

4.11 Hydrological resource

Principle: The project’s planned power generation takes into account hydrological resource availability and reliability in the short- and long-term, and that the reservoir and downstream flow regimes are planned and managed with an awareness of environmental, social and economic objectives.

Scope: Hydrological resource availability and reliability to the project, reservoir planning and downstream flow regimes in relation to environmental, social and economic impacts and benefits.

Requirements:

Criteria	Minimum requirements (good practice)	Advanced requirements (best practice)
Assessment	<p>Preparation Stage:</p> <p><i>Reservoir Planning</i> – Assessment has been undertaken of the important considerations prior to and during reservoir filling and during reservoir operations</p> <p><i>Downstream Flows</i> – An assessment of flow regimes downstream of project infrastructure over all potentially affected river reaches, including identification of the flow ranges and variability to achieve different environmental, social and economic objectives, has been undertaken based on relevant scientific and other information.</p> <p><i>Hydrological Resource</i> – An assessment of hydrological resource availability has been undertaken utilising available data, field measurements, appropriate statistical indicators, and a hydrological model; issues which may impact on water availability or reliability have been identified and factored into the modelling; and scenarios, uncertainties and risks have been evaluated.</p> <p>Implementation Stage:</p> <p><i>Reservoir Preparation and Filling</i> – The important considerations prior to and during reservoir filling and during operations have been identified through an assessment process; and monitoring of implementation activities is being undertaken appropriate to any identified issues.</p> <p><i>Downstream Flows</i> – Issues in relation to flow regimes downstream of project infrastructure during the project implementation stage have been identified and assessed; and monitoring is undertaken to assess effectiveness of flow management measures or any emerging issues during project implementation.</p> <p>Operation Stage:</p> <p><i>Reservoir Management</i> – Ongoing or emerging reservoir management issues have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.</p>	<p>Preparation Stage:</p> <p><i>Reservoir Planning</i> – the assessment is based on dialogue with local community representatives, and takes broad considerations, risks and opportunities into account.</p> <p><i>Downstream Flows</i> – The assessment is based on field studies, and takes broad considerations, risks and opportunities into account.</p> <p><i>Hydrological Resource</i> – Issues that may impact on water availability or reliability have been comprehensively identified; and uncertainties and risks have been extensively evaluated over the short- and long-term.</p> <p>Implementation Stage:</p> <p><i>Reservoir Preparation and Filling</i> – Monitoring of reservoir preparation and filling activities takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.</p> <p><i>Downstream Flows</i> – monitoring of downstream flow issues takes into account inter- relationships amongst issues, and both risks and opportunities that become evident during implementation.</p> <p>Operation Stage:</p> <p><i>Reservoir Management</i> – identification of ongoing or emerging reservoir management issues takes into account both risks and opportunities.</p> <p><i>Downstream Flows</i> – issues identification takes into account both risks and opportunities. In the case of a need to address downstream flow regimes, an assessment has been undertaken that includes identification of the flow ranges and variability to achieve different environmental, social and economic objectives based on field studies as well as relevant scientific and other information.</p> <p><i>Hydrological Resource</i> – Issues that may impact on water availability or reliability have been comprehensively identified; and scenarios, uncertainties and risks are routinely and extensively evaluated over the short- and long-term.</p>

Downstream Flows – Ongoing or emerging issues relating to the operating hydropower facility's downstream flow regimes have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.

Hydrological Resource – Monitoring is being undertaken of hydrological resource availability and reliability, and ongoing or emerging issues have been identified; inputs include field measurements, appropriate statistical indicators, issues which may impact on water availability or reliability, and a hydrological model.

Management

Preparation Stage:

Hydrological Resource – A plan and processes for generation operations have been developed to ensure efficiency of water use, based on analysis of the hydrological resource availability, a range of technical considerations, an understanding of power system opportunities and constraints, and social, environmental and economic considerations including downstream flow regimes.

Reservoir Planning – Plans and processes to manage reservoir preparation, filling and operations have been developed

Downstream Flows – Plans and processes for delivery of downstream flow regimes have been developed that include the flow objectives; the magnitude, range and variability of the flow regimes; the locations at which flows will be verified; and ongoing monitoring; and where formal commitments have been made, these are publicly disclosed.

Implementation Stage:

Reservoir Preparation and Filling – Measures are in place to address identified needs during reservoir preparation and filling; and plans are in place to manage the reservoir and any associated issues for the operating hydropower facility.

Downstream Flows – In the case that a need to address downstream flow regimes has been identified, measures are in place to manage identified downstream flow issues; and where formal commitments have been made, these are publicly disclosed.

Operation Stage:

Reservoir Management – Measures are in place to manage identified issues.

Downstream Flows – In the case of a need to address downstream flow regimes, measures are in place to address identified downstream flow issues; and where formal commitments have been made, these are publicly disclosed.

Preparation Stage:

Reservoir Planning – reservoir plans are based on dialogue with local community and government representatives; and processes are in place to anticipate and respond to emerging risks and opportunities.

Downstream Flows – Processes are in place to anticipate and respond to emerging risks and opportunities; and commitments in plans are public, formal and legally enforceable.

Hydrological Resource – Generation operations planning has a long-term perspective; takes into consideration multiple uses and integrated water resources management; fully optimises and maximises efficiency of water use; and has the flexibility to anticipate and adapt to future changes.

Implementation Stage:

Reservoir Preparation and Filling – Processes are in place to anticipate and respond to emerging risks and opportunities.

Downstream Flows – processes are in place to anticipate and respond to emerging risks and opportunities.

Operation Stage:

Reservoir Management – processes are in place to anticipate and respond to emerging risks and opportunities.

Downstream Flows – processes are in place to anticipate and respond to emerging risks and opportunities. In the case of a need to address downstream flow regimes, in addition commitments are made in relation to downstream flow regimes that include the flow objectives; the magnitude, range and variability of the flow regimes; the locations at which flows will be verified; and ongoing monitoring.

Hydrological Resource – generation operations planning has a long-term perspective; fully optimises and maximises efficiency of water use; and has the flexibility to adapt to anticipate and adapt to future changes.

	<p>Hydrological Resource – Measures are in place to guide generation operations that are based on analysis of the hydrological resource availability, a range of technical considerations, an understanding of power system opportunities and constraints, and social, environmental and economic considerations.</p>	
<p>Conformance/ Compliance</p>	<p>Implementation Stage:</p> <p>In the case that a need to address downstream flow regimes has been identified, processes and objectives in place to manage downstream flows have been and are on track to be met with no major non-compliances or non-conformances, and downstream flow related commitments have been or are on track to be met.</p> <p>Operation Stage:</p> <p>In the case of a need to address downstream flow regimes, processes and objectives in place to manage downstream flows have been and are on track to be met with no major non-compliances or non-conformances, and downstream flow related commitments have been or are on track to be met.</p>	<p>Implementation Stage and Operation Stage:</p> <p>There are no non-compliances or non-conformances.</p>
<p>Outcomes</p>	<p>Preparation Stage:</p> <p>Plans for downstream flows take into account environmental, social and economic objectives, and where relevant, agreed transboundary objectives.</p> <p>Implementation Stage:</p> <p>In the case that a need to address downstream flow regimes has been identified and commitments to downstream flow regimes have been made, these take into account environmental, social and economic objectives, and where relevant, agreed transboundary objectives.</p> <p>Operation Stage:</p> <p>In the case of a need to address downstream flow regimes and commitments to downstream flow regimes have been made, these take into account environmental, social and economic objectives, and where relevant, agreed transboundary objectives.</p>	<p>Preparation Stage:</p> <p>Plans for downstream flow regimes represent an optimal fit amongst environmental, social and economic objectives.</p> <p>Implementation Stage:</p> <p>In the case that a need to address downstream flow regimes has been identified and commitments to downstream flow regimes have been made, in addition these represent an optimal fit amongst environmental, social and economic objectives within practical constraints of the present circumstances.</p> <p>Operation Stage:</p> <p>In the case of a need to address downstream flow regimes and commitments to downstream flow regimes have been made, in addition these represent an optimal fit amongst environmental, social and economic objectives within practical constraints of the present circumstances.</p>