(as defined according to the methodology set out for the assessment); and whether the effects assessment conclusion is sensitive to climate change (including Section 6.3 Physical Environment).

The cumulative effects assessment is in Chapter 7 and monitoring and follow-up programs are discussed in Chapter 8.

5.3.1 Assessment Framework Steps

The assessment employs a series of steps to develop conclusions on the effects of the Project. Key steps include the following:

Step 1: Project Description

The project description (see Chapter 4) defines the Project components and activities required to construct and operate the Project's permanent facilities and to decommission infrastructure not required for operations. This includes measures to mitigate potential adverse effects and specific programs developed to provide appropriate replacements, substitutions or opportunities to offset adverse effects and enhance benefits of the Project.

Step 2: Scope of Assessment

Spatial boundaries define the areas where the biophysical and socio-economic studies were conducted (*i.e.*, the study areas). The study area for each environmental component (*e.g.*, the physical environment, aquatic environment, terrestrial environment) is defined by the geographic extent of the direct and indirect effects of the Project. Where required, the study areas extend beyond the zone of impact to provide context for the studies.

Study areas vary between environmental components to appropriately reflect the extent of Project effects on that component (*e.g.*, the study area for socio-economic effects is larger than the study area for physical effects). Similarly, the study areas for individual VECs and supporting topics within each environmental component also vary as the study area for a species with a large home range need to be larger than the study area for a more sedentary species. The study areas selected are large enough to capture the effects of the Project, but not so large as to mask the effects of the Project (by making the effects of the Project as a percent of the area appear unreasonably small).

The majority of studies focused on the areas where the main impacts would occur. For example, while the regional study area for heritage resources is quite large, the heritage resource studies focus on the reach of the Nelson River between the outflow at Clark Lake and the inflow into Stephens Lake (including the north and south access roads, north and south dykes, and most borrow areas) where the majority of disturbances would occur.

Detailed descriptions of the study areas and related temporal scope for each environmental component are provided in Section 6.2.3.2 (Physical Environment); Section 6.2.3.3 (Aquatic Environment); Section 6.2.3.4 (Terrestrial Environment); Section 6.2.3.5 (Socio-Economic Environment; Section 6.2.3.6 (Resource Use); and Section 6.2.3.7 (Heritage Resources).

During the scoping step, key issues of importance to regulatory authorities and people who may be affected by or have an interest in the Project were identified. From these issues, VECs were selected to focus the assessment of the significance of adverse effects. Selection of VECs was based on the following criteria:

- Overall importance/value to people;
- Key for ecosystem function;
- Umbrella indicator;
- Amenable to scientific study in terms of the analysis of existing and post-construction conditions;
- Potential for substantial Project effects; and
- Regulatory requirements.

VECs selected for each environmental component are listed in the subsequent sections of Chapter 6.

STEP 3: ENVIRONMENTAL SETTING

The existing environment, including the past, the present and the future environment without the Project, is described. This requires a description of the existing environmental setting of the study area, including trends, conditions, and the major influences of past and present projects and activities, in shaping the current and future environmental setting without the Project. The description of the environmental setting includes a discussion of the physical, aquatic, terrestrial, socio-economic, resource use and heritage environments.

STEP 4: IDENTIFICATION OF POTENTIAL EFFECTS

The potential effects of the Project on the existing environment is identified. This step requires a comparison of the existing and future environments with and without the Project, as established in Step 2; potential effects of the Project are identified separately during the Project's construction and operation phases.

STEP 5: MITIGATION OF ADVERSE EFFECTS

Mitigation measures to reduce adverse effects are also identified. These are proposed measures to avoid, prevent or reduce adverse effects and enhance positive effects.

Step 6: Assessment of Residual Effects

The effects that would remain after the application of mitigation measures are identified. These residual effects are assessed in terms of their nature, magnitude, and spatial and temporal extent.

Step 7: Regulatory Significance of Residual Effects

The regulatory significance of residual effects on each VEC is evaluated according to criteria set out in the EIS Guidelines (see Section 5.5).

Step 8: Cumulative Effects

Cumulative environmental effects are assessed that are likely to result from the Project in combination with other projects or human activities that have been or will be carried out. The cumulative effects assessment focuses on VECs (as described in Step 2) that may be adversely affected by the Project (after mitigation) and considers likely adverse effects caused by the other projects or human activities that overlap in space and time with those of the Project. After considering proposed mitigation and using the same criteria as in Step 7, the regulatory significance of any such residual effects of the Project is determined.

Step 9: Monitoring and Follow-Up

The final step is the development of an environmental protection program for monitoring and managing the effects of the Project during construction and operation. The program will be finalized once regulatory requirements are known.

The monitoring programs will help to determine the actual effects of the Project, including:

- Whether they are consistent with the analysis in the environmental impact assessment;
- The effectiveness of mitigation measures; and
- Whether any adaptive management and mitigation measures need to be implemented if unforeseen impacts occur.

5.3.2 Sources of Information

The partners worked together to conduct and document this environmental assessment. ATK, local knowledge and technical science were used to inform the assessment. As both proponents of the Project and as affected in-vicinity First Nations, the KCNs played an integral role, along with Manitoba Hydro, in directing and shaping the assessment.

- Lake sturgeon – are particularly vulnerable to effects of hydroelectric development as a result of their low population numbers and specific habitat requirements. They are culturally and spiritually important to the KCNs and are harvested. They have special status as a heritage species in Manitoba, are assessed as endangered by the Committee on the Status of Endangered Wildlife in Canada and are being considered for protection under the federal *Species at Risk Act*. Lake sturgeon is one of the species of greatest concern for the Project and, as such, has been the focus of considerable study and mitigation planning. Effects to lake sturgeon may also be indicative of effects to other species dependent on riverine environments.

1.2.2.5 Spatial Scope

The spatial extent of the assessment was determined through (i) identifying where the Project could directly affect environmental components of interest; and (ii) identifying where the Project could result in indirect effects (*e.g.*, downstream transport of sediment in water; movement of fish). Map 1-1 provides an overview of the region discussed below (detailed maps are in Section 1.3).

The open water **hydraulic zone of influence** (*i.e.*, the zone of direct Project effects) includes the footprint of the Project itself and the area that will experience substantial changes in water levels and flows. It includes the following:

- Gull Rapids, the site of the proposed GS;
- The reach immediately upstream of the GS where water levels will increase due to impoundment and backwater effects. This reach extends from approximately 3 kilometres (km) downstream of the outlet of Clark Lake to Gull Rapids, including Gull Lake, and the flooded reaches of small tributary streams; and
- The approximately 3 km long reach of the Nelson River immediately downstream of the GS where water levels and flows will be altered by diversion of flow through the tailrace of the GS and by the dewatering of the south channel of Gull Rapids.

Apart from the mainstem, the Project will also affect several streams crossed by the north and south access roads.

The zone of influence of indirect Project effects includes waterbodies that may be affected due to the movement of fish from the direct zone of influence and/or be affected by changes in inputs carried in the river from upstream. The following are included:

- Split Lake and adjoining waters where effects may occur due to the movement of fish from the reservoir;
- The upstream sections of flooded tributaries where fish usage may be affected by changes at the mouth;
- Stephens Lake where effects will occur because fish no longer will have access to Gull Rapids as habitat and the mainstem section will be affected by inputs from the construction and operation of the GS; and

- The Nelson River downstream of the Kettle GS, which may be affected by the downstream transport of substances in the water.

To provide context for existing and post-Project conditions in the waterbodies described above, comparisons were made to areas of northern Manitoba traversed by the Nelson River from Lake Winnipeg to its outlet at Hudson Bay and the Churchill/Rat/Burntwood system from the Manitoba border to its confluence with the Nelson River at Split Lake. The aquatic community of these areas has examples of both natural and regulated waters.

1.2.2.6 Temporal Scope

The temporal extent of the assessment (within the annual cycle and over multiple years) was determined based on:

- Seasonal differences that will affect the Project's effects on the environmental component of interest. For example, the analysis of effects to walleye considered changes to spawning habitat in spring, feeding habitat in summer and overwintering habitat under ice cover;
- Interannual differences were considered in terms of the variation in flow conditions between years, which are important in determining the amount and type of aquatic habitat;
- The period over which the Project could directly affect the environmental components of interest. In general, the assessment considered effects during the construction and operation phases. The operation phase was divided into an initial period (up to the first five years after impoundment to full supply level when the magnitude of on-going environmental change is the greatest), a transitional period (5–25 years as conditions stabilize), and long-term period (after 25 years when the reservoir environment has become established). As the Project life span is 100 years, long-term Project-related changes were considered permanent; and
- The environmental setting includes past conditions, in particular as they relate to the current condition of the environmental component of interest. Current conditions are generally described for the period 1997–2006, based on work done under various technical programs, in particular field studies for this assessment that were initiated in 1999. Additional information was collected after 2006 where analysis indicated data gaps, in particular in relation to lake sturgeon. An analysis of on-going change has also been conducted to determine whether there are clear trends that could continue into the future and markedly change baseline conditions, as they exist today. Conditions prior to 1997 were also considered to the extent that these were important to the current condition of the environmental component of interest.

1.2.3 Assessment Methods

The assessment was based on the concept of comparing the status of environmental components, including the VECs, without the Project in place and with the Project in place. Key elements of the assessment methods are described below.