



Developer and Line Agency Briefing Meeting
Vientiane City, 20 October 2009

Preliminary Design Guidance

Section 2: Standard Specifications for Ship Locks on the proposed hydropower developments on the Mekong mainstream





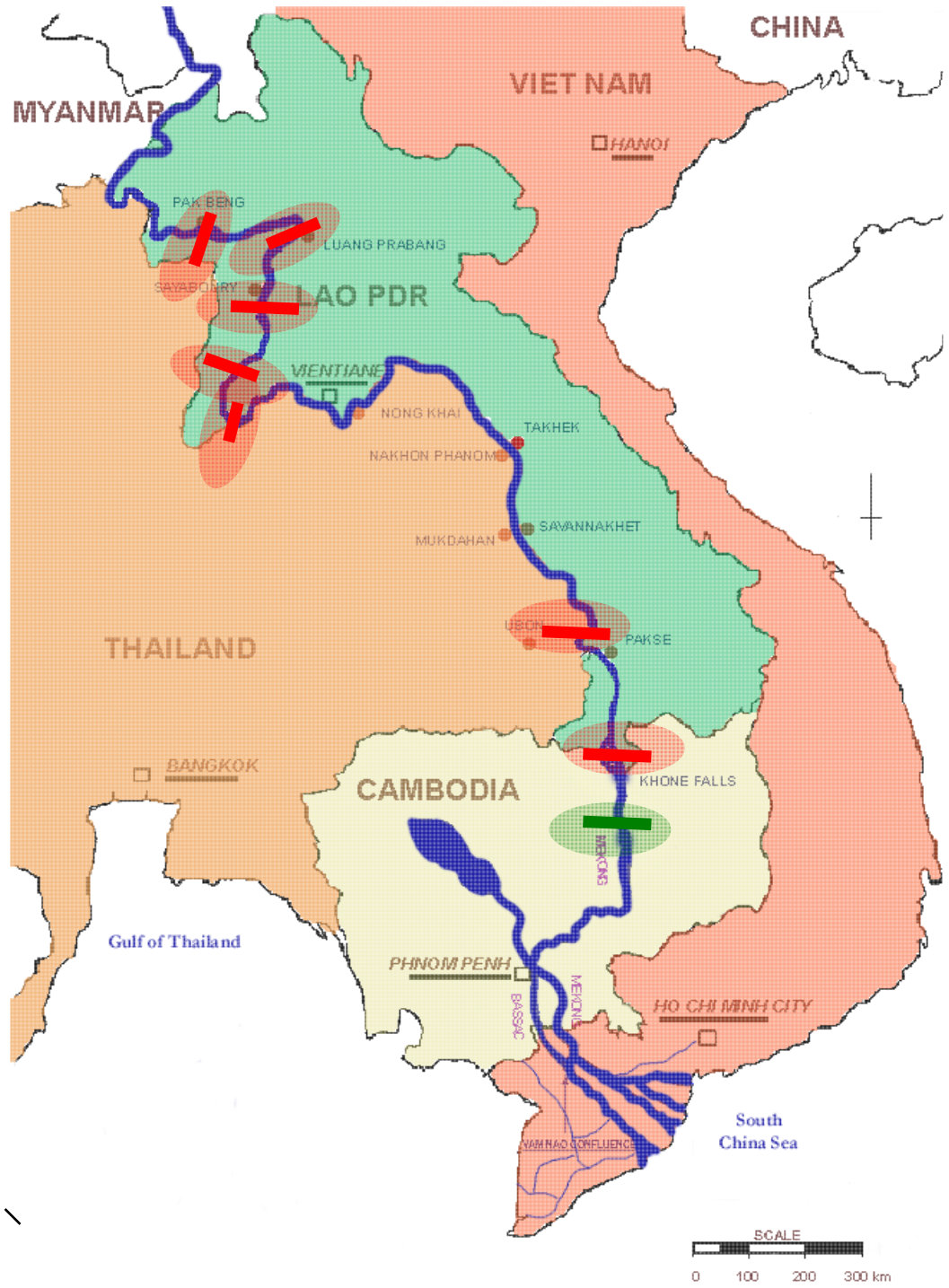
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1. MRC Preliminary Design Guidance on Standard Specification for navigation ship locks (Phase 1) for Mainstream Dams in the Lower Mekong Basin
2. Process of formulating the specifications for design, construction and operation of ship locks, Phase 2
3. Discuss and exchange information among stakeholders on the Design Guidance for Navigation Ship Locks

Planning for hydropower development on the Mainstream of the Mekong River has started



(Drawing with courtesy of Pakbeng Hydropower Scheme)





MRC AGREEMENT

Article 9: Freedom of Navigation

“ On the basis of equality of right, freedom of navigation shall be accorded throughout the mainstream of the Mekong river without regard to the territorial boundaries, ... “



MRC AGREEMENT

Article 9: Freedom of Navigation



Hydropower developments could pose a barrier to navigation, but they also offer the possibility of providing **more reliable and consistent water depths** that will facilitate larger vessel capacities.

The only way to efficiently realise the benefits of inland waterway navigation in harmony with hydropower development is the construction of **navigation locks**.



MRC AGREEMENT

Article 9: Freedom of Navigation



The design, construction and operations of all ship locks along the river should be subject to **common standards** and guidelines for the whole Mekong River.

- Recently MRC finalised a '***Preliminary Design Guidance for Mainstream Dams in the Lower Mekong Basin***', to ensure a consistent approach to the design of individual dams.
- Part of this Guidance: '**Preliminary Ship Lock Dimensions**'



Which parameters used for the Preliminary Dimensions



important parameters



- **Benchmarking (international rivers and references)**
- **Recommendations by PIANC**
- **Chinese waterway classifications and dimensions of planned locks at Guan Lan Ba Dam**
- **Economic analysis**

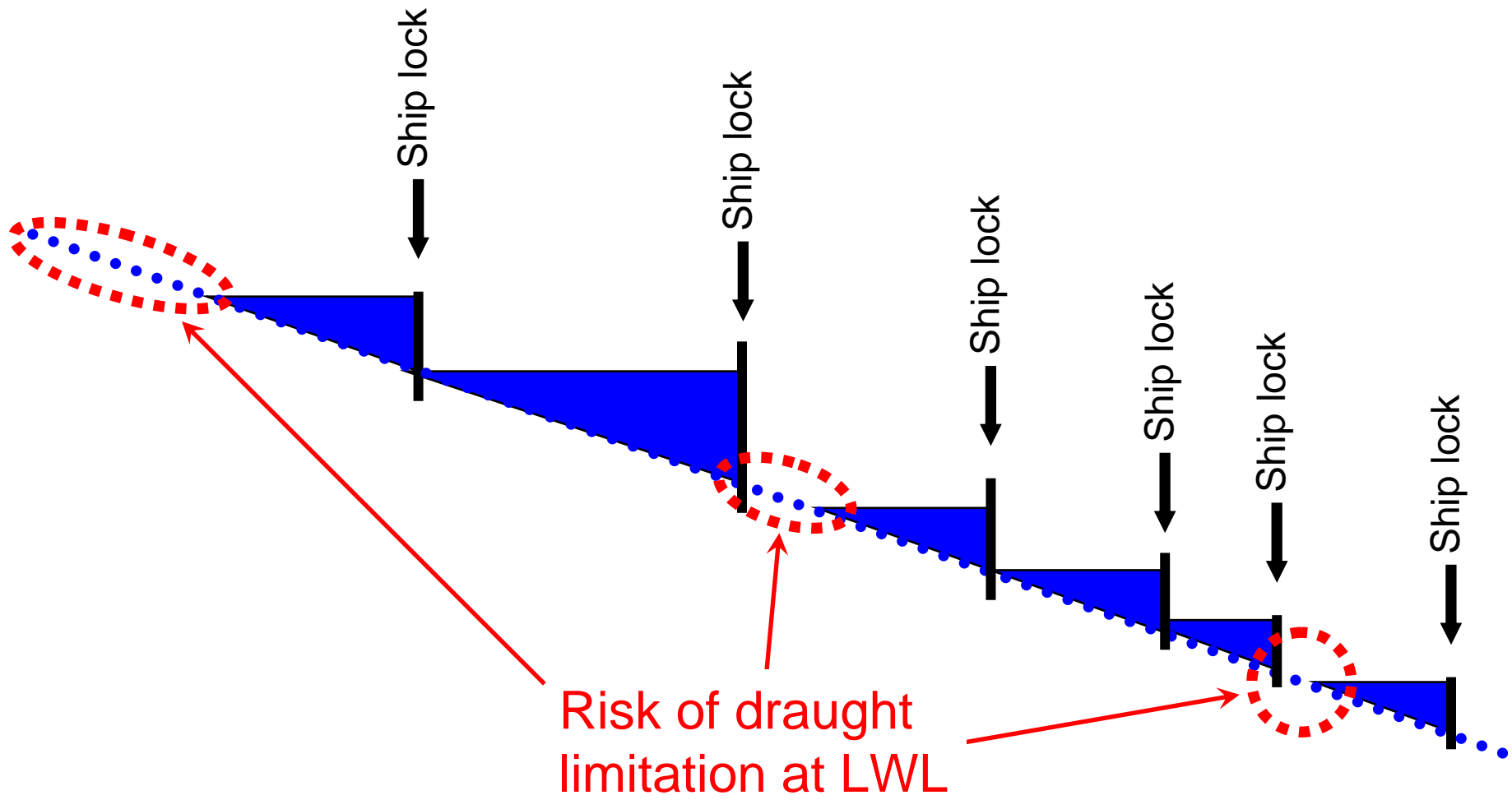


Main preliminary recommendations for the design guidance for ship locks, Phase 1



The term 'preliminary' is used because we first need to define the technical navigation accessibility of the Upper Mekong River in association with planned hydropower development.

MRC will run the results of the Optimisation Study through a hydraulic model to develop a longitudinal profile of the river based on Least Available Depths (LAD). The extent of the river stretch between the limit of the tailwater and the upstream dam will be crucial in defining the optimal ship design.



Until the results of the Technical Navigation Accessibility are fully known, minimum requirements should not be lower than the following dimensions:

Length	120m
Width	12m
Depth	4m

Furthermore, **a parallel slot** is to be reserved for a second lock to double the capacity during a future expansion.

- Max head for one lock chamber : 30 m (reliability, cost)
- Tandem locks rather than ship lift if head > 30 m (reliability, investment cost, maintenance cost)
- Allow area for lock doubling in the future, (reliability, investment cost)

Preliminary table

HP project name	Total lift (m)	Number of chambers	Max unit lift (m)	Transit time -one line of lock (mn)
Pak Beng	30/39	2	15 / 20	30 /50 mn
Louang Prabang	50	2	25	50 mn
Sayaburi	30/39	2	15 / 20	30 /50 mn
Pak Lai	33	1 or 2	17 / 33	30 /50 mn
Sanakham	21	1	21	30 mn
Pak Shom	21	1	21	30 mn
Ban Koum	33	1 or 2	17 / 33	30 /50 mn
Strung Teng	17	1	17	30 mn
Sambor	37	2	19	50 mn

Format of the Design Guidance for Standard Specification of Navigation Ship Locks



For detailed information (Navigation sections is from Para 13-52):

Background para 13 – 19

General Requirement for para 20 - 23

Dimension and Design Vessel para 24 – 27

Lockage Time and Availability para 28 – 33

Location and Alignment para 34 – 38

Construction, Service Life, Expansion para 39 – 42

Chamber Equipment para 43 – 44

Design, operation, safety and maintenance para 45 - 52



Table Contents

2. Process of formulating the specifications for design, construction and operation of ship locks, Phase 2

The immediate objectives of formulation of Standard Specifications for Design, Construction and Operation of Navigation Locks:

- 1) to define the technical navigation accessibility of the Upper Mekong River in association with planned hydropower development, and
- 2) to prepare specifications for the design, construction and operation of the planned navigation locks.

The nautical accessibility of the whole waterway will be assessed under different scenarios:

- the 'cascade scenario': the river as a comprehensive transport corridor between Jinghong and Vientiane in case the 'cascade' of dams would be in place
- the 'stand-alone dam scenarios': only some of the proposed dams will be built
- No 'zero scenario' (no dams are built).

Assessing and quantifying the navigation accessibility, under different scenarios, will include important aspects:

- Evaluation of the free-flowing stretches regarding the available water depth and navigability
- Assess the air clearances. Assess the situation under the proposed bridge constructions.
- Redefine the Longitudinal Profile of the river between Jinghong and the Khone Falls, after dam construction
- Determination of the optimum nautical accessibility, optimal channel design and optimal ship size.

Assessing and quantifying the navigation accessibility, under different scenarios, will include important aspects:

- Recommendations for fine-tuning of the locations of the dams, height of the operating water levels proposal, extent of the back water, bridges, to fit best the navigation potential
- Identification of the regulating works and costs that will be required in the free-flowing stretches to improve navigability for appropriate ship size.

Formulate specifications for the construction and operation of the planned navigation locks:

- Suggesting the re-determination of the maximum operating levels, if require and recommendations for lowest operating levels
- Re-determine the optimum lock dimensions based on the optimal ship size
- Recommendations to maintain navigation during construction
- Recommendations for the exact location of lock + ship entrance channel/alignment.

Formulate specifications for the construction and operation of the planned navigation locks:

- General principles for filling – emptying systems, gate selection and design for mooring devices
- Recommendations for safety instructions (with regards to dangerous goods)
- General principles for operation, including communication systems



CONCLUSION

- There is a time horizon of more than 50 years when deciding on the dimensions of a ship lock
- As shipping on the Mekong River is transboundary, the ship lock constructor makes a decision that will affect all Mekong countries. If a lock is built too small ...
- Damming the Mekong only happens once ...



Thank you,