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NAVIGATION

Design Criteria

- Standards Used
  - MRC Design Guidance
  - PIANC Report n 106

- Requirements
  - 2 x 500 DWT vessels
  - 98% availability
  - Provision of a second lock at a later stage
  - Max. passage time: 50 min

- Relevant Water Levels
  - Minimum Flow: 1,170 m$^3$/s
  - Maximum Flow: 16,940 m$^3$/s

- Main Dimensions
  - Max. lifting height: 35.50 m
  - Tandem lock chambers
  - Size: 120 x 12 m
  - Min. depth: 4 + 1 m

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Operating Level (NOL)</td>
<td>312.00 m asl</td>
</tr>
<tr>
<td>Highest Operating Level (HOL)</td>
<td>312.50 m asl</td>
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<tr>
<td>Lowest Operating Level (LOL)</td>
<td>294.25 m asl</td>
</tr>
<tr>
<td>Lowest Navigable Level (LNL)</td>
<td>276.50 m asl</td>
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<tr>
<td>Highest Navigable Level (HNL)</td>
<td>294.25 m asl</td>
</tr>
</tbody>
</table>
Location & Design
NAVIGATION

Location and Design

• Xayaburi as Basis for the Design
  – NL in operation since several years
  – No operational problems reported
  – Adjusted and optimised for Luang Prabang
    – No fish attraction required
    – Thus diffuser of water feeding system are equally distributed
    – Overall length is shorter

• Location
  – Right bank, next to Spillway

• Small Boat Transfer
  – Overland transfer for small boats will be provided during construction and operation
  – Faster and safer than lockage
  – Good experience in Xayaburi
NAVIGATION

Filling System and Hydraulic Studies

- Feeding System
  - Water conduit in left pier
  - Each chamber has 7 Diffusers
  - Each Diffuser has 5 openings (1.50 x 0.45 m)
- CFD Studies
  - Intake: uniform flow conditions
  - Diffusers and Outlets: Uniform flow in lock chamber
- Filing/Emptying Time
  - Filling/emptying in less than 10 minutes
NAVIGATION

Navigability and Small Boat Transfer

- Navigation during Construction
  - 2D hydraulic model for Construction Phase
  - Check navigability during construction
  - No big difference for up to 5,000 m$^3$/s
- Support for vessels during Construction
  - Higher velocities at higher discharges
  - Provide support by tugging boats
- Small Boats transfer
  - Similar to Xayaburi
  - Fisher boats to be transferred overland by trailers
  - Same foreseen during operation (safer and faster than lockage)
  - Good experience in Xayaburi
Lock Equipment
NAVIGATION

Lock Equipment

- General
  - Arrangement of Lock Equipment follows closely Xayaburi
- Mooring area
  - Waiting area will be provided u/s and d/s of the Navigation Lock
  - As per BD, foreseen on left side of Approach Channel
  - MRC requirements will be met
- Floating mooring bitts
  - Installed on both sides of the walls
- Ship arrester
  - To protect miter gates from ship impacts
- Ladders for evacuation
Approach Channel
NAVIGATION

Approach Channel

• Design Criteria
  – Width of 40 m (minimum)
  – Curve radius: 330 m
  – Min depth: 5 m

• Separation from Main River/ Spillway
  – Need to avoid negative impact from stilling basin
  – By concrete walls in extension of NL
  – By «natural island»

• Infrastructure
  – Lay-by area
  – Waiting area
  – Overnight area: Three areas, one with facilities
  – Mooring area in front of lock