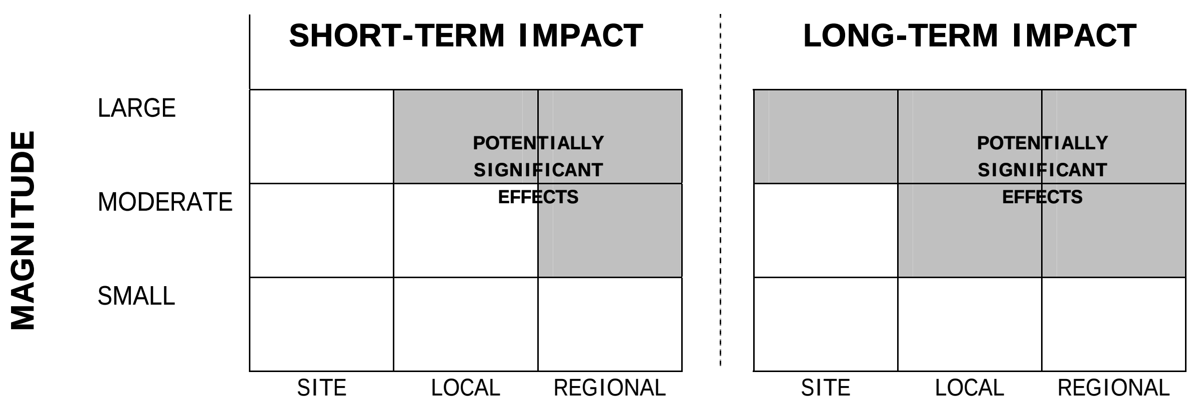
- <u>Duration</u>: short-term (effects that last no more than a one-generation span of the species affected or five years for other environmental components such as water quality); long-term (more than one generation of the species affected or greater than five years for other environmental components).

[12] See Appendix 2F which provides a copy of Section 3.5 of the CEAA CEA Practitioners Guide.

- Magnitude: small (impact does not have a measurable effect on the environmental component population under consideration); moderate (effect could be measured with a well-designed monitoring program[13]); and large (impact would be large enough to be readily noticed without a monitoring program).
- Geographic extent: site (effect confined to a small area and not transportable to other areas); local (the area physically impacted by the Project including areas affected by changes in water levels and flows); and regional (the area impacted could extend well beyond the area physically impacted by the Project, e.g., effects on migratory species).

A matrix that generally illustrates the differences between insignificant and potentially significant effects on biophysical environments based on duration, magnitude, and geographic extent is provided in Figure 2.3-1. While this matrix guides the assessment of significance, the assessment also considers other components such as “frequency” (does the effect occur more than once), “confidence” (how confident are we in the degree of impact), and environmental component-specific characteristics such as “resilience” and “ecological context”. For example, if the environmental component in question is known to be highly resilient (i.e., adaptable and recovers well from disturbance), effects that would otherwise be considered significant could be classed as insignificant, despite the magnitude and/or duration of the effect. Conversely, effects that might not generally be considered significant (e.g., ones that affect a small proportion of the population for a short period) might be significant for a highly vulnerable environmental component where the loss of even a few individuals may affect the long-term status of the population.

The study area for biophysical assessments is generally defined as the area physically affected by the Project. The study area for each environmental component, however, differs based on the characteristics of the environmental component.



Note:

1. *In addition to the above, effects are assessed in terms of their “frequency of occurrence”, “confidence in the assessment”, “resilience”, and “ecological content”.

Figure 2.3-1
Potentially Significant Biophysical Effects on Environment[1]

Compared to assessment of significance for effects on components of the biophysical environment, the assessment of significance for socio-economic components considers:

[13] Implies that effects are statistically significant as determined by a well-designed monitoring program.

- differing perspectives and values among different groups of people about their community and region, as well as their individual and family circumstances; and
- the problems inherent in assessing separately effects on different aspects or components of people's lives that each contribute to an overall "effect" on any group of people, i.e., effects may be either positive and negative, depending on the group affected, and may be both positive and negative when different groups are differentially affected.

Similar to the biophysical assessments, the initial socio-economic significance analysis focuses on three key assessment components for any specific component of the socio-economic environment that is affected by the Project:

- Duration: short-term (effects do not last materially beyond the construction phase or last only during short periods [no more than a few years] of the Project's operations phase); and long-term (effects last throughout a major portion of the operations phase).
- Magnitude: small (no definable or measurable effect on the socio-economic environment under consideration); moderate (effect could be measured, i.e., be statistically significant, with a well-defined monitoring program); and large (effects are readily discernible, i.e., likely to be readily noticeable without a monitoring program).
- Socio-economic "geographic" extent: site specific (effects confined to the immediate footprint of the project or are confined to a small number of people in a small area); local (effects confined to a moderate number of people within a definable group in the Flood Study Region); and region (effects extend to a major portion of a definable group of people, i.e., a major portion of the Flood Study Region population or of specific major communities in the Flood Study Region).

Similar to the biophysical approach, the socio-economic assessment approach recognizes that focusing on the above three components can guide the analysis and help to identify effects where additional assessment components should be considered.

The socio-economic assessment uses the following definitions for an initial rating of residual effects on the socio-economic environment for the purpose of determining significance of these effects:

- Significant – Major Residual Effect: Effects are long-term, large, and regional.
- Potentially Significant – Moderate Residual Effect: Effects which fall between "major" and "minor", and thus are "potentially significant". Essentially, the effect typically is either (a) long-term, and either large and regional or moderate and local/regional, or (b) short-term, and either large and regional/local or moderate and regional. In order to make a final determination of significance for these effects, additional factors will often need to be considered, e.g., concurrent effects on other socio-economic components affecting the same group of people or others in the same socio-economic region, effectiveness of mitigation measures and the degree to which the affected people have any control over mitigation (which may reflect "vulnerability" in socio-economic terms), the extent to which the socio-economic component is affected by the Project (magnitude, frequency, and reversibility of the effect), and overall confidence in the assessment after consideration of potential mitigation and other factors.

- Not Significant or Insignificant – Minor Residual Effect: Effects are either (a) short-term and either small or moderate and not regional, or (b) long-term and either small or moderate and site specific.
- Not Significant or Negligible (insignificant) Residual Effect: No definable effect at any level or is insufficient to be termed a minor effect, and generally indistinguishable from projected baseline conditions.

While the significance of all socio-economic effects is important for many purposes, not all socio-economic adverse effects are defined as "environmental effects" under *CEAA*. The *CEAA* test requires a determination as to whether a residual effect is a "significant adverse environmental effect" that is likely to be caused by the Project. Only socio-economic effects caused by a change in the biophysical environment which, in turn, has been caused by the Project are "environmental effects" as defined in *CEAA*.

Residual biophysical and socio-economic effects of the Project related to flood events are each examined separately from other effects (i.e., effects arising during construction or inactive operation) in order to recognize their special nature. Flood events specifically related to changes resulting from the Floodway Expansion Project (i.e., flood magnitudes equal to at least the 1997 flood) tend to be of very short duration as well as rare in frequency – however, it remains relevant to assess the significance of any residual effects of the Project related to such flood events (i.e., are such effects "short-term" or "long-term" in duration, and what is their spatial extent and magnitude).

Where significant adverse effects are predicted for biophysical or socio-economic residual effects (as defined by *CEAA*), the likelihood of significance is discussed in terms of both the probability of occurrence and the degree of "scientific uncertainty". In this context, Table 2.3-1 defines an assessed significant adverse effect as "moderately likely" when there is a material uncertainty that the effect will in fact end up being "significant".

Table 2.3-1
Definitions for Likelihood of Significance as Applied to Significant Adverse Residual Effects

Rating	Likelihood of Significance
Highly Likely	The effect is probable and there is limited uncertainty based on previous experience and local knowledge.
Moderately Likely	The effect is considered likely to occur, but there is material uncertainty that it will be significant, based on previous experience and local knowledge.
Not Likely	The effect has a small probability of occurring and there is little uncertainty based on previous experience and local knowledge.
Unknown	There is insufficient experience and local knowledge to predict the probability of the effect occurring and it is difficult to determine the probable outcome of mitigation measures.

2.4 SOURCES OF INFORMATION

The EIS incorporates original studies conducted by engineers or scientists commissioned by MFEA specific to the Project, including identification of facility design documents prepared by engineers as they become available and scientific and technical reports and papers on topics relevant to the Project (Section 2.4.1), and local knowledge and available experience (Section 2.4.2). Other information sources include meetings with regulatory agencies (Section 2.4.3) and existing published and unpublished information (Section 2.4.4).

2.4.1 Technical Studies Specific to the Project

Studies completed by various qualified engineering firms during the Project pre-design process, including detailed project description information, forms the primary technical reference documents for this EIS. Separate reports completed and available publicly on the completed pre-design work for the Project are referenced below and detailed in Chapter 11:

- Floodway Expansion Preliminary Engineering Report
- Bridges and Transportation Pre-Design Report Appendix A
- Floodway Channel Pre-Design Report Appendix B
- Inlet Control Structure Pre-Design Report Appendix C
- Outlet Structure/Channel, Local Drainage Structures and Syphons Pre-Design Report Appendix D
- Utility Crossing Pre-Design Report Appendix E
- West Dyke Surveys, Field Investigations and Pre-Design Report Appendix F
- Baseline Studies Appendices G - S

This pre-design activity and engineering work incorporates scientific and technical studies of similar facilities and processes related to the specific work parcel.

2.4.2 Local Knowledge and Available Experience

From the outset of the study program, local knowledge and available experience have been incorporated into the design and implementation of the environmental and planning studies for the Project.

The assessment process for the Project has emphasized consultation and involvement with potentially affected communities, Aboriginal peoples and other interested groups (Chapter 3). This consultation and public involvement has provided the EIS with important information with regard to local knowledge, concerns and interests as well as available experience with flooding and effects of the Existing Floodway.

2.4.3 Regulatory Meetings

Meetings with regulatory agencies (PAT and TAC), as well as provincial and federal government departments, were also held to discuss the status of the environmental and socio-economic studies and provide information to assess ongoing changes to this program (Chapter 1, Section 1.5).

2.4.4 Existing Published and Unpublished Information

Detailed literature searches and personal contacts were conducted to identify both published and unpublished information. A list of the documents utilized and depended on in this assessment is provided in Chapter 11.