9.0 CUMULATIVE EFFECTS

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions (Hegmann et al. 1999). The cumulative effects assessment for the Pointe du Bois Spillway Replacement Project (the Project) was conducted with consideration of the guidance provided by the following:

- The *Canadian Environmental Assessment Act* (1992);
- The Pointe du Bois Spillway Replacement Project Environmental Assessment Scoping Document (Manitoba Hydro August 2010);
- Guidelines for cumulative effects assessments for other projects in Manitoba (e.g., the Manitoba Floodway Project (the Province of Manitoba 2004); and
- Review of other guidance documents for cumulative effects assessment (e.g., Cumulative Effects Assessment Practitioners Guide (Hegmann et al. 1999)).

The *Canadian Environmental Assessment Act* (1992) requires that a cumulative effects assessment be conducted as per Section 16(1) of the Act:

"Every screening or comprehensive study of a project and every mediation or assessment by a review panel shall include a consideration of the following 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;
>
> (b) the significance of the effects referred to in paragraph (a)

In keeping with the above, Section 8.3 of the Pointe du Bois Spillway Replacement Project Environmental Assessment Scoping Document (Manitoba Hydro August 2010) states that:

> In addition to describing the direct effects of the Project, the EIS will also include an assessment of cumulative effects. The Cumulative Effects Assessment (CEA) will include a consideration of the potential for Project effects to act in combination with the effects of other past, present and/or reasonably foreseeable future projects in the Study Area (to be defined for the CEA). The EIS will outline the approach and methods for the CEA, and will include a description of the spatial and temporal boundaries used in the assessment.

Guidance documents such as the Operational Policy Addressing Cumulative Environmental Effects Under the *Canadian Environment Assessment Act* and the Cumulative Effects Practitioners Guide will be used to formulate the CEA process.

The Pointe du Bois Spillway Replacement Project Environmental Assessment Scoping Document reflects the guidelines for cumulative effects assessment for other projects in Manitoba. For example, the guidelines for the Winnipeg Floodway Project (Guidelines for the Preparation of an Environmental Impact Statement for the Winnipeg Floodway Expansion Project 2004), which were prepared pursuant to the requirements of *The Environment Act* and The *Canadian Environmental Assessment Act*, state 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. The environmental impact statement shall explain the approach and methods used to identify and assess the cumulative effects and provide a record of all assumptions and analysis that support the conclusions, including the level of confidence in the data used in the analysis."

Additional guidance is also provided by the Cumulative Effects Working Group (CEWG), which was established to give direction on conducting cumulative effects assessments in Canada. The CEWG states that:

"… 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 beyond an acceptable point (by whatever definition). Therefore, although the total cumulative effect on a VEC due to many actions (defined as projects and activities) 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 (Hegmann et al. 1999)."

9.1 Scoping of the Cumulative Effects Assessment

9.1.1 Spatial Scope of the Assessment

The spatial boundary considered for the cumulative effects assessment was the regional study area as shown in (Figure 7.26).

9.1.2 Temporal Scope of the Assessment

The temporal scope of the assessment extends into the future for a period of 20 years, by which time rehabilitation work will have been completed and the effects of the Pointe du Bois Spillway Replacement Project will not be measureable.

Past and current projects (e.g., existing cottages and recreational facilities, Slave Fall GS, and the Pointe du Bois GS) form an integral part of, and have been incorporated into, the description of the existing environment against which the effects of the Project, and the effects of the Project in combination with other future projects, are assessed

(Chapter 7.0). Past projects were included in the cumulative effects assessment only if on-going effects were expected to change over time to the extent that there would be a measureable effect on the existing environment.

9.1.3 Selection of VECs for Cumulative Effects Assessment

Valued Environmental Components were selected for the cumulative effects assessment if there was:

- A residual negative effect of the Project on that VEC (VECs with no residual effect or a positive residual effect are not included). It should be noted that a VEC may be affected in several ways (e.g., short-term decrease in water quality and a long-term increase in habitat). The VECs selected for the cumulative effects assessment are those that have an overall residual negative effect when all effects (both positive and negative) are combined;
- A temporal overlap of the effects of the Pointe du Bois Spillway Replacement Project on that VEC with the effects of other projects; and
- A spatial overlap of the effects of the Pointe du Bois Spillway Replacement Project on that VEC with the effects of other projects.

The following provides a list of the VECs considered and the rationale for their inclusion or exclusion from the cumulative effects assessment:

- Merritt Fernald's sedge and white wood aster are included as there are small, but negative residual effects and a potential for spatial and temporal overlap with other projects;
- Monarch butterfly is included as there are small, but negative residual effects and a potential for spatial and temporal overlap with other projects;
- Northern leopard frogs and common snapping turtles are included as there are small, but negative residual effects and a potential for spatial and temporal overlap with other projects;
- Bald eagle, osprey, and Canada warbler are included as there are small, but negative residual effects and a potential for spatial and temporal overlap with other projects;
- Lake sturgeon is not included in the cumulative effects assessment. The Project has been planned specifically to avoid effects on lake sturgeon and lake sturgeon habitat (including spawning habitat) and a residual negative effect on lake sturgeon is not expected. Lake sturgeon populations will be monitored and if unanticipated negative residual effects do occur, the effects can be mitigated through adaptive management (e.g., manipulation of flows or modifications to downstream habitat);

- Northern pike and walleye are not included in the cumulative effects assessment as the residual effects of the Project on northern pike and walleye are expected to be small but positive;
- Employment is not included as the residual effect is positive;
- Business opportunities are not included as the residual effect is positive; and
- Enjoyment of the local area, which includes increased traffic, noise and aesthetic changes, has been included as there are negative residual effects, and a potential for spatial and temporal overlap with other projects.

9.1.4 Selection of Projects for the Cumulative Effects Assessment

As noted in Section 9.1.2, past and current projects form an integral part of, and have been incorporated into, the description of the existing environment. Projects selected for inclusion in the cumulative effects assessment are:

- Projects that have already been approved and are being constructed or are planned to be constructed/carried out;
- Projects that are in a government approvals process; or
- Existing projects where on-going effects are expected to measurably change over time. Past projects are included only if on-going effects are expected to change to the extent that there will be a measureable change in the effect on the existing environment. As previously noted, the effects of past projects (e.g., the Pointe du Bois GS) have been incorporated into the description of the existing environment (Chapter 7.0).

The following provides a list of the projects considered and the rationale for their inclusion or exclusion from the cumulative effects assessment. It should be noted that the effects of these projects are only described with respect to VECs included in the cumulative effects assessment for the Pointe du Bois Spillway Replacement Project.

9.1.4.1 Pointe du Bois Generating Station

The Pointe du Bois GS has been in operation since 1911 (construction occurred between 1909 and 1926). As the environment at the Pointe du Bois GS has stabilized (the generating station has been in place for approximately 100 years) and as on-going maintenance to the power house will occur with or without the Project, the Pointe du Bois GS has been excluded from the cumulative effects assessment. In addition, operation of the station will not be affected by the construction of the new spillway (i.e., there will be no effect to water levels and flows) and, therefore, no flooding of terrestrial habitat will occur. It should be noted that although the spillway has been designed to accommodate a new powerhouse, there are no current plans to replace the powerhouse.

9.1.4.2 Pointe du Bois Vehicle Access Bridge

Manitoba Hydro is currently constructing a vehicle access bridge at the Pointe du Bois GS. As part of the Manitoba Hydro Dam Safety Program, it was determined that access to the spillway structures at the Pointe du Bois GS was required to facilitate potential emergency repairs to the existing structure. The bridge will also be used for the construction, operation, and maintenance of the new spillway structures. The bridge Project consists of a west approach and tie-in, an east approach and tie-in, a rock groin, piers and abutments, and superstructure. A detailed project description and an assessment of the potential effects of the project are provided in the Pointe du Bois Vehicle Access Bridge Environmental Assessment (Manitoba Hydro 2009).

The majority of construction work has been completed and the access bridge is functional. Any remaining work will be completed by the end of the summer 2011 prior to initiation of work on the Project. As there is a potential for the effects of the bridge project to overlap with the Spillway Replacement Project, it has been included in the cumulative effects assessment.

The environmental assessment (EA) for the Pointe du Bois Vehicle Access Bridge (Manitoba Hydro 2009) provides the following information relevant to the VECs selected for the cumulative effects assessment (Section 9.1.3):

- Merritt Fernald's sedge was found at five locations; the presence of white aster was not noted. Dogbane and milkweed, which are food sources for monarch butterflies, were also not noted. Mitigation to reduce effects on Merritt Fernald's sedge and mitigation to minimize effects on existing vegetation were described. Residual effects on vegetation were characterized as low in magnitude and geographical extent, short-term, and largely reversible;
- Northern leopard frogs and common snapping turtles were not specifically discussed in the EA but do occur in the general area. It is expected that residual effects, if any, would not be measureable as construction of the Access Bridge was primarily contained within the maintenance and operations area of the generating station;
- Bald eagles, osprey, and Canada warblers occur in the general area. The EA stated that the construction and operation of the Access Bridge could affect wildlife in the area (e.g., disruption of movements along riparian corridors, increased noise during construction, and presence of a workforce). Mitigation measures to reduce the effects on wildlife were described. Residual effects on wildlife, in general, were considered to be minor, short-term, and restricted to a relatively small area; and
- Potential effects on the use of the area for recreation/cottages were primarily related to increased noise during construction and reduced aesthetics. The residual effects of the Access Bridge were considered to be minor, short-term,

and restricted to a relatively small, previously disturbed area (the maintenance and operations area of the generating station).

9.1.4.3 Slave Falls Generating Station

The Slave Falls GS is located 10 km downstream from Pointe du Bois GS. Construction on the Slave Falls GS was initiated in 1928 and completed in 1948. As the environment at the Slave Falls GS has stabilized (the generating station has been in place for over 75 years) and as on-going maintenance will occur with or without the Project, the Slave Falls GS has been excluded from the cumulative effects assessment.

9.1.4.4 Slave Falls Tramway Conversion Project

The 11 km tramway between Pointe du Bois and Slave Falls is in the final stage of being converted to an all-season road with road access now in place to the Slave Falls cut-off dam. Construction began in 2009 and is expected to be completed by the end of 2011.

Conversion of the existing tramway to an all-weather road will reduce associated operation and maintenance costs, and will improve response times to emergencies. The all-weather road will support efficient vehicle access to the Slave Falls GS and will increase the ability of Manitoba Hydro to safely operate and maintain the station (Manitoba Hydro/MMM Group 2008).

The EIS for the Slave Falls Tramway Conversion Project (Manitoba Hydro/MMM Group 2008) provides the following information relevant to the VECs selected for the cumulative effects assessment (Section 9.1.3):

- Merritt Fernald's sedge was found at four locations; the presence of white aster, dogbane, and milkweed was not noted. The EIS stated that Manitoba Hydro would implement a "best efforts" approach within the constraints of the road to minimize effects on terrestrial vegetation;
- Reptiles and amphibians occur in the tramway study area and could be affected by construction and operation of the tramway conversion project (e.g., effects on habitat, direct mortality, and sensory disturbance). Mitigation to reduce the effects was described. The residual effects of the project on amphibians and reptiles were expected to be small, site-specific, short-term, and insignificant;
- Bald eagles, osprey, and Canada warblers occur in the tramway study area and could be affected by construction and operation of the project (e.g., habitat loss, sensory disturbance, effects on nests). Mitigation to reduce effects on birds was described. The residual effects of the tramway conversion project on birds were considered to be minor and insignificant; and
- Potential effects on the use of the area for recreation/cottages were described (e.g., decreased aesthetics, reduced air quality, public safety, and increased traffic and noise). The alignment of the road reduced the effect on existing cottages (it starts at the Pointe du Bois townsite and primarily follows the existing tramway

right-of-way). It was expected that the residual effects of the tramway conversion project on recreation/cottages would be minor and not significant.

9.1.4.5 Shand Cottage Subdivision

Approximately 30 lots will be developed within the Shand Cottage Subdivision (Subdivision) which is located south of Eight Foot Falls and east of the Slave Falls road. The lots have been sold and construction has started and is expected to continue over the next several years.

The access road to the subdivision runs from the Eight Foot Falls area along the existing transmission line right-of way. Information on the potential environmental effects of the subdivision project was not located; however, there is a potential for overlap with the Project and it has, therefore, been included in the cumulative effects assessment.

It is expected that the Subdivision project will result in:

- A small but permanent loss of vegetation;
- A small but permanent loss of wildlife habitat;
- Disturbance to wildlife during construction and use of the cottages and associated infrastructure;
- An increase in noise and a decrease in aesthetics during the construction period;
- Increased truck traffic on PR 313, through the townsite and on the existing cottage access road to Eight Foot Falls during construction;
- A small but permanent increase in boat traffic between Pointe du Bois GS and Slave Falls GS; and
- Increased traffic through the townsite and on the existing cottage road to Eight Foot Falls as a result of the new cottage owners accessing their properties.

9.1.4.6 Sawmill Bay Boat Launch Parking Improvements

The boat launch located on a small peninsula located northwest of the Pointe du Bois GS is used to access the Pointe du Bois forebay. This boat launch, known as the Manitoba Hydro boat launch, will be closed to public use during construction. It will re-open following completion of the Pointe du Bois Spillway Replacement Project. Manitoba Hydro will work with Manitoba Conservation, Parks Branch, to determine a feasible option to reduce the impact to the Sawmill Bay boat launch as a result of increased usage. This may include expansion of the parking area at the Sawmill Bay boat launch for public use. The expanded parking area would assist in accommodating the public displaced from the existing Manitoba Hydro boat launch during the Project construction period. After construction of the Project has been completed, the Manitoba Hydro boat launch will be re-opened.

There is a potential overlap with the Project both temporally and spatially and the parking lot improvement project has, therefore, been included in the cumulative effects assessment.

Detailed information of the potential environmental effects of the expansion of the parking area is not currently available but it is expected that the parking lot improvement project would result in:

- A small but permanent loss of vegetation;
- A small but permanent loss of wildlife habitat;
- A short-term disturbance to wildlife during construction;
- A short-term increase in the use of the Sawmill Bay boat launch which would increase noise and traffic in the area and negatively affect nearby cottages thereby decreasing the enjoyment of the local area; and
- A short-term increase in noise and a decrease in aesthetics during the construction period.

It is expected that the effects of the parking lot improvement project would be minor and limited to a very small area.

9.1.4.7 Transmission Line Upgrade

An upgrade to the existing transmission lines between Pointe du Bois and Slave Falls and the Whiteshell Station is expected to be undertaken in the next several years. As the transmission line upgrade could overlap both temporally and spatially with the Project it has been included in the cumulative effects assessment.

The upgrade activities would take place on the existing right-of-way and would be completed over a relatively short period of time. Detailed information on the potential environmental effects of the transmission line upgrade are not currently available but it is expected that the transmission line upgrade project would result in:

- A small, short-term loss of vegetation (disturbed areas will be rehabilitated);
- A small, short-term loss of wildlife habitat during construction and during rehabilitation of disturbed areas;
- A short-term disturbance to wildlife during construction; and
- A short-term increase in traffic and noise and a decrease in aesthetics during the construction period.

Overall, it is expected that the effects on vegetation, wildlife, and use of the area for recreation would be short-term, local, and minor.

Based on the above, the projects that will be included in the cumulative effects assessment are the:

- Pointe du Bois Vehicle Access Bridge;
- Slave Falls Tramway Conversion Project;
- Shand Cottage Subdivision;
- Sawmill Bay Boat Launch Parking Improvements; and
- Transmission Line Upgrade.

9.2 Assessment of Cumulative Effects on VECs

In considering the cumulative effects of the projects it should be noted that:

- The construction of the Pointe du Bois Vehicle Access Bridge will not overlap with the construction of the Project;
- The construction of the Tramway Conversion could overlap with construction of the Project for several months; and
- The construction of the Shand Cottage Subdivision, the Sawmill Bay Boat Launch Parking Improvements, and the Transmission Line Upgrade will overlap with the construction of the Project.

It should also be noted that with the exception of the Shand Cottage Subdivision, Manitoba Hydro is conducting or participating in all of the projects being considered for the cumulative effects assessment. This will facilitate the management and/or reduction of potential cumulative effects. Manitoba Hydro has provided mitigation/remediation for the effects of the Slave Falls Tramway Conversion Project and the Pointe du Bois Vehicle Access Bridge Project. Monitoring results and follow-up for all of these projects will be co-ordinated and Manitoba Hydro is committed to avoiding or remediating the effects of its future activities in the area.

9.2.1 Merritt Fernald's Sedge and White Wood Aster

The Project is expected to have a negative residual effect on Merritt Fernald's sedge and white wood aster due to the potential loss of individual plants during clearing and construction. It will be small in magnitude, local in geographic extent and short-term in duration. Mitigation has been provided (e.g., plants will be flagged to avoid disturbance to the extent practicable) and cleared areas will largely be rehabilitated.

During the operation of the Project (with the exception of a minor loss of habitat) the future with and without the Project will be the same (i.e., the effects of the current operation of the spillway on Merritt Fernald's sedge and white wood aster will be similar to the effects of the future operation of the spillway).

In addition to the Project, clearing and/or disturbance of terrestrial vegetation on the Pointe du Bois Vehicle Access Bridge Project, the Tramway Conversion Project, the transmission line upgrade, and the Sawmill Bay Boat Launch Parking Improvements could also negatively affect Merritt Fernald's sedge and white wood aster. As noted above, Merritt Fernald's sedge was found at four locations in the study area for the Tramway Conversion Project and at five locations in the study area for the Pointe du Bois Vehicle Access Bridge. Manitoba Hydro has provided mitigation for these projects and is committed to providing mitigation for rare plants on future projects through the flagging of individual plants to avoid disturbance or through the rehabilitation of affected areas. The effects of these projects both individually and cumulatively are expected to be not significant.

The construction of the Shand Cottage Subdivision could add to the loss of individuals of rare plant species, but no information on the potential effects of the Subdivision on rare plants is available. It should be noted, however, that the project is relatively small compared to other projects planned or currently being conducted in the area.

9.2.2 Monarch Butterfly

The Project is expected to have a negative residual effect on the monarch butterfly due to the loss of larval food sources such as dogbane and milkweed and sensory disturbance during clearing and construction activities. It will be small in magnitude, site specific related to geographic extent and short-term in duration. The effects related to sensory disturbance cannot be mitigated but will be restricted to the construction period. Mitigation for habitat loss will be provided through the rehabilitation of the majority of the cleared and disturbed areas. During the operation of the Project (with the exception of a minor loss of habitat) the future with and without the Project will be the same (i.e., the effects of the current operation of the spillway on monarch butterflies will be similar to the effects of the future operation of the spillway).

In addition to the Project, construction activities/noise and clearing and/or disturbance of terrestrial vegetation on the Pointe du Bois Vehicle Access Bridge Project, the Tramway Conversion Project, the transmission line upgrade, and the Sawmill Bay Boat Launch Parking Improvements could also negatively affect monarch butterflies. Manitoba Hydro has provided mitigation for the existing projects and is committed to providing mitigation for future projects through the rehabilitation of cleared and disturbed areas.

The effects of sensory disturbance which cannot be avoided, would occur primarily during the overlapping construction periods which will be short-term (construction of the tramway conversion project will not overlap with the Project and construction of the vehicle access bridge is currently nearing completion). The effects of these projects both individually and cumulatively are expected to be insignificant.

Construction of the Shand Cottage Subdivision could add to sensory disturbances during construction and the loss of dogbane and milkweed from clearing. No information on the potential effects of the Subdivision was located and it is not possible to consider its cumulative effects on the monarch butterfly. It should be noted, however, that the project is relatively small and dogbane and milkweed are common in the study area and are found throughout southern Manitoba.

9.2.3 Northern Leopard Frog and Common Snapping Turtle

The Project is expected to have a negative residual effect on northern leopard frogs and common snapping turtles, primarily due to habitat disturbance and sensory effects such as increased noise during construction and the temporary loss of small ponds. It will be small in magnitude, site specific related to geographic extent, both short-term (related to noise disturbance). To a limited extent, direct mortalities may also occur due to increased traffic. The majority of construction activities will occur in areas where infrastructure is already in place (low quality habitat) and areas cleared or disturbed will be largely rehabilitated although the loss of some small ponds may occur. The effects of sensory disturbances and increased traffic during construction cannot be mitigated but will be short-term (i.e., the construction period). During the operation of the Project (with the exception of a minor loss of habitat) the future with and without the Project will be the same (i.e., the effects of the current operation of the spillway on northern leopard frogs and common snapping turtles will be similar to the effects of the future operation of the spillway).

In addition to the Project, clearing and habitat disruption will also occur as a result of the Pointe du Bois Vehicle Access Bridge, the Slave Falls Tramway conversion project, the transmission line upgrade, and the Sawmill Bay boat launch parking improvements. The majority of habitat in these areas is considered low quality as the projects will be/are constructed in previously disturbed areas (e.g., the transmission line upgrades will occur within the existing right-of-way and the Slave Falls Tramway Conversion Project primarily followed the existing tramway. Disturbed habitat will also be rehabilitated to the extent practicable. Other mitigation measures (e.g., the removal of rails from the tramway will enable turtles to move more freely between areas).

In addition to the Project, construction activities related to the transmission line upgrade and the Sawmill Bay Boat Launch Parking Improvements could also negatively affect northern leopard frogs and common snapping turtles. These effects (primarily sensory disturbances and direct mortality from increased traffic) would occur primarily during the overlapping construction periods, which will be short-term (construction of the Tramway Conversion Project will not overlap with the Project and construction of the Vehicle Access Bridge is currently nearing completion).

Sensory disturbance and direct mortalities from increased traffic cannot be fully mitigated but will be site specific, short-term, and minor. The loss of habitat will be

negligible in comparison to the amount of habitat in the study area and the effects of these projects both individually and cumulatively are expected to be not significant.

Construction of the Shand Cottage Subdivision could add to the effects of sensory disturbance to northern leopard frogs and common snapping turtles during the construction period and some habitat losses or disruptions may occur. However, due to the lack information on the potential effects of the subdivision it is not possible to consider its cumulative effects on northern leopard frogs and common snapping turtles. It should be noted, however, that the project is relatively small compared to other projects planned or currently being conducted in the area.

9.2.4 Bald Eagles and Osprey

The Project is expected to have a negative residual effect on bald eagles and osprey due to sensory disturbances, primarily during the construction period. It will be small in magnitude, site specific related to geographic extent, and short-term in duration. Other potential effects will be largely avoided or mitigated (e.g., avoidance or relocation of nests). During the operation of the Project (with the exception of a minor loss of habitat) the future with and without the Project will be the same (i.e., the effects of the current operation of the spillway on bald eagles and osprey will be similar to the effects of the future operation of the spillway).

In addition to the Project, construction activities related to the transmission line upgrade and the Sawmill Bay Boat Launch Parking Improvements could also negatively affect bald eagles and osprey in the study area. These effects would occur primarily during the overlapping construction periods which will be short-term (construction of the Tramway Conversion Project will not overlap with the Project and construction of the Vehicle Access Bridge is currently nearing completion).

With the exception of sensory disturbance which cannot be avoided during construction, mitigation has been provided for all Manitoba Hydro projects and the effects of these projects both individually and cumulatively are expected to be not significant.

Construction of the Shand Cottage Subdivision could add to the effects of sensory disturbance to bald eagles and osprey during the construction period. However, due to the lack of information on the potential effects of the Subdivision it is not possible consider its cumulative effects on bald eagles and osprey. It should be noted, however, that the project is relatively small and that bald eagle and osprey habitat in the general area is not limiting.

9.2.5 Canada Warbler

The Project is expected to have a negative residual effect on the Canada warbler due to sensory disturbances during the construction period. It will be small in magnitude, site specific related to geographic extent and short-term in duration. Other potential effects

will be largely avoided or mitigated (e.g., clearing will be conducted outside of the nesting period and cleared and disturbed areas will be largely rehabilitated). During the operation of the Project (with the exception of a minor loss of habitat) the future with and without the Project will be the same (i.e., the effects of the current operation of the spillway on Canada warbler will be similar to the effects of the future operation of the spillway).

In addition to the Project, construction activities related to the transmission line upgrade and the Sawmill Bay Boat Launch Parking Improvements could also negatively affect Canada warbler. These effects would occur primarily during the overlapping construction periods which will be short-term (construction of the Tramway Conversion Project will not overlap with the Project and construction of the Vehicle Access Bridge is currently nearing completion). With the exception of sensory disturbance which cannot be avoided during construction, mitigation (e.g., habitat rehabilitation) has been provided for all Manitoba Hydro projects and the effects of these projects both individually and cumulatively are expected to be not significant.

Construction of the Shand Cottage Subdivision could add to the effects of sensory disturbance to Canada warbler during the construction period. However, due to the lack of information on the potential effects of the Subdivision it is not possible consider its cumulative effects on Canada warbler. It should be noted, however, that the project is relatively small and that Canada warbler habitat in the general area is not limiting.

9.2.6 Enjoyment of Local Area

The primary effects of the Project on the "enjoyment of the local area" include the following:

- An improved level of dam safety that will be beneficial to local property (positive, large in magnitude, local/regional in geographic extent, and long-term in duration);
- Traffic levels as a result of construction activities (negative, moderate in magnitude, regional in geographic extent and short-term in duration);
- Increased traffic levels and wait times as a result of additional use of the Sawmill Bay boat launch (negative, moderate in magnitude, local in geographic extent and short-term in duration); and
- Aesthetic changes in the appearance of the immediate area, both from removal of vegetation from the east side of the river and the center island as well as construction and decommissioning activities (negative, moderate in magnitude, site specific related to geographic extent and medium-term in duration).

With the exception of reduced aesthetics which will be largely rehabilitated, the majority of the negative effects will occur during the construction period for the Project. During the operation of the Project the future with and without the Project will be similar (i.e.,

the effects of the current operation of the spillway on the enjoyment of the local area would be similar to the effects of the future operation of the spillway). Some aesthetics effects will remain for the first several years of operation. In addition to the Project, construction activities related to the transmission line upgrade and the Sawmill Bay Boat Launch Parking Improvements could negatively affect noise and traffic. These effects would occur primarily during the overlapping construction periods which will be short-term (construction of the Tramway Conversion Project will not overlap with the Project and construction of the Vehicle Access Bridge is currently nearing completion).

Despite mitigation, the combined effects of the transmission line upgrade and the boat launch parking improvements with the Project on traffic and noise will be negative, moderate in magnitude, local in geographic extent, and short-term in duration. With respect to aesthetics, the combined effects will be negative, moderate in magnitude, local in geographic extent, and medium-term in duration.

Construction of the Shand Cottage Subdivision could add to the effects of increased traffic and noise during the construction period. However, due to the lack of information on the potential effects of the Subdivision it is not possible consider its cumulative effects on the enjoyment of the area. It should be noted, however, that the project is relatively small compared to other proposed or on-going projects.

The combined effects of these projects on the enjoyment of the local area will be moderate in magnitude, primarily local in geographic extent, and short-term in duration. They are not expected to be significant.

9.3 Summary of Cumulative Effects

The effects of the Project combined with the effects of other projects (i.e., cumulative effects) on the VECs are not expected to be significant.

10.0 SUSTAINABILITY ASSESSMENT

10.1 Sustainable Development

The concept of **sustainable development** is considered a general philosophy, ethic and approach to guide individual and collective behaviour in respect of the environment, the economy, and social well-being, each being equal and mutually reinforcing. A generally accepted definition of sustainable development is provided from the report published by the Brundtland Commission in 1987 titled Our Common Future. The definition is that "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*".

In the context of the general philosophy of sustainable development, the sustainability assessment of the Project considered how the federal, provincial and Manitoba Hydro sustainable development goals, guidelines and principles were addressed in the planning, design, construction, operation and maintenance, and eventual decommissioning of the Project.

10.2 Federal Sustainable Development Goals

The purpose of the *Federal Sustainable Development Act* is to provide the legal framework for developing and implementing a Federal Sustainable Development Strategy that will make environmental decision-making more transparent and accountable to Parliament. The basic principle is that the Government of Canada accepts that sustainable development is based on an ecologically efficient use of natural, social and economic resources and acknowledges the need to integrate environmental, economic and social factors in the making of all decisions by government.

In October 2010, the report titled "Planning for a Sustainable Future: A Federal Sustainable Development Strategy for Canada" was published (Executive Summary-Attachment 10.1). Table 10.1 illustrates how the Project addresses the goals in the federal strategy.

10.3 Provincial Sustainable Development Principles and Guidelines

In 1998, the Province of Manitoba established *The Sustainable Development Act* (the Act) in order to create a framework through which sustainable development can be implemented in the provincial public sector and promoted in private industry and society generally. The Act contains principles and guidelines as the framework for implementing sustainable development in the province (Attachment 10.2). Tables 10.2 and 10.3 illustrate how the Project addresses the provincial principles and guidelines, respectively.

10.4 Manitoba Hydro Sustainable Development Principles

Manitoba's Crown Corporations are required to establish and adopt a corporate sustainable development policy to complement sustainable development in the province. Manitoba Hydro has developed sustainable development principles (Attachment 10.3) to guide implementation of Manitoba Hydro developments. Table 10.4 illustrates how the Project addresses the Manitoba Hydro principles.

10.5 Provincial Sustainability Indicators and Trends

In addition to Principles and Guidelines, the Province of Manitoba has developed sustainability indicators and trends (as outlined in the Provincial 2009 Sustainability Report for Manitoba) as an evaluation measure for sustainable development. The indicators and trends address the three dimensions of natural environment, economy and social well-being (Executive Summary-Attachment 10.4). Table 10.5 outlines how the Project affects the Provincial Sustainability Trends.

10.6 Project Sustainability Assessment Conclusion

Based on the analysis undertaken in consideration of federal, provincial and Manitoba Hydro goals, principles and guidelines, the Spillway Replacement Project is considered to be a sustainable development that will meet the needs of the present without compromising the ability of future generations to meet their needs.

Table 10.1: Federal Sustainable Development Strategy	
Goal	**Project Attribute**
Goal 1: Climate Change Reduce greenhouse gas emission levels to mitigate the severity and unavoidable impacts of climate change.	The total greenhouse gas emissions for construction and operation of the Project are approximately 0.003% of the provincial energy sector total. The Project supports the on-going operations at the Pointe du Bois GS which produces an average of 580 GWH per year of renewable energy. In comparison to an equivalent amount of energy produced from thermal (coal) generating stations, the Project may contribute to an annual reduction of 435,000 tonnes of CO_2 emissions.
Goal 2: Air Pollution Minimize the threats to air quality so that the air Canadians breathe is clean and supports healthy ecosystems.	Measures will be implemented to reduce potential effects to air quality during construction. Emissions as a result of operation of the Project will be minimal.
Goal 3: Water Quality Protect and enhance the quality of water so that it is clean, safe and secure for all Canadians and supports healthy ecosystems.	Measures will be implemented to reduce the potential of affecting water quality during construction and operation. Effects to water quality from the construction and operation of the Project will be minimal.
Goal 4: Water Availability Enhance information to ensure that Canadians can manage and use water resources in a manner consistent with the sustainability of the resource.	Historic water levels will be maintained. The Project has been designed to minimize changes to flow patterns.
Goal 5: Wildlife Conservation Maintain or restore populations of wildlife to healthy levels.	The Project is not expected to affect wildlife populations.
Goal 6: Ecosystem / Habitat Conservation and Protection Maintain productive and resilient ecosystems with the capacity to recover and adapt; and protect areas in ways that leave them unimpaired for present and future generations.	The productivity of the ecosystem will be maintained. Special efforts have been undertaken to avoid and minimize effects on lake sturgeon spawning habitat in order to maintain their productive ecosystem.
Goal 7: Biological Resources Sustainable production and consumption of biological resources are within ecosystem limits.	The production and consumption of biological resources will be within ecosystem limits.
Goal 8: Greening Government Operations Minimize the environmental footprint of government operations.	The Project has been designed to minimize the change to the environment. For example, the Project will be constructed and operated within the existing water regime.

Table 10.2: Manitoba Sustainable Development Principles	
Principle	**Project Attribute**
Integration of Environmental and Economic Decisions: ♦ Economic decisions should adequately reflect environmental, human health and social effects. ♦ Environmental and health initiatives should adequately take into account economic, human health and social consequences.	Manitoba Hydro developed criteria for evaluating general arrangements. The criteria included dam safety, lake sturgeon habitat, stakeholder effects, constructability, ability to accommodate a future powerhouse and cost.
Stewardship: ♦ The economy, environment, human health and social well-being should be managed for the equal benefit of present and future generations. ♦ Manitobans are caretakers of the economy, the environment, human health and social well-being for the benefit of present and future generations. ♦ Today's decisions are to be balanced with tomorrow's effects	Manitoba Hydro developed criteria for evaluating general arrangements. The criteria included dam safety, lake sturgeon habitat, stakeholder effects, constructability, ability to accommodate a future powerhouse and cost. The Project is required in order to maintain public and dam safety, and provide a safer working environment for staff. It has been designed to minimize the change to the environment
Shared Responsibility and Understanding: ♦ Manitobans should acknowledge responsibility for sustaining the economy, the environment, human health and social well-being, with each being accountable for decisions and actions in a spirit of partnership and open cooperation. ♦ Manitobans share a common economic, physical and social environment. ♦ Manitobans should understand and respect differing economic and social views, values, traditions and aspirations. ♦ Manitobans should consider the aspirations, needs and views of the people of the various geographical regions and ethnic groups in Manitoba, including Aboriginal peoples, to facilitate equitable management of Manitoba's common resources.	Manitoba Hydro's employees, contractors and agents will be made aware of the sustainable development policies and guiding principles and be encouraged to act accordingly. Manitoba Hydro has, and will continue to engage Aboriginal groups and local stakeholders in the Project implementation.
Prevention: ♦ Manitobans should anticipate, and prevent or mitigate, significant adverse economic, environmental, human health and social effects of decisions and actions, having particular reasonable and well-informed grounds, appear to pose serious threats to the economy, the environment, human health and social well-being.	The Project is required in order to maintain public and dam safety, and provide a safer working environment for staff. It has been designed to minimize effects on the environment, including existing fish habitat, with special emphasis on lake sturgeon.

Table 10.2: Manitoba Sustainable Development Principles	
Principle	**Project Attribute**
Conservation and Enhancement: ♦ Manitobans should maintain the ecological processes, biological diversity and life-support systems of the environment; ♦ Manitobans should Harvest renewable resources on a sustainable yield basis; ♦ Manitobans should Make wise and efficient use of renewable and non-renewable resources; ♦ Manitobans should Enhance the long-term productive capability, quality and capacity of natural ecosystems.	The Project is designed to maintain existing biological diversity through protection of fish habitat and replacement where appropriate.
Rehabilitation and Reclamation: ♦ Manitobans should endeavour to repair damage to or degradation of the environment; and ♦ Manitobans should consider the need for rehabilitation and reclamation in future decisions and actions.	On Project completion, construction areas will be rehabilitated and material source areas reclaimed. Replaced infrastructure will be rendered innocuous by removing some and retaining other parts depending on the impacts associated with the dismantling options.
Global Responsibility: ♦ Manitobans should think globally when acting locally, recognizing that there is economic, ecological and social interdependence among provinces and nations, and working cooperatively, within Canada and internationally, to integrate economic, environmental, human health and social factors in decisions making while developing comprehensive and equitable solutions to problems.	The total greenhouse gas emissions for construction and operation of the Project are approximately 0.003% of to the provincial energy sector total. The Project supports the on-going operations at the Pointe du Bois GS which produces an average of 580 GWH per year of renewable energy. In comparison to an equivalent amount of energy produced from thermal (coal) generating stations, the Project may contribute to an annual reduction of 435,000 tonnes of CO2 emissions.

Table 10.3: Manitoba Sustainable Development Guidelines	
Guideline	**Project Attribute**
Efficient Use of Resources which means: ♦ Encouraging and facilitating development and application of systems for proper resource pricing, demand management and resource allocation together with incentives to encourage efficient use of resources; and ♦ Employing full-cost accounting to provide better information for decision makers.	Efficient and economic use of energy and materials will be encouraged throughout construction and operation.
Public Participation which means: ♦ Establishing forums which encourage and provide opportunity for consultation and meaningful participation in decision making processes by Manitobans; ♦ Endeavouring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions; and ♦ Striving to achieve consensus amongst citizens with regards to decisions affecting them.	Communication and consultation through meetings, open houses and newsletters has been undertaken with Aboriginal groups, local stakeholders, governments and other interested parties. Project information has been and will be continued to be shared with interested parties. Issues and concerns identified through the consultation process for the project will be addressed to the extent practicable (i.e. maintain the historical water regime).
Access to Information which means: ♦ Encouraging and facilitating decision-making and planning processes that are efficient, timely, accountable and cross-sectoral and which incorporate an inter-generational perspective of future needs and consequences.	Hydro maintains a user-friendly, website with up-to-date information about the Pointe du Bois Project as well as its other projects and undertakes extensive project-specific consultation for each project throughout their planning, design, construction and operational phases. EA studies and research provide extensive information about Manitoba's environment and socio-economic characteristics. The information is compiled in EIS documentation available to the public as a part of the licensing process.
Integrated Decision Making and Planning which means: ♦ Encouraging and facilitating decision-making and planning processes that are efficient, timely, accountable and cross-sectoral and which incorporate an inter-generational perspective of future needs and consequences.	Manitoba Hydro developed criteria for evaluating general arrangements. The criteria included dam safety, lake sturgeon habitat, stakeholder effects, constructability, ability to accommodate a future powerhouse and cost. Decisions also incorporated input-form consultations with Aboriginal groups, local stakeholders, governments, professional specialists (engineers, biologists, archaeologists, economists) and other interested parties.
Waste Minimization and Substitution which means: ♦ Encouraging and promoting the development and use of substitutes for scarce resources where such substitutes are both environmentally sound and economically viable; and ♦ Reducing, reusing, recycling and recovering the products of society.	Waste generated by the Project will be minimized and waste materials will be recycled to the extent practicable. All other waste will be disposed of in an environmentally responsible manner.
Research and Innovation which means: ♦ Encouraging and assisting the researching, development, application and sharing of knowledge and technologies that further out economic, environmental, human health and social well-being.	The Project has been designed and will be constructed and operated to minimize the effect to the environment. The new spillway will provide a safer working environment for staff.

Table 10.4: Manitoba Hydro Sustainable Development Principles	
Principle	**Project Attribute**
Stewardship of the Economy and the Environment Manitoba Hydro will recognize its responsibility as a caretaker of the economy and the environment for the benefit of present and future generations of Manitobans. Manitoba Hydro will meet the electricity needs of present and future Manitobans in a manner that ensures the long term integrity and productivity of our economy, our environment, our natural resources and safeguards our human health.	Manitoba Hydro applied economic, environmental, and social criteria in evaluating, planning and designing the Project. The Project provides for the continued production of renewable energy that enhances the reliability of the southern Manitoba electricity system, while meeting safety criteria for our staff and public.
Shared Responsibility Manitoba Hydro will ensure that Manitoba Hydro's employees, contractors, and agents are aware of our sustainable development policies and guiding principles and encourage them to act accordingly. Manitoba Hydro will encourage the Corporation's employees to share their knowledge of the concepts and practical application of sustainable development.	Employees, contractors and agents working on the Project will be informed through the environmental protection programs about Manitoba Hydro's commitment to sustainable development. The program integrates the practical application of Manitoba Hydro's principles. Furthermore, through Manitoba Hydro's public involvement program, people were able to gain an understanding of how Manitoba Hydro strives to integrate economic, environmental and social considerations into its projects and operations.
Integration of Environmental and Economic Decisions Manitoba Hydro will treat technical, economic and environmental factors on the same basis in all corporate decisions, from initial planning to construction to operations to decommissioning and disposal. To the extent practical, Manitoba Hydro will include environmental costs in economic and financial analysis.	Manitoba Hydro applied economic, environmental, and social criteria in evaluating, planning and designing the Project.
Economic Enhancement Manitoba Hydro will enhance the productive capability and quality of Manitoba's economy and the well-being of Manitoban's by providing reliable electrical services at competitive rates.	The Project supports the continued production of economic, renewable energy at the Pointe du Bois Generating Station, which supports the reliability of the southern Manitoba electricity system.
Efficient Use of Resources Manitoba Hydro will encourage the development and application of programs and pricing mechanism for efficient and economic use of electricity by our customers. As well, efficient and economic use of energy and materials will be encouraged throughout all our operations.	Efficient and economic use of energy and materials will be encouraged throughout construction and operation
Prevention and Remedy Manitoba Hydro will to the extent practical, anticipate and prevent adverse environmental and economic effects that may be cause by Corporate policies, programs, projects and decisions rather than reacting to and remedying such effects after they have occurred. Where practical, environmentally sound products will be purchased, taking into account the lifecycles of the products. Manitoba Hydro will address adverse environmental effects of Corporate activities that cannot be prevented by: ♦ First, endeavouring, wherever feasible, to restore the environment to predevelopment conditions or developing other beneficial uses through rehabilitation and reclamation ♦ Second, striving to replace the loss with substitutes that would enhance the environment and/or associated resource uses while offsetting the type of damage experienced ♦ Third, making monetary payments for compensable damages on a fair, equitable and timely basis.	The Project was planned and designed to avoid adverse environmental effects to the extent practicable (i.e. special attention paid to the existing lake sturgeon spawning habitat). Appropriate mitigation will be applied to address residual effects.

Table 10.4: Manitoba Hydro Sustainable Development Principles	
Principle	**Project Attribute**
Conservation Manitoba Hydro will to the extent practical, plan, design, build, operate, maintain and decommission Corporate facilities in a manner that protects essential ecological processes and biological diversity. Manitoba Hydro will give preference, where practical, to projects and operating decisions that use renewable resources to that extend the life of supplies of non-renewable resources.	The Project will protect essential ecological processes and biological diversity. For example: ♦ conserving lake sturgeon spawning habitat thus conserving the healthy population of fish at the site; and ♦ to the extent possible, construction activities during sensitive periods for fish and wildlife will be avoided.
Waste Minimization Manitoba Hydro will manage all wastes arising from Corporate activities by: ♦ First, endeavouring to eliminate or reduce the amount generated ♦ Second, striving to fully utilize reuse and recycling opportunities ♦ Third, disposing of remaining waste in an environmentally sound manner.	Waste generated by the project will be minimized and waste materials will be recycled to the extent practicable (i.e. rock from blasting will be utilized in construction). All other waste will be disposed of in an environmentally sound manner.
Access to Adequate Information Manitoba Hydro will share relevant information on a timely basis with employees, interested people and governments to promote a greater understanding of Manitoba Hydro's current and planned business activities and to identify impacts associated with the Corporation's plans and operations.	Hydro maintains a user-friendly, website with up-to-date information about the Pointe du Bois Project as well as its other projects and undertakes extensive project-specific consultation for each project throughout their planning, design, construction and operational phases. EA studies and research provide extensive information about Manitoba's environment and socio-economic characteristics. The information is compiled in EIS documentation available to the public as a part of the licensing process.
Public Participation Manitoba Hydro will provide opportunities for input by potentially affected and interested parties when evaluating development and program alternatives and before deciding on a final course of action.	Communication and consultation through meetings, open houses and newsletters has been undertaken with Aboriginal groups, governments, and other interested parties. Project information has been and will be continued to be shared with interested parties. Issues and concerns identified through the consultation process for the project will be addressed (i.e. maintain historical water regime) to the extent practicable.
Understanding and Respect Manitoba Hydro will strive to understand and respect differing social and economic views, values, traditions and aspirations when deciding upon or taking action. Preference will be given to those alternatives which best fulfill Corporate objectives while minimizing infringements on the ability, rights, and interests of others to pursue their aspirations.	The nature of the consultation process provided opportunity for sharing/ understanding perspectives. Issues and concerns identified through the consultation process have been addressed to the extent practicable.
Scientific and Technological Innovation Manitoba Hydro will research, develop, test and implement technologies, practices and institutions that will make electrical supply and services more efficient, economic and environmentally sound.	The Project has been designed and will be constructed and operated to minimize the effect to the environment. The new spillway will provide a safer working environment for staff.
Global Responsibility Manitoba Hydro will recognize there are no political and jurisdictional boundaries to our environment, and that there is ecological interdependence among provinces and nations. Manitoba Hydro will consider environmental effects that occur outside of Manitoba when planning and deciding on new developments and major modifications to facilities and to methods of operations.	The total greenhouse gas emissions for construction and operation of the Project are approximately 0.003% of the provincial energy sector total. The Project supports the on-going operations at the Pointe du Bois GS which produces an average of 580 GWH per year of renewable energy. In comparison to an equivalent amount of energy produced from thermal (coal) generating stations, the Project may contribute to an annual reduction of 435,000 tonnes of CO_2 emissions.

Table 10.5: Project Effect on Manitoba Sustainability Trends			
Category	**Provincial Indicator**	**Provincial Trend**	**Project Effect on Provincial Trend**
Natural Environment Framework			
Biodiversity	Natural lands and protected areas	Stable	No project effect
	Wildlife species and ecosystems at risk	Inconclusive	No project effect
Fish	Fish species biodiversity and population	Changing	Project has been designed to minimize the effect on existing fish population and habitat
	Commercial fish harvest	Variable, depending on fishery	Not applicable
Forests	Forest type and age class	Stable	No project effect
	Forest renewal	Stable	No project effect
Air	Air quality	Stable- Winnipeg, Brandon and Flin Flon	Minor degradation in local area due to dust and noise during construction period
Water	Water quality	Stable	No project effect
	Water allocation and consumption	Stable	No project effect
Climate Change	Average annual and seasonal temperature	Negative	Not applicable
	Total annual and seasonal precipitation	Inconclusive	Not applicable
	Greenhouse gas emissions	Stable	Insignificant addition to provincial GHG inventory during construction
Economic Framework			
Economic performance	Real gross domestic product per capita	Positive	Not applicable
	Gross domestic product by sector	Positive	Not applicable
Agricultural sustainability	Total net farm income	Variable	Not applicable
	Farm structure	Increasing consolidation	Not applicable
	Adoption of sustainable agricultural management practices	Positive	Not applicable
Mining	Mineral exploration	Positive	Not applicable
	Mineral reserves	Stable	Not applicable
	Mineral production	Positive	Not applicable
Energy efficiency and conservation	Energy intensity	Positive	Not applicable
	Renewable energy consumed versus total energy consumed	Positive	Maximum use of renewable energy
Consumption and waste management	Waste disposal	Negative	No project effect
	Waste recycled or used	Negative	No project effect

Table 10.5: Project Effect on Manitoba Sustainability Trends			
Category	**Provincial Indicator**	**Provincial Trend**	**Project Effect on Provincial Trend**
Economic Framework			
Employment	Labour force trends	Positive	No project effect
	Labour force opportunities	Positive	Local opportunity during construction period
	Building and maintaining vibrant communities	Stable/positive	No project effect
Education	Readiness for school	Positive	Not applicable
	Literacy and numeracy — youth, adult	Stable	Not applicable
	High school and post secondary education completion	Increasing – high school Stable- post secondary	Not applicable
	Academic achievement and socio-economic status	Variable	Not applicable
Social Well Being Framework			
Demographics	Population growth	Positive	Not applicable
	Migration to Manitoba from other jurisdictions	Positive	Not applicable
Equity and rights	Low income	Positive	Not applicable
	Income inequality	Positive	Not applicable
	Income dependency	Positive	Not applicable
	Community supported living	Positive	Not applicable
Community and culture	Community engagement	Positive	Not applicable
	Heritage conservation	Positive	No project effect
	Language diversity	Positive	Not applicable
Governance	Voting rates	Positive	Not applicable
	Progress toward debt repayment	Positive	Not applicable
Health	Health status	Stable	Not applicable
	Access and quality of care	Stable	Not applicable
Justice	Crime rate	Inconclusive	Not applicable

11.0 MONITORING AND FOLLOW-UP PROGRAMS

11.1 Introduction

An Environmental Protection Program will be developed to mitigate, manage and monitor potential environmental effects during the construction and operation phases of the Pointe du Bois Spillway Replacement Project. As well, the Environmental Protection Program will be used to verify predictions made in this EIS. If unexpected effects are detected during monitoring, the protection program defines the process for determining what measures will be taken to mitigate them.

11.2 Commitment to Environmental Protection

Manitoba Hydro is committed to protecting and preserving natural environments and heritage resources affected by its projects and facilities. Furthermore, Manitoba Hydro's continual improvement of environmental performance is demonstrated through the company's Environmental Management System, which is ISO 14001 certified.

Environmental protection can only be achieved with the full engagement of Manitoba Hydro employees, consultants and contractors at all stages of projects — from planning and design through construction and operational phases.

As stated in the Corporate Environmental Management Policy:

> "Manitoba Hydro is committed to protecting the environment. In full recognition of the fact that corporate facilities and activities affect the environment, Manitoba Hydro integrates environmentally responsible practices into its businesses, thereby:

- "preventing or minimizing any adverse effects, including pollution, on the environment, and enhancing positive effects;
- "continually improving our Environmental Management System;
- "meeting or surpassing regulatory requirements and other commitments;
- "considering the interests and utilizing the knowledge of our customers, employees, communities, and stakeholders who may be affected by our actions;
- "reviewing our environment objectives and targets annually to ensure improvement in our environmental performance; and
- "documenting and reporting our activities and environmental performance."

Manitoba Hydro's environmental management policy will be used to guide the development of the Environmental Protection Program for the Project. Implementation of the program is a practical application of the policy and demonstrates Manitoba Hydro's commitment to environmental stewardship.

11.3 Purpose and Scope

The Environmental Protection Program assists Manitoba Hydro and its contractors to be compliant with the corporate environmental policy and all regulatory requirements. Additionally, the program provides an opportunity for adaptive management to mitigate unexpected adverse effects should they be detected during monitoring.

The program includes the who, what, where and how aspects of protecting and monitoring the environment within the area affected by the Project. As part of the program, three different types of documents will be prepared:

- Environmental protection plans (EnvPP) which provide detailed, site-specific directions to contractors to minimize environmental impact;
- Environmental management plans which are focused documents that address a specific environmental issue; and
- Environmental monitoring plans which provide instructions for monitoring the effects of construction and operational activities on the biophysical, physical and socio-economic environments.

Each plan includes an implementation strategy. Depending upon the plan, the implementation strategy may include contractual arrangements, training, compliance inspections, and communication of results.

11.4 Program Development

Development of the program is based on the issues identified in this EIS, construction activities required to complete the work and regulatory requirements. The plans developed as part of the program will undergo regulatory review. Input received during the review process will be incorporated into the documents prior to finalizing them.

Potential environmental effects are addressed during different phases of a project. Some issues can be mitigated at the design stage by making modifications to physical works, i.e., deciding on location of the primary spillway. The environmental effects that cannot be addressed during the design stage are managed at the construction stage. Mitigation measures are identified prior to construction commencing in order to reduce or eliminate effects of the various project activities. These measures will be incorporated into the EnvPP(s).

Management plans will be developed to target specific issues to minimize or eliminate negative effects. For example, loss of fish habitat will compensated through

implementation of the fish habitat compensation plan and sediment inputs during in-stream construction and spillway commissioning will be managed through a Sediment Management Plan.

Monitoring is carried out to measure the actual effects of the project in order to confirm or negate predictions made during the environmental assessment and documented in the EIS. It also includes an evaluation of mitigation measures in place and demonstrates where improvements can be made. Several monitoring plans will be developed to cover various environmental components.

11.5 Environmental Protection Plans

An EnvPP is a practical document that provides detailed site-specific environmental protection procedures to be implemented by the construction team during various phases of the Project. They are designed for use as reference documents providing best management practices to meet or exceed regulatory requirements. EnvPPs are organized by construction component, highlighting measures to reduce the impact of a specific work activity i.e., tree clearing.

Manitoba Hydro requires all contractors to work in compliance with the EnvPP. The contents of the EnvPP will include, but will not necessarily be limited to:

- Mitigation measures – includes those outlined in Chapter 8.0 that apply to construction as well as numerous others; -
- Erosion and sediment control measures – engineering drawings and specifications for materials and methods to be applied to prevent erosion sediment input from land into water;
- Timing restrictions – restrictions on construction for wildlife nesting, calving and spawning;
- **Environmental sensitivity** maps – visual tool that demonstrate areas where mitigation measure must be applied;
- Heritage resource protection – description of what is to be done if a heritage resource is discovered;
- Emergency response plan–spill containment equipment and clean up protocols;
- Regulatory guidance documents – pertinent federal and provincial guidelines for work being undertaken;
- Permits, licences, and authorizations received; and
- Inspection sheets – an environmental inspector will monitor contractors' compliance with the mitigation measures.

11.6 Management Plans

Management plans focus on minimizing effects of a specific environmental issue and often include monitoring as well. They outline specific actions that must be taken. Manitoba Hydro is responsible for the implementation of the plans.

Two management plans will be developed for the Project:

- Sediment Management Plan – describes how to measure sediment inputs into the Winnipeg River during in-stream construction and Project commissioning as well as prescribing actions to be taken in order to remain below total suspended solids (TSS) target levels.
- Fish habitat compensation plan – describes works to be installed that compensate for the loss of fish habitat due to the Project and monitoring activities to determine the success of the structures.

11.7 Monitoring Plans

During the course of the environmental assessment, various recommendations for monitoring were identified. Several project-specific monitoring plans will be developed to cover various environmental components. These plans are designed to measure the actual effects of the project, verify predictions or identify unanticipated effects. They will also include monitoring commitments made to **regulatory authorities** and others. The monitoring plans will cover the construction phase and continue into the operation phase.

The following monitoring plans will be developed for the Project:

- Aquatic Effects Monitoring Plan – outlines monitoring for the effects on the aquatic environmental components such as water quality, aquatic habitat, lower trophic levels, and fish community.
- Terrestrial Effects Monitoring Plan – outlines monitoring for the effects on terrestrial environmental components such as birds, amphibians, wildlife, plants and terrestrial habitat.
- Physical Environment Monitoring Plan – outlines monitoring for the effects on physical environmental components such as air quality, noise, climate, and water regime.
- Socio-Economic Monitoring Plan – outlines monitoring for the effects on components such as employment, business opportunities, traffic, aesthetics and safety.

11.8 Environmental Protection Program Implementation

In order to put the plans developed for the program into practice and for the program to be effective, a number of arrangements need to be made; and activities need to occur; prior to and during construction of the Project. The following sections describe these activities and arrangements.

11.8.1 Roles and Responsibilities

Responsibility for implementing the Environmental Protection Program falls on a number of individuals and groups: the project manager, environmental inspector, contractors and various departments within Manitoba Hydro. It is necessary that the roles of each individual or group be clearly understood to ensure all elements of the Environmental Protection Program are implemented. The following is a brief description of some of the key roles.

- The project manager will have the ultimate authority and responsibility for all aspects of construction, including the Environmental Protection Program.
- The environmental inspector will monitor compliance with the EnvPP; will report on any incidents, and communicate alterations that are necessary to the project manager; may act as delegate to the project manager on environmental issues; and. will be responsible for implementation of the Sediment Management Plan
- Contractors will perform work in accordance with the EnvPP, licences and permits, and applicable regulations and guidelines.
- Manitoba Hydro will be responsible for implementation of the monitoring plans and the fish habitat compensation plan, as well as fulfilling reporting requirements to meet licence conditions.

11.8.2 Tenders and Contracts

All environmental requirements including the EnvPP will be included in the tender packages and the binding construction contracts for the Project work. This will require contractors to budget and base their work on meeting the environmental requirements and conducting activities in an environmentally acceptable manner. The selected contraction will be required to comply with and implement the plans.

11.8.3 Training and Orientation

Prior to construction, an environmental orientation program will be developed and delivered to contractors and Manitoba Hydro Project personnel so they are aware of the environmental requirements and sensitivities associated with the Project. They will be familiar with components of the Environmental Protection Program, particularly the

EnvPP as it has direct implications on day-to–day work. Periodic update sessions will occur during construction on specific environmental issues.

The environmental inspector will receive specific training to fulfill the position including use of the EnvPP, how to perform inspections, reporting incidents and routine reporting, the protocol for emergency response, as well as what resources are available if an environmental issue arises.

11.8.4 Inspection and Compliance

Environmental inspection is an essential function in environmental protection and implementation of mitigation measures. The environmental inspector will be responsible for undertaking compliance monitoring of the work site to confirm that activities are not in contravention with regulatory requirements or the EnvPP. The inspector will visit work sites daily and record all inspection activities. Any incidents of concern or non-compliance will be recorded and reported so that appropriate action to rectify the problem is implemented.

11.8.5 Working with Contractors

Meetings will be held regularly with the project manager, resident engineer, environmental inspector and contractors to discuss environmental issues and what needs to be done to protect the environment as construction progresses. Compliance with the EnvPP and regulatory requirements will also be included in these progress meetings.

11.8.6 Work Stoppages

Construction activities will be stopped in the event unexpected effects are occurring to the environment or when mitigation measures are proving to be insufficient to prevent a potential effect. If a heritage resource is discovered by any individual work must be stopped and the find reported.

The project manager, resident engineer, and environmental inspector will all have authority to issue stop work orders. The contractor can also voluntarily stop work where circumstances indicate that some environmental or heritage damage could result from continuation of a particular activity. Work will not resume until the situation has been assessed and resolved.

11.8.7 Working with Regulators

Licences and **regulatory approvals** for the proposed Project require environmental and compliance monitoring and production of monitoring reports. Regulatory authorities will be notified by the project manager or his delegate of situations where the environment is affected that was not previously predicted. Full cooperation will be

given to representatives of environmental regulators conducting inspections and a project staff member will be available to escort the regulator during the visit around the construction site and answer questions and discuss concerns as required.

11.8.8 Reporting

In fulfillment of the Project *Environment Act* licence and *Fisheries Act* authorization requirements, reports will be submitted by Manitoba Hydro to Manitoba Conservation and Fisheries and Oceans Canada in accordance with the schedule outlined in these approvals. Reports that will be prepared include:

- A compliance monitoring report in connection with the EnvPP; and
- Technical reports of the activities and results of the various monitoring and management plans.

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13.0 ACRONYMS AND GLOSSARY

13.1 List of Acronyms and Abbreviations

AECL	Atomic Energy of Canada
AEMP	Aquatic Effects Monitoring Plan
ANFO	Ammonium nitrate-fuel oils
ARD	Acid rock drainage
ASI	Area of special interest
asl	above sea level
BB	Blind Bay
BCMOE	British Columbia Ministry of Environment
Br	Bedrock
CCC	Crown Consultation Coordinator
CCME	Canadian Council of Ministers of the Environment
CDA	Canadian Dam Association
CEA	Cumulative Effects Assessment
CEAA	Canadian Environmental Assessment Act
CEAR	Canadian Environmental Assessment Registry
CEARIS	Canadian Environmental Assessment Registry Internet Site
CEMR	Central Manitoba Railway
CFD	Computational Fluid Dynamics
CFU	Colony forming units
CGVD	Canadian Geodetic Vertical Datum
CIZ	Community interest zone
CJP7	Bird River Airport
CJS9	Water aerodrome to accommodate seaplanes
CJX6	Water aerodrome for seaplane landings
cms	Cubic meters per second
CNR	Canadian National Railway
CON	Conservation
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPR	Canadian Pacific Railway
CPUE	Catch per unit effort

CYAX	Lac Du Bonnet Regional Airport
dB	Decibel
dBA	Decibels adjusted (noise power)
DFO	Department of Fisheries and Oceans
DO	Dissolved oxygen
DOJ	Department of Justice
DSR	Draft Screening Report
e.g.	For example
EA	Environmental assessment
EAPF	Environment Act Proposal Form
EC	Environment Canada
EGD	East Gravity Dam
EIS	Environmental impact statement
EMS	Environmental management system
EnvPP	Environmental protection plan
ERC	Emergency Response Crews
et al.	and others
etc.	And so forth, and so on, etcetera
FA	Fisheries Act
FEAC	Federal Environmental Assessment Coordinator
FHCP	Fish Habitat Compensation Plan
FMU	Forest Management Unit
FSDS	Federal Sustainable Development Strategy
FSL	Full supply level
GHG	Greenhouse gases
GPS	Global positioning system
GS	Generating station
GWh	Gigawatt hour
ha	hectare
HC	Health Canada
HDPE	High density polyethylene
HS	Habitat suitability
HSC	Habitat suitability criteria
HSI	Habitat suitability index
I	1 (Roman numeral)

i.e.	that is
IDF	Inflow design flood
IEM	Innovation, Energy and Mines
II	2 (Roman numeral)
III	3 (Roman numeral)
IMAC	Interim maximum acceptable concentration
INAC	Indian and Northern Affairs Canada
Inc.	Incorporated
IPCC	Intergovernmental Panel on Climate Change
ISD	In-service Date
ISO 14001 certified	Manitoba Hydro Environmental Management System
IV	4 (Roman Numeral)
kV	Kilovolt
L/s	Litres per second
LAeq dB	LAeq is the main unit used for assessing occupational noise in dB. See dB.
LCM	Loss control materials
Ldn	Average day-night sound level
LEL	Lowest effect level
Leq	Equivalent continuous noise level
LGD	Local Government District
Ltd	Limited
LWCB	Lake of the Woods Control Board
m	metre
MAC	Maximum acceptable concentration
MBCDC	Manitoba Conservation Data Centre
MC	Manitoba Conservation
MEA	Manitoba Environment Act
MESA	Manitoba Endangered Species Act
MH	Manitoba Hydro
MMER	Metal Mining Effluent Regulations
MMF	Manitoba Metis Federation
MOU	Memorandum of Understanding
MPMO	Major Projects Management Office
MSQG	Manitoba Sediment Quality Guideline
MW	Megawatt

MWQSOG	Manitoba Water Quality Standards, Objectives, and Guidelines
NIA	Navigation Impact Assessment
NRCan	Natural Resources Canada
NTU	Nephelometric turbidity units
NWPA	Navigable Waters Protection Act
OPS	Operational policy statement
PAHs	Polycyclic aromatic hydrocarbons
PAL	Protection of aquatic life
PAT	Project administration team
PCB	Polychlorinated biphenyls
PduB	Pointe du Bois
PEL	Probable effect level
ppm	part per million
PR	Provincial Road
PTH	Provincial Trunk Highway
RA	Responsible Authority
RCM	Regional climate model
RCMP	Royal Canadian Mounted Police
RM	Rural Municipality
RTL	Registered Trap line
SARA	Species at Risk Act
SD	Scoping Document
SE	Standard error
SEL	Severe effect level
SEMP	Socio-economic Effects Monitoring Plan
SF	Slave Falls
SNOMAN	Provincial snowmobile association website
sp.	species
spp.	refers to more than one species
SQG	Sediment quality guideline
TAC	Technical Advisory Committee
TC	Transport Canada
TCU	True colour units
TDGR	Transportation of Dangerous Goods Regulation

TEMP	Terrestrial Effects Monitoring Plan
TKN	Total Kjeldahl nitrogen
TLE	Treaty Lands Entitlement
TM	Technical memorandum
TN	Total nitrogen
TOC	Total organic carbon
TP	Total phosphorus
TRG	Tissue residue guideline
TSS	Total suspended solids
Tu	Turbidity
V	5 (Roman Numeral)
VEC	Valued environmental component
WGD	West gravity dam
WHMIS	Workplace Hazardous Materials Information Sheets
WMA	Wildlife Management Area
WMO	World Meteorological Organization
WWTP	Wastewater Treatment Plant
YOY	Young-of-the-year
µg/L	Micrograms per litre

13.2 Glossary of Terms

Aboriginal	Individuals who are Aboriginal (i.e., Indian, Inuit or Metis).
Aboriginal Knowledge	The knowledge base acquired by indigenous and local peoples over many hundreds of years through direct contact with the environment.
Acid Leachate	Water that has become acidic after seepage through rock spoils; potentially very damaging to fish habitats and drinking water supplies.
Adaptive Approach	A process for implementing decisions as an ongoing activity that requires monitoring and adjustment
Adverse Effects	Negative effects on the environment and people that may result from a proposed project.
Alignment	The vertical and/or horizontal route or direction of a linear physical feature.
Ammonium nitrate-fuel oils (ANFO)	A widely used explosive mixture.
Amphibian	Cold-blooded animal of the class Amphibia that typically lives on land but breeds in water (e.g., frogs, toads, salamanders).
Anuran	Any of the vertebrates of the order Anura. The group includes the frogs and toads.
Aquatic Habitat	The biotic and abiotic components of water habitats such as creeks, rivers, sloughs, wetlands, seas and oceans.
Aquatic Vegetation	Plants with roots that are fully or partially underwater.
Archaeological Sites	Sites containing relics, artefacts and other evidence of past human cultures.
Baseline Condition	Establishing the status of a system or other item as of a given date. Used to provide a common denominator and starting point for later measurements and comparisons.
Batch Plant	A plant used to manufacture concrete by mixing cement, sand, aggregate and water. The aggregate may be either crushed rock or gravel.
Bedrock	A general term for any solid rock, not exhibiting soil-like properties, that underlies soil or other surficial materials.
Benthic	Relating to the bottom of a waterbody (e.g., lake).
Blast Mattress	A temporary rockfill working platform to facilitate drilling and blasting to the rock underneath the platform.

Borrow Area	An area where earth material (clay, gravel or sand) is excavated for use at another location (also referred to as "borrow sites" or "borrow pits").
Boulder	The largest of rock particles, having a diameter greater than 256 mm.
Camp	A temporary residence for employees working on a construction project at a remote location, consisting of bunkhouse dormitories, a kitchen and other facilities.
Cement	A dry powder made of burned lime and clay that is mixed with water, sand and aggregate to make concrete.
Clay	Fine-grained soil or the fine-grained portion of soil that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when air-dry
Cobble	Rocks larger than gravel but smaller than boulders, having a particle diameter between 64 and 256 mm.
Cofferdam	A temporary dam, usually made of rockfill and earth, constructed around a work site in the river, so the work site can be dewatered or the water level controlled during construction.
Commercial Resource Use	Extraction, harvesting, processing or refining natural resources for profit.
Commissioning	A systematic process of ensuring that the new spillway(s) perform according to the documented design intent and the owner's operational needs, and that specified system documentation and training are provided to facility staff.
Concrete	A mixture of sand, gravel, water and cement which hardens to a stone like condition when dry, capable of bearing significant load.
Construction Power	The electrical requirements during the construction of the project, including the camp, batch plants, cranes, heaters and other equipment.
Crest	The top surface of a dam or roadway, or the high point of the spillway overflow section, or the highpoint of a landform.
Cumulative Effects Assessment	An assessment of the incremental effects of an action on the environment when the effects are combined with those from other past, existing and future actions.
Dam	A barrier built to hold back water.
Decommissioning	Planned shutdown, dismantling and removal of a building, equipment, plant and/or other facilities from operation or usage and may include site cleanup and restoration.

Depositional Habitat	Macroinvertebrate habitat type characterized by slow-moving water/pools.
Development Controls	Control of the use of land exercised by local authorities or the responsible planning authority through mechanisms such as development plans and zoning by-laws.
Dewatering	Use of a system of pumps, pipes and temporary holding dams to drain or divert waterways or wetlands before excavation of soils and sediments can occur.
Directional Drilling	A drilling method in which the wellbore intentially deviates from the vertical
Discharge Capacity	The maximum rate of volume of water a structure is designed to safely pass without exceeding the design upstream water level.
Dissolved Oxygen	Oxygen dissolved in water. Dissolved oxygen is essential for the survival of most aquatic biota.
Diversity	Related to the number of different species or different features in a given location.
Drawdown	Lowering a reservoir by discharging more flow than is coming into it.
Duration	The period of time in which an effect may exist or remain detectable (i.e., the recovery time for a resource, species or human use).
Earth Structure	A structure constructed using rock, earth, gravel and sand, or some combination of these materials
Effect	Any change that the Project may cause in the environment. More specifically, a direct or indirect consequence of a particular Project impact
Effluent	Liquid waste from sewage treatment or industrial processes, especially such liquid waste that is released into a river or other waterway.
Emergency Response Plan	A detailed program of action to control and/or minimize the effects of an emergency requiring prompt corrective measures beyond normal procedures to protect human life, minimize injury, to optimize loss control, and to reduce the exposure of physical assets and the environment from an accident.
Emergent vegetation	A plant rooted in shallow water and having vegetative growth above water.

Employment Rate	The proportion of individuals in the active labour force that have a job. This includes all persons working for wages or salaries, all self-employed persons (with or without paid help) working in their own business, farm or professional practice, and all persons working without pay on a family farm or business during the reference week.
Endangered	A wildlife species considered to be facing imminent extirpation or extinction.
Energy	The capacity of an electric generating station to do work, usually measured in megawatts (MW).
Entrainment	Fish (larval or adult) that are drawn into a current and cannot escape.
Environmental Impact Assessment (EIA)	An evaluation of the likely adverse environmental effects of a project that will contribute to decisions about whether to proceed with a project.
Environmental Impact Statement (EIS)	A document setting out the results of an environmental impact assessment (see EIA), including adverse (and sometimes positive) effects of a proposed development. The document is filed as part of an application for environmental approvals under the *Environment Act* (Manitoba) or the *Canadian Environmental Assessment Act.*
Environmental Protection Plan (EnvPP)	A "user-friendly" guide for the contractor that includes: information such as a brief project description; updated construction schedule; summary identifying environmental sensitivities and mitigative actions; listing of all federal, provincial or municipal approvals, licenses, or permits that are required for the project; a description of general corporate practices and specific mitigating actions for the various construction activities; emergency response plans, training and information; and environmental/engineering monitoring plans and **reporting protocol**s.
Environmental Sensitivity	Areas or components of the physical environment that are more susceptible to degradation due to internal or external factors that have been identified as vulnerable.
Ericaceous	Plants that belong to the heath family, usually small shrub.
Erosion	A natural process, which is either naturally occurring or anthropogenic in origin, by which the Earth's surface is worn away by the actions of water and wind.
Extirpation	Becoming extirpated; the loss of a species (native to Manitoba) from its Manitoba range. An extirpated species may still be found elsewhere in its range, or in captivity.

Feasible	Capable of being accomplished with a reasonable amount of effort, cost or other hardship.
Fecal coliform bacteria	Bacteria used as an indicator of the potential presence of pathogenic bacteria, which can be spread through the release of untreated human and animal wastes into surface waters. Sub-group of the larger group total coliform bacteria
Fill	Natural soils or loose rock that may or may not have been processed and are placed to construct an earth fill structure or to construct a grade, dyke or dam.
Fines	Small particulate matter (e.g., silt/clay with some sand).
Fish Habitat	Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.
Follow-up	An internal auditing process by which the adequacy, effectiveness, and timeliness of actions taken by management are determined and considered further.
Follow-up Program	A program for: a) verifying the accuracy of the environmental assessment of a project, and b) determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project.
Forebay	Impoundment area immediately upstream from a dam or hydroelectric plant intake structure.
Freeboard	The vertical distance between the normal maximum level of the water surface and the top of the sides of a dyke, dam, etc., which is provided so that waves and other movements of the water will not overtop the confining structure.
Frequency	The number of occurrences of an event within a specific period of time.
Full Supply Level (FSL)	The normal maximum controlled level of the forebay.
Gantry	A mount for a traveling crane consisting of a large arch like or bridge like frame designed to move along a set of tracks.
Generating Capacity	The maximum amount of power that a power plant, such as a hydroelectric dam, can produce under specific conditions.
Generating Station	A complex of structures used in the production of electricity, including a powerhouse, spillway, dam(s), transition structures and dykes.
Generator	Machine that coverts mechanical energy into electrical energy.

Geographic Extent	The area over which an effect is likely to occur or be noticeable. The geographic extent can be described according to specific study areas, or more specifically in terms of distance from the site or source of disturbance.
Geology	The study of the Earth's structure, including rocks.
Gigawatt (GW)	Unit of power equal to 1 billion watts or one thousand megawatts of electricity.
Glacial till	Material deposited by glaciers, usually composed of a wide range of particle sizes, which has not been subjected to the sorting action of water.
Goatsuckers	Mainly active during twilight and/or at dusk or nocturnal non-passerine birds with mottled greyish-brown plumage and large eyes; feed on insects
Graminoid	Grasses and grass-like plants such as sedges and rushes.
Gravel	An accumulation of loose or unconsolidated, rounded rock fragments larger than sand, and between 10 and 100 mm in diameter; rock larger than sand but smaller than cobble having a particle diameter between 2 and 64 mm.
Gravity Structure	A structure that is designed so that its own weight provides the major resistance to the forces exerted on it.
Groin	A rockfill structure extending out into a river or lake from the bank or shore.
Grouting	Filling cracks and crevices with a slurry composed of a cement and sand mixture or other material to prevent or reduce flow through them
Habitat	The place where a plant or animal lives; often related to a function such as breeding, spawning, feeding, etc.
Hazardous Materials	Any material that presents a potential for unwanted consequences to people, property and the environment.
Heritage Resources	A heritage site, heritage object, and/or any work or assembly of works of nature or of human endeavour that is of value for its archaeological, palaeontological, pre-historic, historic, cultural, natural, scientific or aesthetic features, and may be in the form of sites or objects or a combination thereof.
Hydraulic	1) of or relating to liquid in motion; and, 2) of or relating to the pressure created by forcing a liquid through a relatively small orifice, pipe, or other small channel.

Hydrocarbons	Organic compounds of hydrogen and carbon whose densities, boiling points and freezing points increase as their molecular weights increase. Petroleum is a mixture of many different hydrocarbons.
Hydroelectric	Electricity produced by converting the energy of falling water into electrical energy (i.e., at a hydro generating station).
Hydrology	The study of the movement, distribution and quantity of water around the earth, including all aspects of the water cycle, and used to estimate the magnitude and timing of river flows.
Hydrostatic pressure	The pressure exerted by a fluid at equilibrium at any given point within the fluid, due to the force of gravity.
Igneous bedrock	Rock formed by the solidification of molten magma.
Impervious Core	A zone of low permeability material (usually glacial till) in an earth dam, used to reduce leakage through the dam.
Impingement	The process whereby a fish (larval or adult) comes into contact with an object (i.e., a screen) and is unable to free itself.
Infrastructure	Permanent or temporary structures or features required for the construction of the principal structures, including access roads, construction camps, construction power, batch plant and cofferdams.
In-service Date	The date the newly modernized Pointe du Bois Dam starts to produce electricity. The slated in-service date for the project is 2015.
Invertebrates	Animals lacking a backbone or vertebral column.
Labour Force	That portion of the population 15 years of age and over who are employed or are unemployed and actively looking for work or on layoff and available for work.
Landscape	In general, ecological usage this term can refer to the entire mosaic of habitat patches that is relevant to the organism of interest, which makes its spatial extent relative. In the terrestrial habitat and ecosystems assessment, this term refers to a heterogeneous land area composed of a cluster of interacting landscape elements that is repeated in similar form throughout.
Leakage Flows	Water passing through the spillway by leaking.
Life-Cycle	All phases in the life of a project or structure. Specific phases may include: design, construction, operation and decommissioning.
Lower Trophic Levels	Organisms that occur lower within the food chain such as phytoplankton, zooplankton and invertebrates.

Macroinvertebrates	Small animals without backbones living on or in the substrata of lakes and rivers that are retained by a 500 μm mesh size. Macroinvertebrates retained on 500 μm sieves are important food items to vertebrates (particularly fish) and useful bioindicators of environmental change.
Macrophyte	A macrophyte may be an emergent, submergent or floating type of an aquatic plant.
Magnitude	A measure of the size of an effect.
Manitoba Hydro	Manitoba Hydro is a Crown Corporation in the province of Manitoba and is the province's major energy utility.
Metalloids	Non-metallic elements, such as arsenic and selenium, with some of the chemical properties of metals.
Methylmercury	An organic form of mercury that is able to concentrate in animal tissue.
Migratory Birds	Bird species whose life cycle includes long-distance seasonal flights for wintering, summering or breeding purposes (e.g., migratory waterfowl).
Mitigation	A means of reducing adverse Project effects. Under CEAA, mitigation is "the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means"
Mixedwood	A forest composed of both hardwood and softwood trees.
Modernization	The act of making something current.
Monitoring	Measurement or collection of data to determine whether change is occurring in something of interest. The primary goal of long term monitoring of lakes and rivers is to understand how aquatic communities and habitats respond to natural processes and to be able to distinguish differences between human-induced disturbance effects to aquatic ecosystems and those caused by natural processes.
Occupancy	Occupancy is determined by reference to the activities that have taken place on the land and the uses to which the land has been put by the particular group.
Ogee	A double cure with the shape of an elongated S used for the overflow section of a spillway to match the shape of a freely falling stream and therefore maximize the carrying capacity.
Open Houses	An informal public meeting with the primary objective to disseminate project information to the public and accept public comment.

Participation Rate	The labour force of a particular group (age, sex, marital status) expressed as a percentage of its population.
Passerines	Any bird of the order Passeriformes, having feet with three toes pointing forward and one toe pointing backwards and includes warblers, sparrows and other songbirds.
Peatland	A wetland type in where vegetation is produced faster than it decomposes, resulting in the accumulation of partially decomposed vegetative material called peat. Bogs and fens are types of peatlands.
Periphyton	An assemblage of algae, microorganisms and detritus, that is attached to submerged surfaces.
Permafrost	Ground where the temperature remains below 0°C for two or more consecutive years.
Physiography	Physical geography, i.e., the study of physical features of the surface of the Earth.
Phytoplankton	Drifting autotrophic microorganisms that live near the water surface (e.g., diatoms and cyanobacteria)
Planktivorous	An animal that feeds on plankton, which are passively floating or weakly swimming, usually minute, animals and plants in a body of water.
Power	The instantaneous amount of electrical energy generated at a hydroelectric generating station, usually expressed in megawatts.
Powerhouse	Structure that houses turbines, generators, and associated control equipment, including the intake, scroll case and draft tube.
Project	Any action or activity requiring the design, construction, operation, modification or decommissioning of structures or equipment.
Public Consultations	Public consultation typically involves two-way communication between a responsible authority, or a body acting on its behalf, and the public. It is an active approach to provide the public with an opportunity to express their views and knowledge regarding a project. The intent of consultation is to raise awareness about a project and to receive public comments for consideration to make better-informed decisions.
Quarry Site	An open pit where rock is mined for use as a building material at the construction site
Raptors	Any of the group known as "birds of prey," including eagles, hawks, owls, vultures and falcons.

Rating Curve	A graph displaying the relationship between discharge (volumetric flow rate of water in cms) and stage (water level in m) for a given point on a waterbody.
Reach	A section, portion or length of stream or river under study, often with similar features along its length.
Regulatory	Pertaining to requirements.
Regulatory Approvals	A permit, authorization or license required, by statute, to carry out an activity.
Regulatory Authorities	A government agency that regulates an area of human activity by codifying and enforcing rules and regulations, supervision or oversight, for the benefit of the public at large.
Remnant	Portion of a cofferdam
Reporting Protocols	A detailed plan that outlines the steps that are to be taken if an event happens that requires reporting as per an internal or external policy.
Reptiles	Cold-blooded animal of the Class Reptilia that includes tortoises, turtles, snakes, lizards, alligators and crocodiles.
Reservoir	A body of water impounded by a dam and in which water can be stored for later use
Residual Effects	Project effects that remain after mitigation, but do not include existing developments and activities.
Reversible	The time the environment will take to recover from the initial effect after the source of the disturbance is removed or ceases. The reversibility of the effect can be either described in general terms as reversible or not reversible; or more quantitatively; also known as "permanence".
Riprap	A layer of large stones, broken rock, boulder, or other suitable material placed on the upstream and downstream faces of embankments, dams or other land surfaces to protect them from erosion or scour caused by current, wind, wave, and/or ice action
Rockfill Dam	An embankment dam in which more than 50 percent of the total volume is comprised of compacted or dumped pervious natural or crushed rock.
Rollway	The concrete portion of the spillway that water flows over when the spillway is in operation
Run of River	The natural flow and elevation drop of a river are used to generate electricity without requiring a large impoundment of water.
Sand	A loose soil composed of particles between 1/16 mm and 2 mm in diameter.

Scoping	A consultative process for identifying the number of items (e.g., issues) to be examined as part of a detailed environmental assessment.
Scoping Document	A document outlining the scope of the environmental assessment to be undertaken for a project
Screening level	"Screenings" identify and assess the effects of proposed projects and determine the need to prevent, eliminate or mitigate impacts. The majority of assessments completed under the *Canadian Environmental Assessment Act* are screenings.
Sedimentation	A combination of processes, including erosion, entrainment, transportation, deposition and the compaction of sediment.
Settling Pond	A natural or artificial pond for recovering the solids from an effluent.
Significance	A measure of how adverse or beneficial an effect may be.
Silt	Sediment particles 0.004 – 0.06 mm in diameter, regardless of mineral type.
Silt curtain	Flexible sediment control barriers designed to prevent the spread of silt and sediment in lakes and other water bodies when work is being performed in water, or on or near the shoreline.
Sluiceway	An open channel inside a dam designed to collect and divert ice and trash in the river (e.g., logs) before they get into the turbine units.
Soil stratigraphy	Study and mapping of soil layers.
Spawning	The act of reproducing in fish.
Spill Response Plans	A written plan developed to respond to any spills.
Spillway	A concrete structure that is used to pass excess flow so that the dam, dykes and the powerhouse are protected from overtopping and failure when inflows exceed the discharge capacity of the powerhouse.
Staging Area	A designated area where vehicles, supplies, and construction equipment are positioned for access and use to a construction site.
Stakeholder	People with an interest or concern in something in this environmental impact statement.
Stoplogs	Long timbers with steel ends, or fabricated steel units, designed to be placed horizontally on top of one another while fitting tightly into guides at their ends and sealing against a frame so as to close a water passage in a dam or spillway.

Study Area	The geographic limits within which an impact is assessed. The geographic limits within which effects on a VEC (valued environmental component) is assessed.
Substratum	The material forming the streambed; also solid material upon which an organism lives or to which it is attached.
Surcharge	A condition in a forebay in which the water level rises above the full supply level.
Sustainable Development	Environmentally sound and sustainable economic development that meets the needs of today without sacrificing the ability of future generations to meet their own needs.
Switching Station	An area that typically contains electrical equipment that is used in the transmission of electricity.
Tailrace	A channel immediately downstream from a powerhouse that directs the water away from the turbine and into the river channel.
Tailwater Level	The level of water in the natural stream immediately downstream from a dam.
Technical Advisory Committee (TAC)	A committee comprised of technical experts to a related field that provide project guidance.
Tendering	A job contracting procedure whereby potential suppliers are invited to make a firm and unequivocal offer of the price and terms which, on acceptance, shall be the basis of the subsequent contract.
Terrestrial	Belonging to, or inhabiting the land or ground.
Threatened species	In the *Species At Risk Act* of Canada, "a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction."
Total coliform bacteria	Group of bacteria used as indicators of sewage (i.e., fecal matter), including bacteria that inhabit the intestinal tracts of warm-blooded animals as well as soils.
Total Kjeldahl Nitrogen (TKN)	Total concentration of nitrogen in the form of ammonia and organic nitrogen.
Total Nitrogen (TN)	Sum of organic and inorganic forms of nitrogen.
Total Phosphorus (TP)	Sum of organic and inorganic forms of phosphorus.
Total Suspended Solids (TSS)	Solids present in water that can be removed by filtration consisting of suspended sediments, phytoplankton and zooplankton.

Transition Structure	A concrete structure that connects an earth structure such as a dyke or dam to a concrete structure such as the powerhouse or spillway.
Transmission Line	A conductor or series of conductors used to transmit electricity from the generating station to a substation or between substations.
Trophic Level	In ecology, trophic level describes an organism's position in the food chain.
Turbidity	Cloudiness or opacity in the appearance of a liquid caused by solids, particles and other pollutant. Turbidity measurement provides an indication of the clarity of water and water quality.
Turbine	A machine for converting the power of flowing water to rotary mechanical power that is then transferred by a large metal shaft to the generator for conversion to electric power
Understory	An underlying layer of vegetation, especially the plants that grow beneath a forest's canopy.
Unemployment Rate	The proportion of individuals in the active labour force that does not have a job. The Statistics Canada definition of unemployed does not account for the underemployed, or those individuals working part-time but desiring a full-time position. As well, the definition does not include discouraged workers: those individuals who wish to work but have ceased looking because they do not believe they will find a job.
Unfeasible	Impracticable: not capable of being carried out or put into practice.
Valued Environmental Component (VEC)	Any part of the environment that is considered important by the proponent, public, scientists or government involved in the assessment process. Importance may be determined based on cultural values or scientific concern
Water Control Gates	Gates that regulate the amount of water let into the spillway to achieve desired function and/or generating capacity.
Water Control Structure	A barrier that acts to hold water at a planned level.
Water Regime	A description of water body (i.e., lake or river) with respect to water levels, flow rate, velocity, daily fluctuations, seasonal variations, etc.
Wing Wall	A concrete wall attached to a powerhouse or spillway that retains embankment material from falling into the river and guides the river flow into and out of the structure.

Winnipeg Hydro	An electrical utility for the City of Winnipeg, established in 1906 and acquired by Manitoba Hydro in 2002.
Zooplankton	Drifting or passively swimming heterotrophic organisms (usually microscopic in size) that live in the water column (e.g., protozans and crustceans)