

DRAFT TECHNICAL REVIEW REPORT OF THE LUANG PRABANG HYDROPOWER PROJECT – SEDIMENT TRANSPORT AND GEOMORPHOLOGY

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 address in TRR**



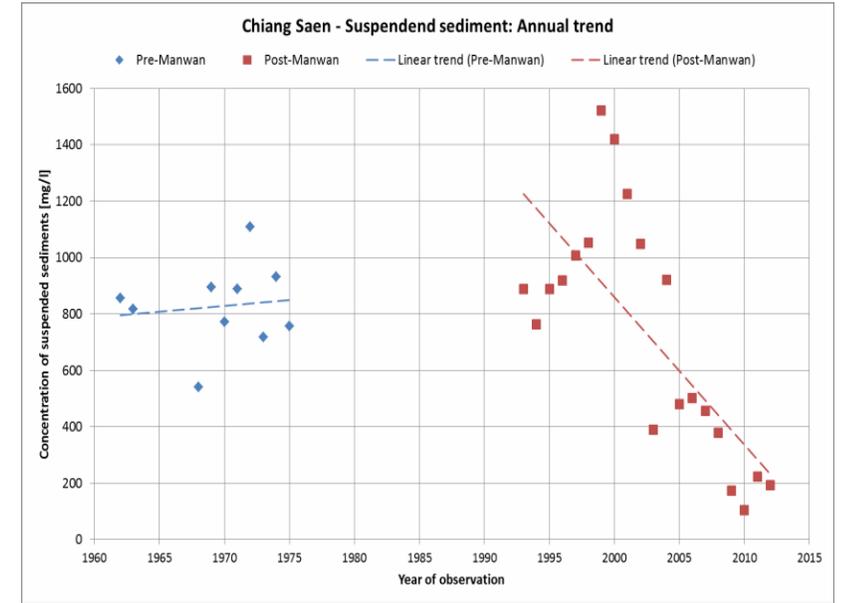
Recommendations

Background

- Sediments transport is important to maintain ecological functioning.
- Sediment trapping behind dams increases the erosivity of the released water, which can destroy and alter existing habitats and can erode the banks of the river posing a danger to riparian communities.
- Sediment trapping in impoundments and near HPP infrastructure can also reduce its power output and pose a risk to operations.
- Rapid fluctuations in reservoir water levels can cause the banks to slump into the river.
- Technical review is based on submitted FS reports and drawings with consideration MRC Procedures and Guidances.
- Review on data used, proposed infrastructure, sediment modelling, monitoring and management plan, and transboundary impacts.

Main Review Findings (1) – Data Used

- **Relevant and consistent data and information** related to geomorphology and sediment transport and potential impacts area in the region of the development.
- Provides a **good literature review** of the range of sediment data sets available, and the role that land use and upstream hydropower developments in affecting sediment transport on a regional scale.
- Some **sediment samples collected** the grain-size distribution analysis (10 samples) and suspended sediment concentrations (6 samples).
- The developer suggest the **total sediment loads** of about 110 Mt/y pre-dam and 20 to 24 Mt/y post-dam [Lancang Cascade] are considered for the Luang Prabang HPP site.



Trend Analysis of Annual Suspended Sediment Concentration at Chiang Saen Station – 40-years data provided by the Thai Department of Water Resources

Main Review Findings (2) – Data Used

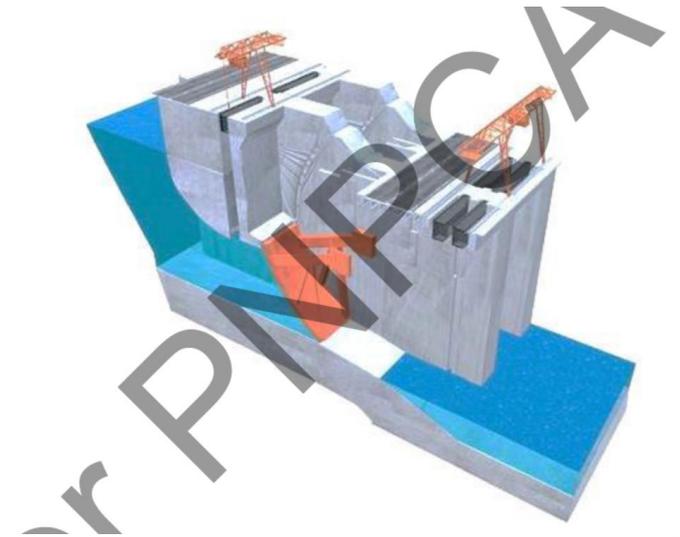
- The developer should use **available information** related to sediment transport modelling including sediment trapping in impoundments under various **MRC studies** which provide basin-wide context in literature review.
- The conditions at the LPHPP are not accurately captured by the Chiang Saen and Luang Prabang monitoring sites due to **contribution from Nam Ou river and tributaries**. **No site-specific data was collected** to verify this assumption.
- **No site-specific grain-size information** was provided which was shown to be very important for sediment trapping.
- Need further information and discussion on **impacts of combined operations** of Nam Ou, Xayaburi and LP HPP.

Main Review Findings (3) – Infrastructure for Sediment

- **Three Low-Level Outlets (LLO)** of 12 m x 16 m at the sill level of 275m for sediment flushing along the right side of the project.

Review of infrastructure

- **Similar design as Xayaburi** suggesting that the sediment loads could be passed through both impoundments under **coordinated operations**.
- The discussion of sediment transport management strategies and mitigation measures is very limited, and only includes the opening of the Low-Level Outlets (LLO) when flow rates exceed of 5,355 m³/s at yearly basis.
- The quantification of sediment flushing load through the LLO is not provided.

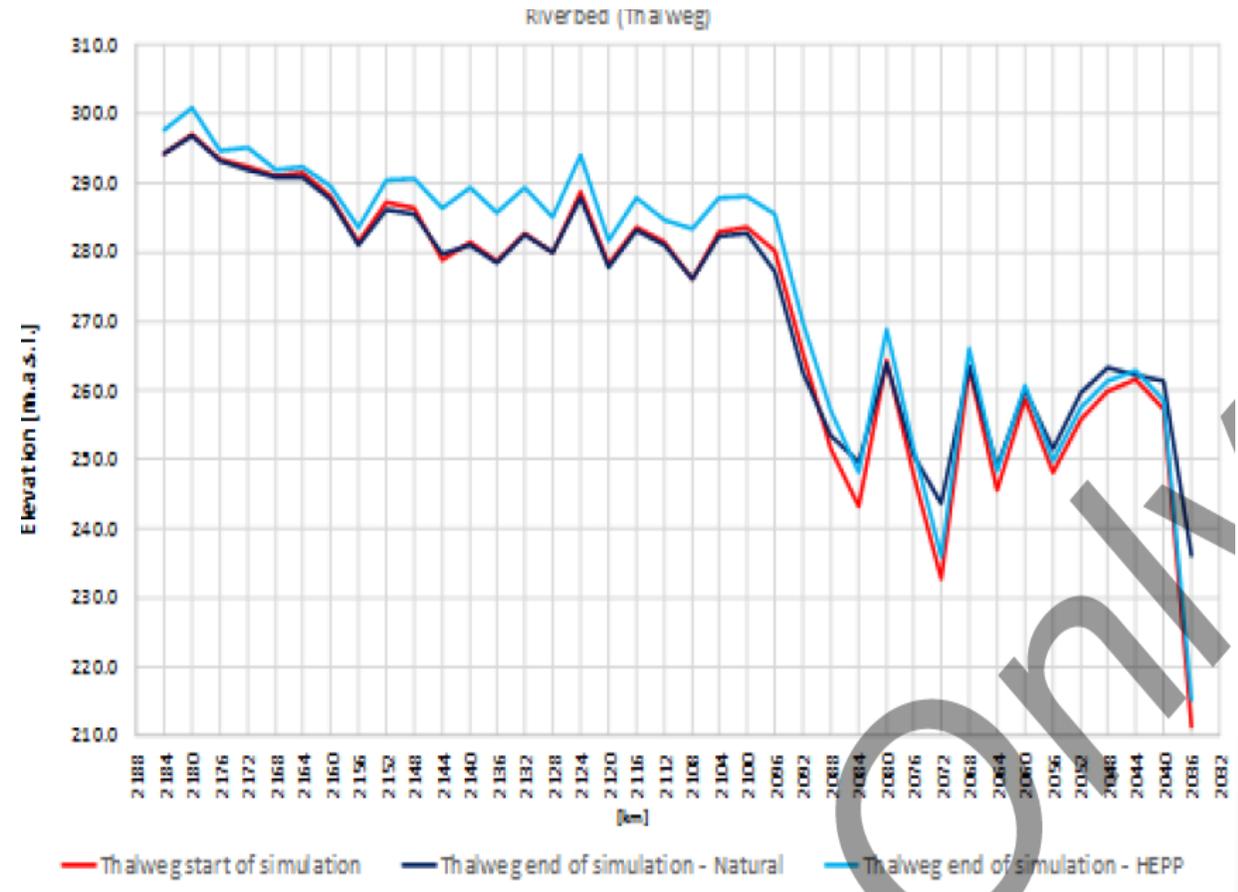


Main Review Findings (4) – Monitoring & Operating

- The proposed sediment management strategy of opening LLO **only during high flows** will remove sediment near the toe of the dam, but will not transport sediment down the impoundment.
- There is no discussion of sediment flushing involving **the lowering of the impoundment level** to facilitate sediment transport through the impoundment which is in direct contrast to what is recommended in the PDG 2009.
- Investigating sediment routing through the impoundment **during periods of high sediment inflow** or sediment flushing is recommended.
- The importance of potential impacts of **possible hydropeaking or water level fluctuations** originating from **upstream Pak Beng HPP** should be considered in terms of coordinated operations.

Main Review Findings (5) – Sediment Transport Modeling

- The model results show **deposition throughout the impounded area**, with higher potential in the area between km 2052 and 2164.
- There is no sediment transport modelling associated with **sediment discharge from the dam** related to the proposed use of the LLO, sediment behaviour near the hydropower infrastructure, or downstream.



Main Review Findings (6) – Transboundary Impacts

- Changes to downstream sediment transport, including **transboundary impacts**, are stated as likely to occur, **but not described in detail**. The developer suggests a **new equilibrium** will occur over a period of time, but this time is not quantified.
- The link between **land use and sediment input** is discussed with respect to historic land use changes in China, but there is no discussion of how the **changing land use patterns within northern Lao PDR** could affect sediment input in the future.
- No discussion of **the impacts of fluctuating water levels** within the impoundment on erosion of the shoreline with potential for hydropeaking at the upstream Pak Beng hydropower.
- **The loss of exposed sand bars and rocky** outcrops over a 160 km river reach has not been discussed in relation to the availability of these habitat types for biota.

Public comments from 8th RSF and MRC's address in 2nd Draft of TRR

Public comments from 8 th RSF	MRC's address in 2 nd draft of TRR
1. The impact of upper stream Lancang cascade in reduction of sediment indicated is not correct. Total is 80million tones, not 100 million tones. How has it been estimated?	The data is based on the investigation that CNR carried out along 1,000km stretch from Northern Laos border to Vientiane over the last years. We didn't receive any data from Lancang in this matter. This has been addressed in the draft TRR.
2. How much sediment deposit in reservoir? How much sediment discharge? How much reservoir capacity reduced due to sediment? Impact on normal WL, impact from Xayaburi Dam backwater, quality of data from MRCS?	The documentation submitted does report on preliminary assessments of deposition of sediments in the impoundment and concurs with the developer's commitment to do more detailed studies. The impacts on the backwaters of Xayaburi are dealt with in some detail.
3. Data and information are needed to update for sediment model.	The TRR includes additional comments calling for the developer to provide more information about sediment analysis, including any monitoring results collected for the project.

Public comments from 8th RSF and MRC's address in 2nd Draft of TRR

Public comments from 8 th RSF	MRC's address in 2 nd draft of TRR
4. Sediment is an important issue, and it needs baseline and monitoring data at the dam site, as well as accumulated data along the cascade.	The TRR call for the developer to implement monitoring ASAP. In the December meeting the developer stated that monitoring at the site had commenced, but did not provide details about the locations, frequency or monitoring methods
5. The sedimentation rate, bank erosion impact has not been addressed.	The TRR requests that the developer provides a more in-depth analysis of transboundary impacts associated with sediment trapping, including the Cambodian floodplain and VN delta.

Recommendations

- More information about **sediment analysis** including any **data** collected are recommended.
- More attention needs to be paid to potential impacts in the Mekong downstream of LPHPP extending to the **backwater of the Xayaburi** project and related to the impacts of the Nam Ou cascade.
- Strategies that promote the rapid movement of material downstream and through the impoundment, such as **sediment routing** should be considered.
- **Hydraulic modelling** of impounded area must be done and used to formulate option for **sediment management flushing** operation.
- **The coordinated operations** and consideration of risk at the cascade level are recommended with regarding possible hydropeaking and sediment flushing.
- **Sharing data** from sediment management operations at Xayaburi showing the effect of using the LLO would be useful to the MCs.



THANK YOU

One Mekong. One Spirit.