9. Kabinakagami River Project Water Management Plan

There is no existing WMP for the Kabinakagami River. MNR has advised that the proposed Kabinakagami River Project will require the preparation of a greenfield WMP for the combined operation of the four facilities under the LRIA.

MNR (2007) has recommended a coordinated approach between the environmental screening process and water management planning to avoid duplication of effort. This section has been prepared in accordance with MNR's WMP Guidelines for Water Power (2002), and references other sections of this report to provide information applicable to the water management planning process. This WMP will specify the allowable water levels and flows at the four facilities, which will be legally enforced.

Approval of the WMP will not relieve the owner/operators from responsibility to comply with any applicable legislation or provide authority to flood private or public lands without the consent of the owners of the affected land which in this case is the Crown. Nothing in this WMP precludes the Minister from making further orders under the LRIA.

9.1 Introduction and Zone of Influence

9.1.1 Goal and Key Principles of Water Management Planning

MNR states in their Water Management Planning Guidelines (MNR, 2002), that the goal of water management planning is to contribute to the environmental, social and economic well-being of the people of Ontario through the sustainable development of waterpower resources and to manage these resources in an ecologically sustainable way for the benefit of present and future generations.

MNR has outlined the following key principles to guide the water management planning process:

- strive to maximize the net environmental, social and economic benefits to society
- strive for riverine ecosystem sustainability through the management of water levels and flows
- use best available information in WMP
- conduct a thorough assessment of water management options
- use adaptive management to reduce areas of uncertainty, build on successes and make adjustments to limit adverse impacts
- take action on study findings in a timely manner
- undertake water management planning without prejudice to the rights of Aboriginal people and treaty rights
- implement public participation to ensure accountability and transparency in the planning process.

9.1.2 *Objectives of the Kabinakagami River Water Management Plan*

The key objective of this WMP is to define the acceptable range of water levels and flows associated with the four proposed waterpower facilities (Site 3 - Neeskah, Site 4 - Peeshoo, Site 5 - Wahpeestan and Site 6 - Wapoose) to meet CLFN and Northland's electricity generation targets, while fully complying with regulatory requirements towards the other uses of water in the Zone of Influence which includes maintaining aquatic habitat and biota, maintaining surface water quality and providing recreational opportunities (e.g., navigation, angling etc.).

As discussed in Section 2.5.2.8, CLFN, DFO and MNR jointly prepared the Management Objectives for the Kabinakagami River for the reach between Highway 11 and the confluence of the Kabinakagami and Nagagami Rivers. The Objectives identify the main valued resources that CLFN, DFO and MNR would like maintained/protected from adverse effects due to the Kabinakagami River Project. There were five main objectives (with several sub-objectives) developed, as follows:

Objective 1

Goal:

- The maintenance of navigation opportunities downstream from the last facility (Site 6) the same as what natural conditions would allow for

Objectives:

- To maintain the river below Site 6 undisturbed, so that the downstream flow path, flows and levels are equal to what they would be without the facilities in place.

Strategies:

- Operate the facility so that natural flow and water levels are maintained downstream from Site 6 (i.e., water coming in upstream of facilities, plus inflow from creeks, equals water out at last facility all of the time).
- This mode of operation will be documented in the legally enforceable Water Management Plan for the facilities.
- Flow and water level will be monitored during operations to ensure that the facilities are being operated in accordance with the conditions of the Water Management Plan.

Objective 2a

Goal:

- Maintain the fishery and fisheries values downstream of Wapoose (Site 6).

Objectives:

- Maintain existing spawning areas downstream; maintain the flows and levels required for spawning downstream of Site 6 (as flows and levels would be naturally).

- The maintenance of current native aquatic biodiversity and community structure, including the vertebrate, invertebrate and vegetation species dependant on functioning rivers downstream of Site 6.

Strategies:

- Operate the facility so that natural flows and water levels, and associated aquatic habitat conditions, are maintained at all times downstream from Site 6 (i.e., water coming in upstream of the facilities, plus inflow from creeks, equals water out at last facility all of the time). So water into the projects above Site 3 - Neeskah, plus inflow from the creeks, will equal the water out below Site 6 - Wapoose.
- Possible strategy – to reduce the potential of invasive species being introduced to the new head ponds by posting signage at the new access points.
- Implement erosion and sediment controls throughout the construction period to ensure sediment is not transported downstream to critical aquatic habitats (i.e., spawning sites).
- Monitoring spawning and habitat conditions at known spawning areas downstream from Site 6 following commencement of operations to confirm suitable conditions remain present.
- Potential mortality associated with passage through the turbines will be limited by minimizing the flow velocity upstream from the intake (so fish can swim away) and installing trashracks with a relatively narrow opening (75 mm) to minimize fish movements into the turbines.

Objective 2b

Goal:

- For the area within the facility zone of influence (Site 3 to Site 6), not including downstream of Site 6 (see 2a)
  - Maintain wetted area between the Projects (no dry river bed)
  - Maintain an abundant population of the existing species biodiversity with the understanding that some components may be eliminated (i.e., sturgeon and brook trout) and some components may increase (walleye, pike, sucker).

Objectives:

- Where productive habitat may be lost or inaccessible, habitat compensation will be as local as possible, and wherever possible, emulate natural conditions to sustain current species diversity by maintaining natural habitat features and ecosystem function.
- Maintain existing diversity of terrestrial and aquatic habitats by protecting representative areas and locally compensating for any areas lost by development (e.g., new spawning beds downstream from each facility).

Strategies:

- Design of facilities prevents dewatering of any sections of the riverbed by having the powerhouses adjacent to the dams (eliminating the need for a bypass channel) and setting head pond water levels so they extend upstream to the base of the next upstream facility.
- Head pond levels will only fluctuate in response to natural high flow conditions during spring conditions or high rain fall events.
- During normal and low flow conditions the facilities will be operated to maintain head pond water level with minimum fluctuations.
- The projects will maintain flow rates coming into the upper headpond at all times to maintain aquatic habitat within each head pond area.
- Spawning habitat enhancements for species such as walleye and suckers will be installed in each head pond to ensure such species have access to spawning areas.
- The water management strategy should promote growth of shoreline vegetation for northern pike spawning in the head ponds.
- Potential mortality associated with passage through the turbines will be limited by minimizing the flow velocity upstream from the intake (so fish can swim away) and installing trashracks with a relatively narrow opening (75 mm) to minimize fish movements into the turbines.

Objective 3a

Goal:

- Prevent the over-exploitation of moose in the area of the projects (Pelican Block area) due to the increased access during construction.

Objectives:

- To avoid moose over-exploitation during construction phase.

Strategies:

- Develop an awareness amongst community members that moose over exploitation is a possibility due to increased activity in the project area.
- hunting restrictions (red zones) during construction, main purpose is for safety of construction workers but also benefits moose.
- possibility of community education on moose harvest.
- CLFN leadership to work on strategy during construction (3-yr period).

Objective 3b

Goal:

- Maintain the existing values for moose downstream of the projects, specifically the potential calving sites and moose aquatic feeding areas.

Objectives:

- To maintain moose habitat downstream of Site 6.
- To maintain the river below Site 6 so that downstream flows and levels are equal to what they would be without the facilities in place.

Strategies:

- Site 8 was dropped from consideration following discussions with CLFN members due to the environmental sensitivity, fisheries and the importance of Moose calving and aquatic feeding areas that would be impacted by development at Site 8.
- Facilities operated to maintain natural flows and levels downstream from Site 6 to ensure that shoreline aquatic feeding areas are not impacted by the Project.

Objective 4

Goal:

- To provide recreational opportunities (angling, canoeing, sailing, kayaking, hunting and trapping access, ATV, hiking, photography) for members of CLFN in the newly developed head pond areas.

Objectives:

- Create access from west side.
- Maintain and/or enhance fishing opportunities in the head ponds (ties into objective 2)

Strategies:

- Provide boat launch areas at each of the four head pond sites and associated portages around each facility.
- Temporary construction access to the east side of the river decommissioned post construction.

Objective 5

Goal:

- Maintain water quality.

Objectives:

- To maintain the water quality of the Kabinakagami River (facility influence).

Strategies:

- Baseline fish and water quality mercury data collected, long term mercury monitoring planned.
- Clear entire inundation zone prior to flooding to reduce mercury methylation.
- Relatively small facilities and associated head pond areas minimizes potential for temperature increases in head ponds.
- Full height intake to draw from full water column to reduce temperature increases due to ponding and also to maintain sediment movement downstream.
- Spill prevention and response plans will be in place for the construction and operations periods.
- An erosion and sedimentation control plan will be implemented during construction.
- During construction have adequate sized settling ponds and monitoring and maintain settling ponds to ensure proper functioning.
- Potential contaminants will be identified during construction and operations and contingency plans will be in place to address potential concerns.
- Fluid and waste storage sites will be designed to prevent accidental discharge of contaminants to the environment.
- Oil-water separators will be installed in each powerhouse and secondary containment will be utilized where potentially contaminating materials are present (i.e., transformers).
- Monitoring and reporting will be conducted according to conditions of approvals during construction
- Long term water quality monitoring conducted post-construction.

The complete Management Objectives document is provided in Appendix C19. The Management Objectives identify a number of strategies to achieve each individual objective. Strategies related to the management of levels and flows as a result of facility operation are prevalent for the majority of the Objectives.

These Objectives were used to guide the development of the operating regime for the proposed facilities; specifically, a strict run-of-river operating regime was necessary to meet the identified Objectives. This required mode of operation was recognized by Northland early on in the discussions with CLFN and has been the basis for the Project since its inception.

This ER has assessed the potential effects of the proposed operating regime, with specific focus towards confirming that the Management Objectives noted above have been met. Additional mitigation has been specified as required throughout this ER to meet the Management Objectives.

The subsequent regulatory approvals processes will further support the WMP planning process and ensuring that Objectives are met by identifying and documenting the mitigation measures that must be implemented to ensure the facility is constructed and operated in the manner described in this ER and any subsequent terms and conditions of permits and approvals. The ER and subsequent permits and approvals will identify monitoring requirements to confirm that the facility is constructed and operated accordingly and is indeed meeting the identified management objectives.

9.1.3 Zone of Influence

The potential Zone of Influence for the Kabinakagami River Project is defined as the reach of the river from the upstream end of the proposed Site 3 - Neeskah head pond (at the 1:100-yr flow event) to an undefined point downstream from the Site 6 - Wapoose facility location where flows and levels due to facility operations are not affected (on a daily average basis, this point will be approximately 150 m downstream from the site). This downstream zone of influence will be confirmed post-construction using a science-based protocol (see Section 9.5.4 and Section 10.3 for operational monitoring requirements)

9.2 Physical and Biological Description of Riverine Ecosystem

See Section 4.

9.3 Socioeconomic Description Related to Riverine Ecosystem and Water Management

See Section 4.

9.4 Waterpower Facilities, Water Control Structures, and Current Water Management Strategies

There are no existing water management structures (dams or waterpower facilities) on the Kabinakagami River.

9.5 Issues, Data Gaps and Baseline Data Collection Program

9.5.1 Issues, Resource Values and Interests

Environmental and social/socio-economic issues, resource values, and interests associated with the Kabinakagami River Project were identified through the following procedures:

- application of OWA Class EA Potential Effects Matrix for construction and operations of the facilities
- communication and consultation with all relevant federal and provincial agencies, particularly CEA Agency, DFO, TC, EC, NRCan, HC, MNR and MOE, as well as the Town of Hearst
- notifications to public stakeholders regarding the commencement of the Project, two PICs in Hearst, the Notice of Inspection 30-day report review period and the Notice of Completion 30-day report review period
- extensive consultations with CLFN, commenced in 2007, included a community workshop prior to commencement of the Class EA, two open houses as part of the Class EA process,

opportunities to review the Draft ER, traditional ecological knowledge meetings and a terrestrial and aquatic management objective setting meeting with MNR and DFO. CLFN community members also participated extensively in environmental investigations (particularly fisheries) to ensure that all local knowledge was accessed during the baseline investigations

- Face-to-face meeting with Fort Albany First Nation and Kashechewan First Nation in February 2012 to consult with the Chiefs and Band Council members. A team consisting of the Chief and members of the Band Council of CLFN, liaison workers from CLFN, a fisheries biologist from MNR and a representative from Northland attended for the Project. The meeting involved comprehensive presentations on the Project including technical, environmental and fisheries aspects of the Projects.

Issues identified through stakeholder consultation activities are presented in Section 2.

Resource values considered important for the Project are the environmental components listed in Table 1.2 (Section 1.8). These environmental components were assessed in terms of potential impacts from the proposed Project and the results are provided in Section 5. The Terrestrial and Aquatic Management Objectives (see Section 2 and Appendix C19), defined by CLFN, MNR and DFO were used as the primary tool to identify resource values and assess the significance of potential environmental effects and requirement for mitigation measures.

9.5.2 Baseline Data Collection and Data Gaps

Initial baseline data collection activities were focussed on gathering information on the existing natural, social and socio-economic environment from local sources and government websites.

The results of this effort indicated that there were baseline data deficiencies in the following areas:

- information on fish and benthic invertebrate species and aquatic habitat for the Study Area
- information on vegetation, wildlife and wildlife habitat in the Study Area, including woodland caribou and odonates
- information for the Study Area on surface water quality and fish tissue mercury concentrations
- as discussed in the next section, a baseline field investigation program was prepared to address these information gaps.

9.5.3 Baseline Field Investigations to Fill Data Gaps

In consultation with government agencies, baseline field investigations were undertaken as follows (results of those studies are discussed in Section 4):

- Spring fish spawning study – May 2009
- Aquatic habitat and fish community assessment – September 2009
- Fall fish spawning study – October 2009
- Lake Sturgeon Tagging and Tracking Study – 2009/2010

- Benthic invertebrate study – October 2009
- Surface water quality – May, September and October 2009
- Surface water temperature –2012 (ongoing)
- Odonate study – July 2009
- Terrestrial study – September 2009
- Winter Caribou Study – February 2011.

Complete details regarding the above baseline field investigations are included in Section 4 – Existing Environment.

9.5.4 Outstanding Gaps in Data, Information and Knowledge

Through the Class EA process and the Management Objectives setting process undertaken by CLFN, DFO and MNR, data and information gaps were identified, as discussed in the following sections.

The potential for impacts on Olive-sided Flycatcher was identified by MNR as a data gap, since actual baseline use of the Project Area by the species is unknown. As noted in Section 5.16.9.4, it has been predicted that vegetation clearing may result in an overall gain in habitat for this species, since it prefers woodland edges, such as those that will be created by clearing for access roads, transmission lines and work areas. However, it is anticipated that construction will result in a temporary disturbance to this species. At the request of MNR, Northland will be conducting an Olive-sided Flycatcher breeding study in spring 2013 to provide additional information on the species within the Project Area. The results of the study will be provided to MNR.

Northland will also be implementing an additional baseline fluvial geomorphological assessment to supplement the baseline data collection prepared as part of the Class EA. This assessment will involve the establishment of a number of full geomorphic field stations upstream and downstream from the proposed developments to identify and quantify the baseline sediment transport regime in the Kabinakagami River in the Study Area. This information will be used to provide baseline data to compare to post-construction data to understand any effects on the sediment transport regime due to the Project.

MNR and DFO also identified several potential impacts of run-of-river hydroelectric development where there is not adequate existing knowledge based on other similar examples that can be drawn upon to assess the potential effects and mitigation requirements for this proposed Project. In these instances, potential effects and mitigation requirements have been identified using examples that are available in the literature and the professional judgment of the ER authors, in collaboration with government agency representatives, although some uncertainty still exists as to the actual effects that will occur. Mitigation has been identified on the basis of the predicted effects. However, post-construction monitoring programs are proposed to assess the actual effects of the proposed development on these environmental values. The results will then be used to identify opportunities for additional mitigation to prevent/minimize ongoing effects and will also enhance the knowledge base on the effects of small run-of-river

hydroelectric development, which can then be used for other Projects where similar conditions exist. The potential effects/environmental values for which such uncertainty exists include

- potential effects on surface water temperatures as a result of the formation of the small head ponds upstream of each facility
- potential effects on cold water habitat and fish use of this habitat in cold water tributary mouth areas that will be inundated by the proposed head ponds (i.e., Carey Creek mouth in the Site 3 – Neeskah head pond)
- potential effects of alterations to sediment supply downstream from Site 6 – Wapoose and corresponding effects on benthic invertebrates and long-term Lake Sturgeon growth and condition, and potentially, relative reproductive capacity.

Also, as noted previously, a study will be implemented post-construction to confirm the downstream zone of influence of the facilities. A science-based protocol will be developed in consultation with the regulatory authorities.

Other post-construction monitoring studies have also been proposed (see Section 10.3) to confirm the predictions made in this ER and identify if remedial actions are required to address unanticipated adverse effects on valued environmental components. This form of adaptive management is consistent with the guiding principle of water management planning.

9.6 Option Development and Preferred Option

Several alternative layouts for the proposed Kabinakagami River Project were considered as outlined in Section 1.6. The preferred scheme for the four facilities is presented and discussed in Section 3 in relation to its constructability, and operational aspects.

The key consideration during development of the alternatives for the facilities was the desire of Northland to address significant concern from CLFN regarding the potential for sections of the Kabinakagami River to be dewatered during normal operations (e.g., due to fluctuations in flow or due to the requirement for a bypass reach where flows are diverted away from the dam and powerhouse). Based on this, the proposed facilities have been designed with close-coupled powerhouses integrated into the dam structures to avoid any requirement for a bypass reach. The layout of the four facilities has been designed such that the head pond from the downstream facility backs up to the base of the upstream facility to prevent any dewatering at the base of the dam. CLFN and Northland have decided to operate the facilities in a strict run-of-river manner to avoid any changes in downstream flow rates that could affect aquatic biota and habitat or the use of the river for navigation.

9.7 Environmental Effects of Preferred Option

Prior to confirming the preferred water management strategy for the proposed Kabinakagami River Project as described in Section 9.8, the environmental effects of construction and operation were assessed and documented. The results are provided in Section 5.

9.8 Preliminary Dam Operating Plan for the Kabinakagami River Projects

Each facility will operate in a run-of-river mode of operation which means that the inflow to the head pond will equal the outflow through the powerhouse and/or over the spillway, taking into

account local inflows from tributaries draining into the respective head ponds. In this manner, there will be no alteration to the flow rate of the Kabinakagami River downstream of the facilities, including Site 6 – Wapoose, below which natural flows prevail.

The ECO Bulb turbines proposed for the Project (two per facility) will each be capable of operating at flow rates ranging from a minimum of 8 m^3/s to a maximum of 45 m^3/s, with the rated flow (i.e., the maximum flow rate they are designed for) being 41 m^3/s. Each facility will contain two ECO Bulb turbines, so the range of possible flows for each facility will be from 8 to a theoretical 90 m^3/s, with the actual maximum rated flow being 82 m^3/s. The Project's power purchase agreement with the OPA will not pay for over generation).

During normal operational conditions when both turbines are operating, each turbine will be operated up to the maximum rated capacity of 41 m^3/s for a total powerhouse flow of 82 m^3/s. When river flows are between 41 and 82 m^3/s, both turbines will be operated to pass an equal amount of flow. When flow in the river decreases below 41 m^3/s, only one turbine will be operated. As discussed in Section 3, if one of the turbines is not operating (due to being down for maintenance), the remaining turbine may be operated up to the maximum flow capacity of 45 m^3/s, provided that amount of flow is in the river.

All flow in excess of 82 m^3/s will be passed over the spillway. Under normal operating conditions when flows are between 8 and 82 m^3/s, all flow will be passing through the turbines, with no spill occurring. However, if the facilities are not able to use all the available flow (e.g., if one unit is shut down for maintenance), any flow in excess of the maximum capacity of one turbine (45 m^3/s) will be passed over the spillway.

Due to cavitation and imbalance risks in the turbines, the facilities will not be able to generate electricity at flow rates less than approximately 8 m^3/s (i.e., the minimum flow capacity of one turbine). When flows in the river are less than 8 m^3/s, the facility would be shut down until river flow increases above that threshold. Under this scenario, all river flow would be passed over the overflow spillway at each site until flows increase above 8 m^3/s and the facility resumes operations.

Each facility will be operated under a 'water level control' strategy whereby, during periods of normal inflow (up to the rated flow of the turbines (82 m^3/s), which occurs approximately 89% of the time in an average flow year) the turbines will be operated to maintain the head pond level approximately 0.05 m below the level of the overflow spillway crest, with all flow passing through the turbines. This head pond water level, measured at a point immediately upstream from each facility, is a constant elevation termed the TOL. This level will be monitored and maintained by the use of water level transducers located upstream from each facility when flows are between 8 and 82 m^3/s. During such time periods, the facility will be operated to maintain the water level of each head pond at the TOL. The water level transducer will automatically relay the head pond water level to the system control equipment. Once the water level reaches a specified threshold above or below the TOL, the flow through the powerhouse will be briefly varied to bring the head pond level back to the TOL. Taking into account the response time of turbines to changes in water levels and to avoid constantly changing operations of the turbines (which can place undue stress on mechanical components), while maintaining the run-of-river

mode of operation, the head ponds will be maintained +/- 0.05 m around the TOL. This 0.10 m wide band around the TOL is called the Target Operating Zone. The head pond water levels will be maintained within this zone when flows in the river are between 8 and 82 m^3/s.

However, Northland has been advised by the manufacturer of the ECO Bulb turbines proposed for use at the proposed facilities that the turbine's ability to respond to flow changes and provide such fine control of water levels decreases at flow rates below 20 m^3/s. Therefore, when flows in the river are less than 20 m^3/s, the turbine may not be physically able to respond to natural changes in flow with sufficient control to maintain the head pond water level within the Target Operating Zone. For this reason, a Low Water Zone of 0.05 m is added to the range of water levels for each head pond when flows are below 20 m^3/s. The lower limit of this zone is called the Absolute Minimum Water Level. The facilities will attempt to operate the head ponds at the TOL within the Target Operating Zone to the extent possible, but the mechanical constraints noted above may periodically cause the head pond levels to decrease into the Low Water Zone.

During periods of high flow (above the 82 m^3/s rated flow of each powerhouse), the head pond water level will increase and start flowing over the overflow spillway. Assuming the powerhouses are operating at full capacity, during the 1:2-yr flood, the head ponds will increase by approximately 1.35 m. For the 1:100-yr flood, assuming the facilities are shut down, the head pond levels will increase by between approximately 2.4 m, although if the facilities are operating, the increase will be about 1.9 m. Northland will have no ability to control water levels in the head pond when flows in the river are higher than the operational capacity of the powerhouse; since there is no operational control ability at the spillway and the objective of the Project is to allow natural conditions to prevail. Based on this lack of water level control when flows exceed the operational capacity of the facility, no upper head pond compliance limit is proposed. For the purposes of the WMP, the maximum water levels for each head pond have been defined as the levels that would occur at the 1:100-yr flood, although higher magnitude floods would have correspondingly higher water levels. The range between the spillway crest and the 1:100-yr flood level is called the High Water Zone.

When flow in the river decreases below 8 m^3/s, the facilities will shut down since this is lower than the operational capacity of one turbine. Such flows have occurred an average of 3% of the time over the hydrology period of record, but have only occurred in 6 of the 36 years on record. Therefore, occurrence of such flows is anticipated to be an infrequent event. Once flow in the river reaches 12 m^3/s, the facilities will be operated to maintain the water level of each head pond as close as possible to the spillway crest. When flows drop to 8 m^3/s, the facilities will stop generating power. The turbine will continue to pass 3 m^3/s and the remaining flow in the river will be used to fill each head pond sequentially to the spillway crest level so spilling commences. After this, flow through the turbines will be completely shut off and all flow in the river will be going over the spillway. The passage of 3 m^3/s will be monitored throughout this period until spilling commences at all four facilities to ensure that this minimum flow is maintained.

Therefore, the overall operating zones for each facility will vary depending on the flow rate in the river, as identified in Table 9.1.

Table 9.1 Head Pond Water Level Ranges at Different Flow Rates

River Flow (m^3/s)	Operating Zone	Water Level Range
> 82	High Water Zone	Spillway crest to 2.4 m over spillway crest (at 1:100-yr flow)
8 – 82	Normal Operating Zone	+/- 0.05 m around TOL
8 – 20	Low Water Zone	0.10 to 0.05 m below TOL
< 8	n/a – facility not operational	Above spillway crest

The specific water levels and flows for each facility are identified in the following sections.

9.8.1 Site 3 - Neeskah

Table 9.2 summarizes the water levels of the proposed Site 3 - Neeskah facility.

Table 9.2 Site 3 - Neeskah Head Pond Water Level Regime

	(m)
Spillway Crest Elevation	200.00
Target Operating Level	199.95
Target Operating Zone (flows 8 to 82 m^3/s)	199.90 to 200.00
Low Water Zone (flows 8 to 20 m^3/s)	199.85 to 199.90
Absolute Minimum Water Level	199.85
1:2-yr Flood Level	201.35
Maximum Head Pond Water Level (1:100-yr flood)	202.30

This water level regime is depicted graphically in Figure 9.1.

9.8.2 Site 4 - Peeshoo

Table 9.3 summarizes the water levels of the proposed Site 4 - Peeshoo facility.

Table 9.3 Site 4 - Peeshoo Head Pond Water Level Regime

	(m)
Spillway Crest Elevation	190.00
Target Operating Level	189.95
Target Operating Zone (flows 8 to 82 m^3/s	189.90 to 190.00
Low Water Zone (flows 8 to 20 m^3/s)	189.85 to 189.90
Absolute Minimum Water Level	189.85
1:2-yr Flood Level	191.35
Maximum Head Pond Water Level (1:100-yr flood)	192.30

This water level regime is depicted graphically in Figure 9.2.

9.8.3 Site 5 - Wahpeestan

Table 9.4 summarizes the water levels of the proposed Site 5 - Wahpeestan facility.

Table 9.4 Site 5 - Wahpeestan Head Pond Water Level Regime

	(m)
Spillway Crest Elevation	179.50
Target Operating Level	179.45
Target Operating Zone (flows 8 to 82 m^3/s)	179.40 to 179.50
Low Water Zone (flows 8 to 20 m^3/s)	179.35 to 179.40
Absolute Minimum Water Level	179.35
1:2-yr Flood Level	180.85
Maximum Head Pond Water Level (1:100-yr flood)	181.80

This water level regime is depicted graphically in Figure 9.3.

9.8.4 Site 6 - Wapoose

Table 9.5 summarizes the water levels of the proposed Site 6 - Wapoose facility.

Table 9.5 Site 6 - Wapoose Head Pond Water Level Regime

	(m)
Spillway Crest Elevation	168.50
Target Operating Level	168.45
Target Operating Zone (flows 8 to 82 m^3/s)	168.40 to 168.50
Low Water Zone (flows 8 to 20 m^3/s)	168.35 to 168.40
Absolute Minimum Water Level	168.35
1:2-yr Flood Level	169.85
Maximum Head Pond Water Level (1:100-yr flood)	170.80

This water level regime is depicted graphically in Figure 9.4.

9.9 Compliance Considerations

For compliance purposes, the Target Operating Zone will be the legal operating limits when flows are between 20 and 82 m^3/s. The head pond water levels will be out of compliance with this WMP if they go outside the Target Operating Zone when flows in the river are within this range. Northland will be required to submit an Incident Report following standard compliance procedures outlined by MNR whenever the head pond water levels deviate outside the Target Operating Zone when river flow is within this range.

When flows are between 8 and 20 m^3/s, the legal operating limits will include the Target Operating Zone and the Low Water Zone since equipment constraints may prevent the water levels from being maintained solely within the Target Operating Zone. Northland will be required to submit an Incident Report following standard compliance procedures outlined by MNR whenever the head pond water levels deviate outside the Target Operating Zone/Low Water Zone when river flow is within this low flow range.

When flows are above 82 m^3/s, Northland will have no ability to control water levels in the head ponds, since they will rise and fall in accordance with natural inflows until flow decreases back

to or below 82 m^3/s. For compliance purposes, no Incident Report will be required if water levels exceed the spillway crest elevation when flows are greater than 82 m^3/s. However, if water levels decrease below the spillway crest when flows are greater than 82 m^3/s, Northland will be out of compliance and will have to submit an Incident Report to MNR, following standard compliance procedures.

9.10 Effectiveness Monitoring Program

A post-construction environmental monitoring program is outlined in Section 10 and its purpose includes assessment of the effectiveness of mitigation proposed, including effectiveness of the proposed water management plan in achieving the Management Objectives outlined in Section 9.1.2.

9.11 Compliance Monitoring and Reporting Program

Northland will be required to report the following for each facility:

- one instantaneous discharge (flow) reading at 15 minute intervals
- one instantaneous head pond water level reading at 15 minute intervals.

For total instantaneous discharge readings, this would be a combination of gauged/measured flows through each facility and calculated discharge from the spillway.

For the purposes of compliance monitoring, the head pond water level will be monitored from a water level gauge located on the upstream side of each powerhouse.

Water temperature in each head pond will also be monitored on an hourly basis and this data will be reported with the flow and water level reading data.

This information will be reported annually by March 1 in a compliance monitoring report to MNR. The information will be provided in an electronic format that can be graphed as well as in a written format.

An out-of-operating zone situation will require the submission of an Incident Report as noted in Section 9.9.

9.12 Provisions for Plan Reviews, Amendments and Plan Renewals

This WMP will have a plan term of 10 years. It will also be subject to the conditions for plan amendments, reviews and renewals as specified in the Final WMP.

9.13 Aboriginal and Public Consultation

Aboriginal and public consultation for the proposed Kabinakagami River Project and WMP is included in Section 2.

Figures

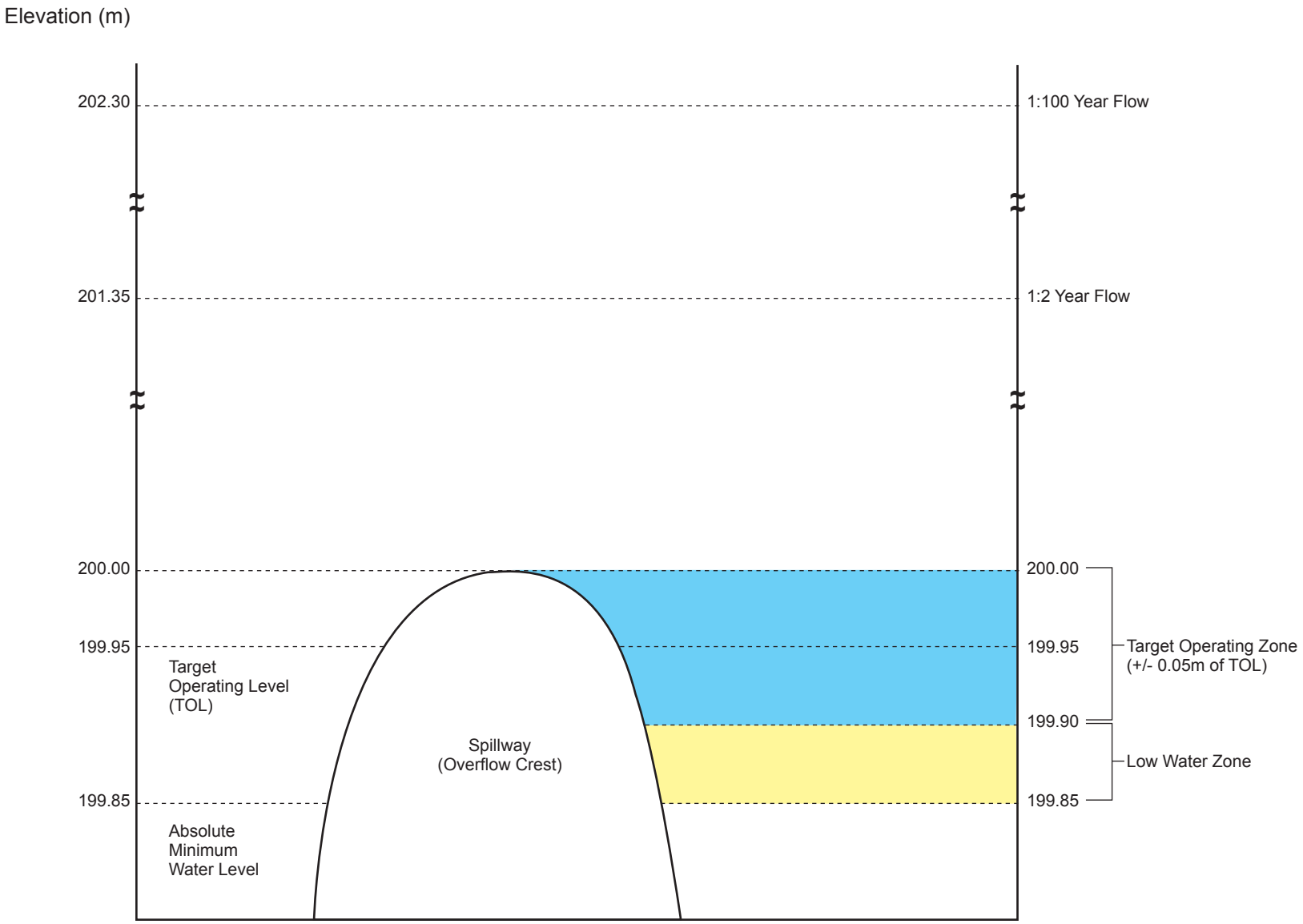

Figure 9.1
Northland Power Inc.
Kabinakagami River Project
Site 3 - Neeskah - Operating Water Levels

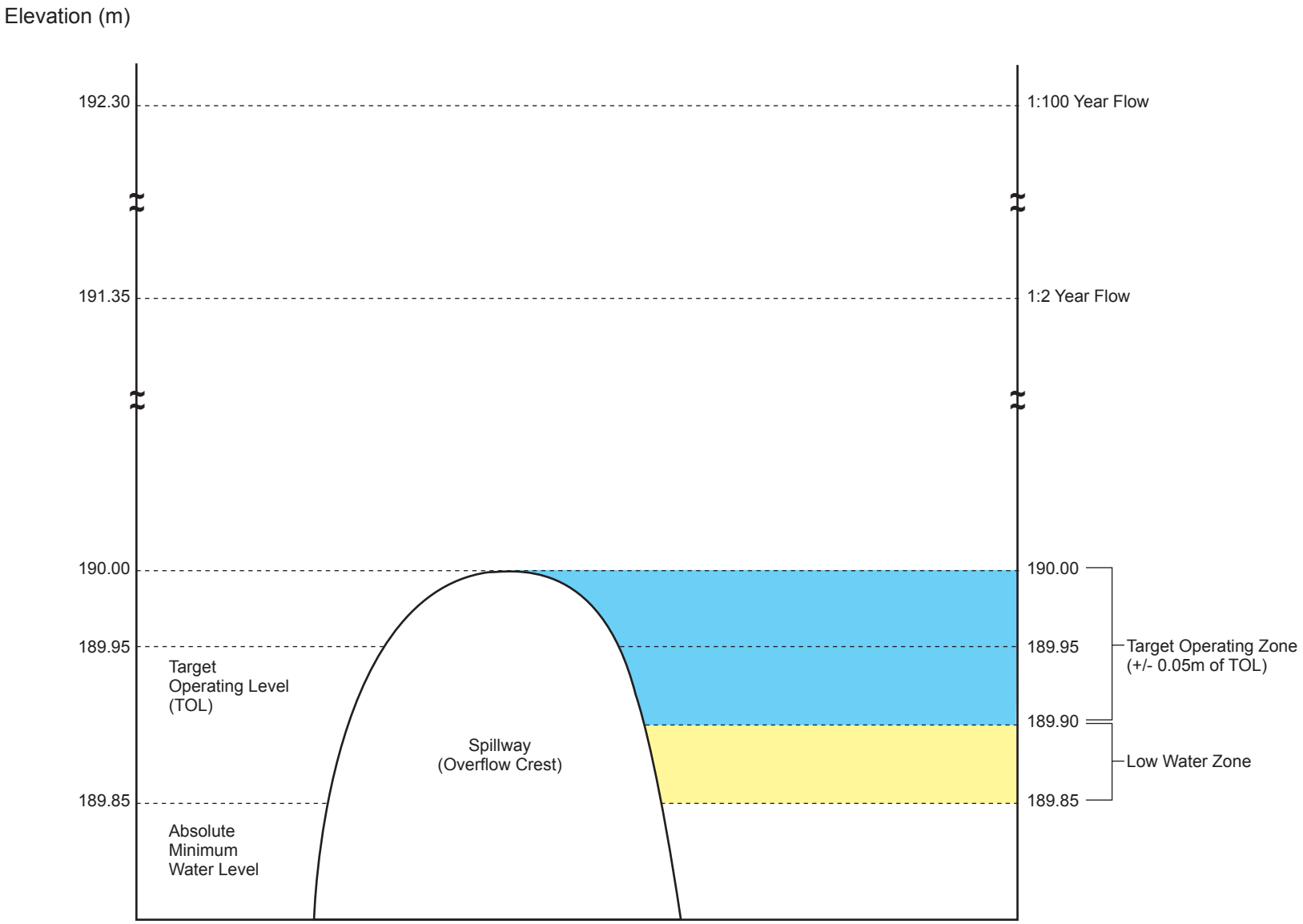

Figure 9.2
Northland Power Inc.
Kabinakagami River Project
Site 4 - Peeshoo - Operating Water Levels

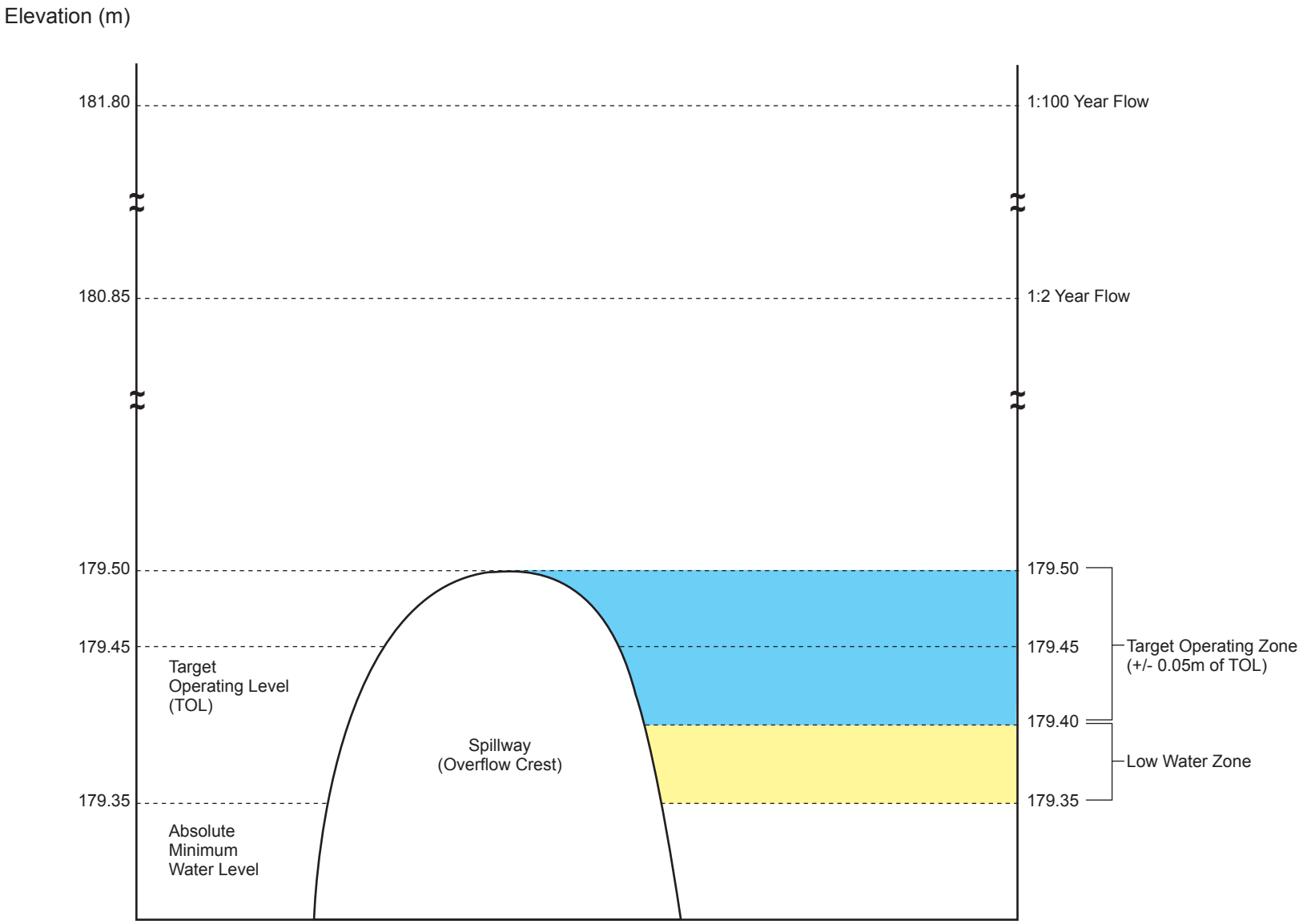

Figure 9.3
Northland Power Inc.
Kabinakagami River Project
Site 5 - Wahpeestan - Operating Water Levels

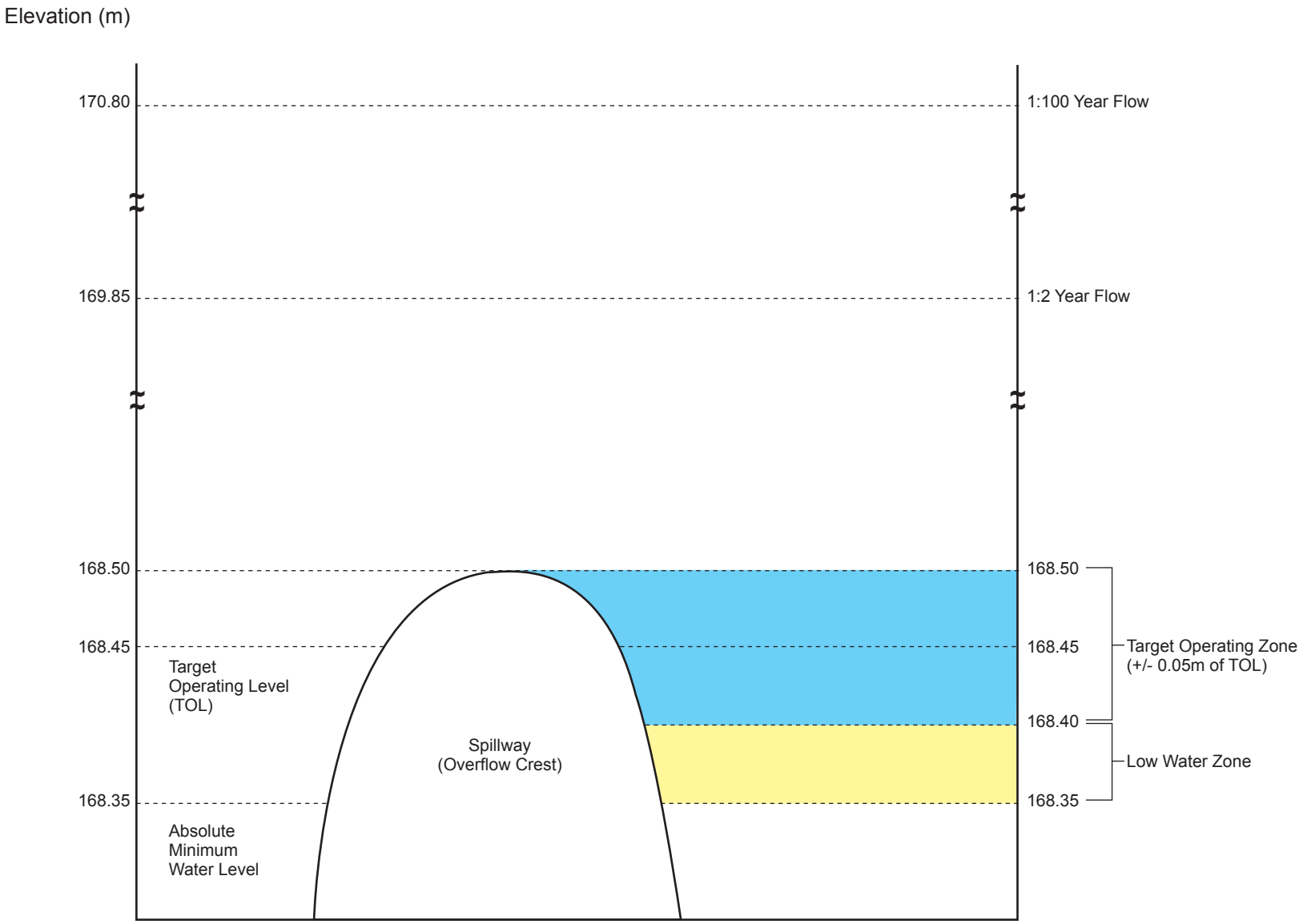

Figure 9.4
Northland Power Inc.
Kabinakagami River Project
Site 6 - Wapoose - Operating Water Levels