

DRAFT TECHNICAL REVIEW REPORT FOR THE LUANG PRABANG HYDROPOWER PROJECT – DAM SAFETY

THE 9TH MRC REGIONAL STAKEHOLDER FORUM

DAY 1: THE 2ND REGIONAL INFORMATION SHARING ON PRIOR CONSULTATION FOR LUANG PRABANG
HYDROPOWER PROJECT

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OUTLINES



Background



Main Review findings



**Public comments from 8th RSF
and MRC's response in Draft TRR**



Recommendations

1. Background

The Luang Prabang HPP is located approx. 25 km upstream of Luang Prabang City.
Safety is important!

The TRR provides an assessment of the Luang Prabang HPP FS Report with respect to **Dam Safety requirements.**

- Ensure that a dam does **not contradict Article 7 of the Mekong Agreement** by causing harmful damage to the environment (upstream or downstream)
- **Protect life, property and the environment** from the consequences of dam operation or failure
- Ensure a **consistent approach to design criteria for mainstream dams**, specifically for the safe passage of extreme floods and seismic stability.
- Ensure that design, construction, operation and maintenance regimes, as well as institutional arrangements, are **consistent with national requirements and international good practice** for the safety of dams and related emergency response planning.

2. Main Review Findings (1) – Geological Analysis

Geology

- Geological investigation provides a good basis for assessing the foundation conditions
- The information is well presented
- **NEED: additional investigation to provide further details of the anomalies found**, a more intensive laboratory testing and field mapping of outcrops. Now, Developer is conducting.

Seismicity

- Luang Prabang is within a moderate to high seismicity region → The nearest active fault is 8.6 km distance to the project site.
- Design earthquakes have been determined for the following load cases (MCE, SEE, etc.)
- Clauses related to seismicity are considered to meet requirements of PDG 2018.
- Two seismic events occurred on 20 November 2019 near Dam site → The reported Peak Ground Acceleration (PGA) at the epicentre was significantly below the design limit proposed in the FS → Developer confirmed that the LPHPP design standards are adequate.

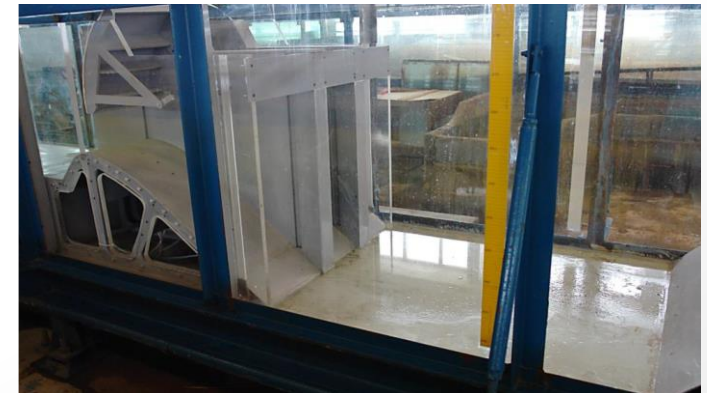
2. Main Review Findings (2) – Design and operational parameters

Flood Parameters

- Lao Electric Power Technical Standards (LEPTS 2018) requires the spillway to pass the PMF as the Inflow Design Flood → More onerous than envisaged by the FS.
- **NEED:** The ultimate spillway capacities of existing and planned upstream projects should be assessed.

Discharge Capacity

- The work undertaken in the FS is useful as a first approximation, but **more work is required** → Physical model test of the entire dam and spillway, including U/S and D/S of the river, has been underway.
- **No clear reference in the FS report to the proposed freeboard between reservoir level and crest level under various combinations of events (LEPTS 2018 requirement).**



2. Main Review Findings (2) – Design and operational parameters

Reliability

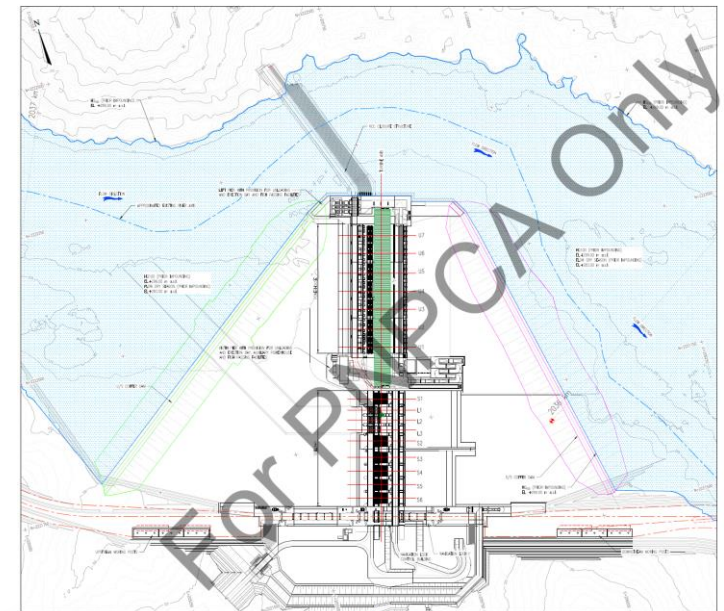
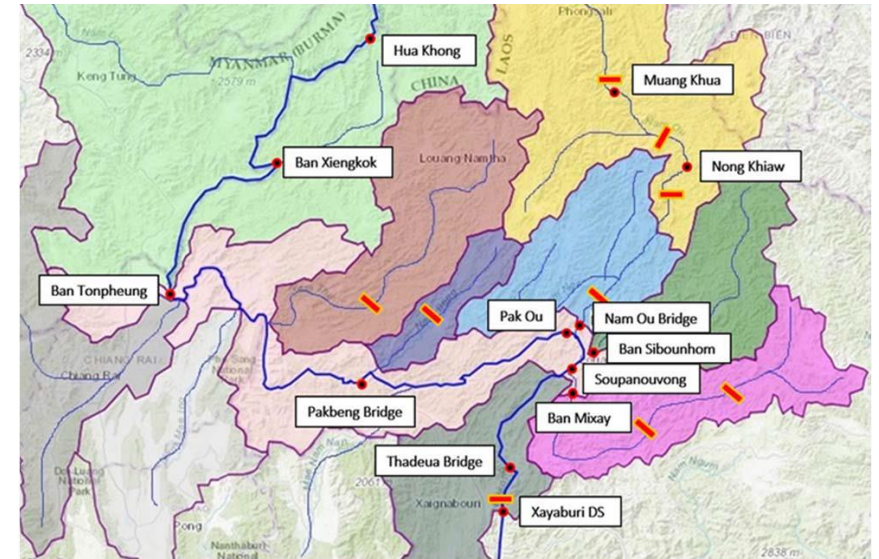
- The requirements for opening times, redundancy and security of spillway gate operation are **currently not considered in the FS report**.

Energy Dissipation

- The **physical model test report does not provide any information on the effectiveness of energy dissipation or the potential for erosion in the riverbed downstream.**
- The geological model currently indicates that part of the powerhouse is to be founded on meta-sedimentary rocks → **Potential for bed erosion D/S of the turbine outlets.**
- **NEED:** The ongoing physical model study covering the full dam and spillway will provide an opportunity to measure velocity fields and determine potential zones of erosion and deposition

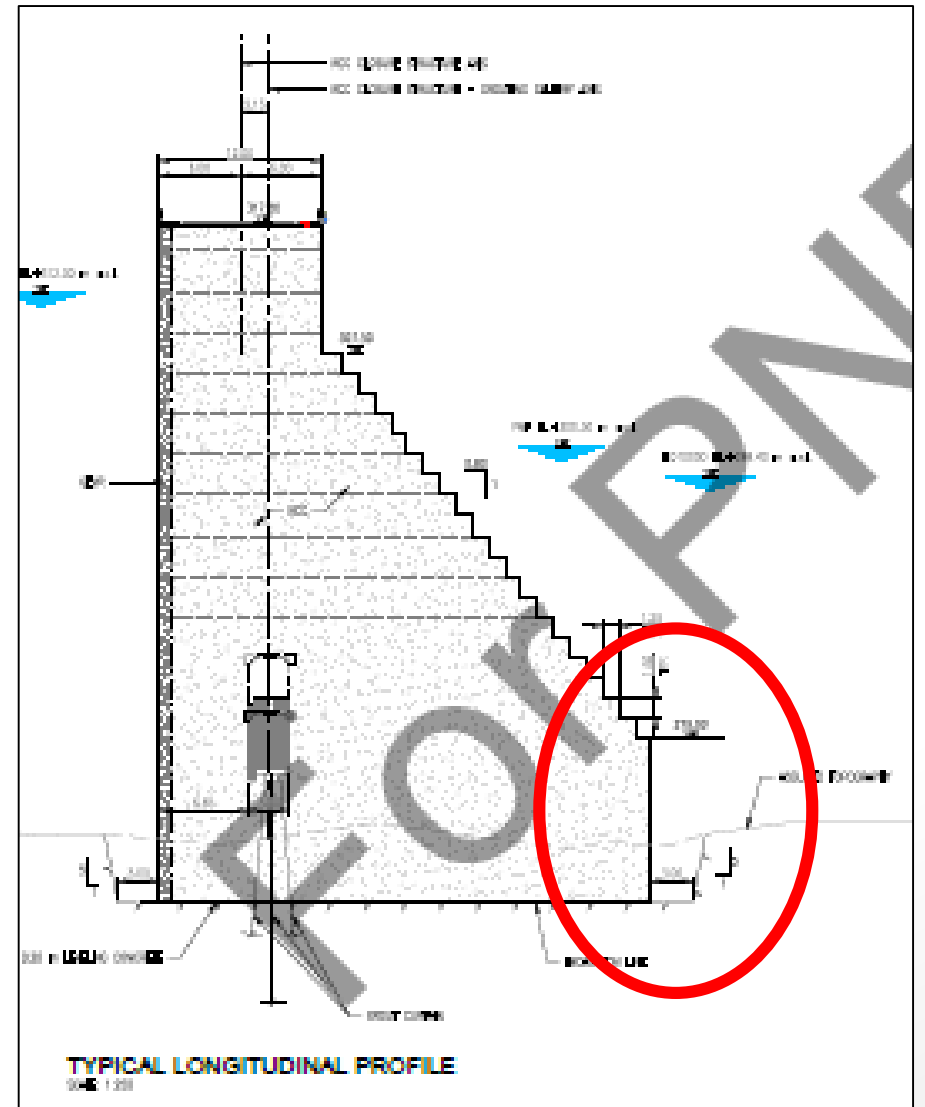
2. Main Review Findings (3) – Flood Management

- **NEED:** Effective flood management → Requirement for an upstream hydrometric network and effective communication with upstream projects. → The developer verbally advised that the hydrometric network for the Xayaburi project will also be used.
- **No reference to a cascade flood management strategy in the FS report.** → A co-ordinated approach by the Government of Laos is required.
- River diversion is achieved by constructing the right bank structures first in a single coffer dam and confining the river to the left channel. **NEED:** Some form of upstream flood forecasting system



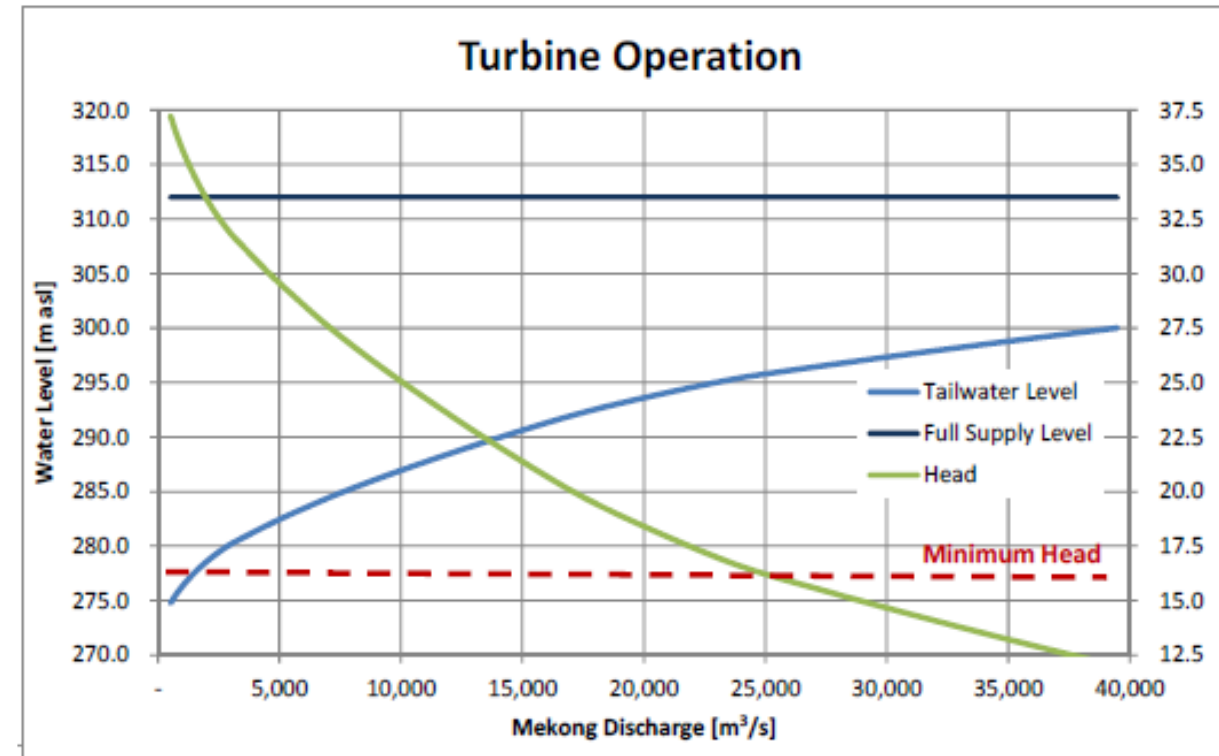
2. Main Review Findings (4) – Stability

- The FS does **not describe the derivation of foundation strength parameters or modulus values** for the meta-sediments and there is **no description of the loading cases**.
 - The additional information were provided by Developer and should be checked further.
- **The critical section is likely to be the RCC closure dam in the left channel with a truncated toe**
 - However, the developer already redesigned for more suitable.



2. Main Review Findings (5) – Reservoir Operations

- The reservoir operating rules are not outlined in detail elsewhere in this FS report.
 - Require to limit the rate of change of water level D/S of HPP to a safe rate for riverbank users including river crafts
 - **NEED:** Ideally be considered and explored as part of the cascade operations.
- The operating level range of 312 to 312.5 m is higher than the value of 310 m proposed by GoL.
 - No apparent dam safety consequences for the adoption of this higher operating level. However, the impact is on the profitability of Pak Beng HPP.
 - **Must be resolved by GoL**

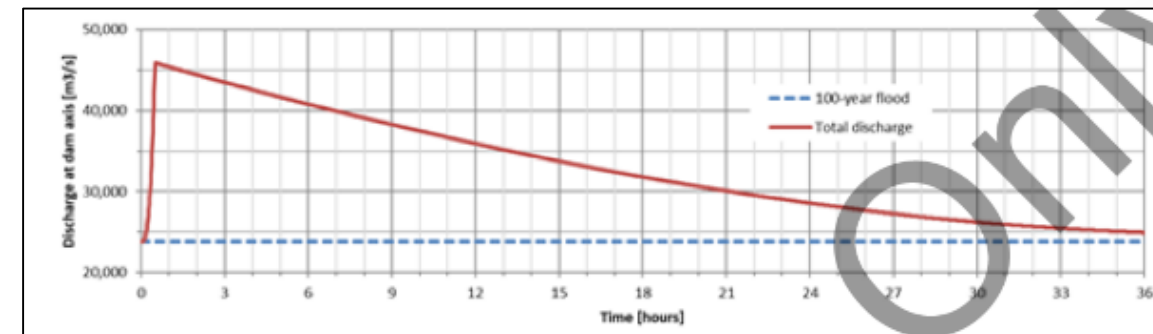
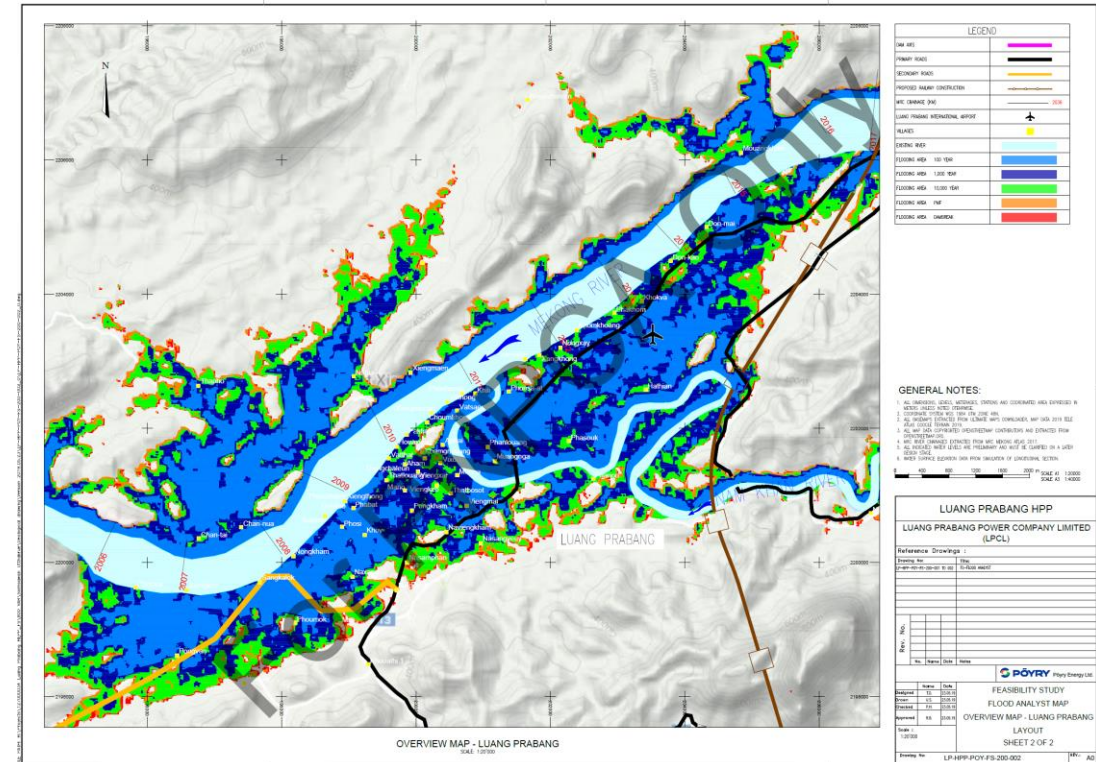


2. Main review findings (6) – Dam Safety Management

- **Panel of Experts** - The FS report does not refer to the appointment of a Dam Safety Review Panel (ICOLD and World Bank Operating Policies' requirement)
- **Emergency Preparedness Planning** – The FS report provides a general discussion, which is appropriate at this stage.
- **Instrumentation** – The FS provides an initial indication of the instrumentation. The final requirements can be determined later.
 - **NEED:** The instrumentation system must also cover the left channel closure dam since sections of this dam are over 50 m high → **The requirement for pendulums in the closure dam.** → The developer verbally indicated to consider.
- **Dam Safety Management System (DSMS)** - The FS report provide sufficient information in this stage.

Main review findings (7) – Failure Modes Assessment

- The FS report presents an overview of failure modes assessment.
 - This is reasonable at this stage, but a detailed failure modes assessment should be undertaken at the commencement of the detailed design stage.
- The DS impacts of failure have been examined by the inundation studies in the FS.
 - At this stage sufficient work has been done, in the next stage, the potential for dam breach to impact Thailand should be checked considering together with other D/S projects e.g. Xayaburi.



Public comments from 8th RSF and MRC's address in Draft of TRR

Public comments from 8 th RSF	MRC's address in Draft of TRR
<p>The dam safety design is based on World Bank (WB) policies. Are other dams in Laos based on WB guidelines too?</p>	<p>The TRR refers to the importance of the Lao Electric Power Design Standards with regard to design. These would apply to all the dams in Lao PDR.</p>



Recommendation (1)

1. The Feasibility Study presents a sound basis for the formulation of the project but lacks some of the detail that would be expected at this stage for a major hydroelectric development;
2. An initial site investigation programme has been undertaken. This programme has provided a good understanding of the structural geology of the site but has identified issues that require further investigation. A further investigation is in progress, but the details should be shared when they come available;
3. There is no interpretation of geology to derive preliminary foundation parameters for design and no description of stability loading cases and results. → The developer has indicated that this is in progress;
4. A Seismic Hazard Assessment has been undertaken that provides a suitable basis for project design.

Recommendation (2)

5. The **hydraulic model study has not yet been undertaken** and therefore the spillway capacity and erosion protection requirements for the project have not been adequately demonstrated. → The developer has indicated that these studies are underway;
6. The **proposed design standards for stability and flood management do not meet the dam stability and design flood requirements of the revised 2018 LEPTS.** → The developer has indicated that the project will comply to the latest version of the LEPTS.
7. There is **no reference to the appointment of a Dam Safety Review Panel**, which should be in place during prior consultation. This Panel should be appointed as soon as possible. → The developer has indicated that the establishment of an independent panel of experts will be coordinated with the GoL.



THANK YOU

One Mekong. One Spirit.