



# Mekong River Commission

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## The Council Study

**Study on the sustainable management and development of the Mekong River,  
including impacts of mainstream hydropower projects**

### **Work Plan: Formulation of Development Scenarios for the Navigation Thematic Area**

This work plan describes the roadmap and the approach for formulating the development scenarios for the Navigation thematic area. It includes the following:

- Baseline Conditions, 2020 DFS, 2040 Planned Development, and Proposed Navigation Thematic Sub-scenarios
- Detailed schedule of data collection and analysis including coordination with Member Countries through consultation with appropriate experts of line agencies, national consultations, and regional technical working group
- Detailed data needs including current status, source agencies, and known issues for each proposed development scenario
- Proposed methodology and assumptions to fill data gaps in particular where data are known to be not available
- Personnel roles and responsibilities

*Prepared by:*

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6 June 2015 (DRAFT)

## Document history

Version	Revision	Description	Issue date	Issued by
1	0	First Draft Work Plan: Formulation of Development Scenarios for the Navigation Thematic Area	6 June 2015	LG

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- 6. Budget, Personnel Roles and Responsibilities**

# 1 Introduction

This work plan describes the roadmap and the approach for the formulation of the development scenarios that are going to be assessed under the Council Study. The results of these development scenario assessments will be used as the primary basis to address the overall objective of the Council Study which is to further enhance the ability of the Mekong River Commission (MRC) to advise Member Countries (MCs) on the positive and negative impacts of water resources development on people, economies and the environment of the Mekong River Basin. This enhanced ability is expected as a result of meeting the following specific objectives of the Council Study:

Objective 1: Further develop/establish a reliable scientific evidence base on the environment, social and economic consequences (positive and negative) of development in the Mekong River Basin.

Objective 2: Results of the study are integrated into the MRC knowledge base to enhance the Basin Development Planning (BDP) process providing support to the MCs in the sustainable management and development of the Mekong River Basin.

Objective 3: Promote capacity and ensure technology transfer to MCs in the process of designing and conducting of the study.

As such, the formulation of development scenarios is most critical since it defines the extent to which these three objectives can be met. The formulated development scenarios will set the boundary for what new knowledge will be generated, what knowledge gaps will be closed, and what uncertainties in the assessments will be minimized (i.e., Objective 1). The assessment methodology and the associated tools (both existing and new) along with the expanded MRC knowledge base will determine the extent of how the current BDP process can be enhanced (i.e., Objective 2). The participatory process adopted in formulating the development scenarios will govern how effective the learning-by-doing approach is with respect to building internal capacity and successfully transferring technology (i.e., Objective 3). Of course such exercises are costly and budgets need to be found.

As per the Council Study Concept Note, Terms of Reference (ToR) and Inception Report, the assessments will include the following types:

- An assessment of the cumulative positive and negative impacts of water resource developments in all six selected thematic areas on the triple-bottom-line including clear indications of hotspots when/if relevant, and the thresholds of rapid transition—tipping points—in complex systems such as the Tonle Sap Lake in Cambodia and the Mekong Delta in Cambodia and Viet Nam (i.e., referred hereinafter as the assessment of **cumulative development scenarios**).
- Assessments for each thematic area summarising the transboundary impacts of developments in the selected thematic areas including cross-cutting impacts on the triple-bottom-line: the environmental, social and economic parameters of interest in the Mekong River Basin (i.e., referred hereinafter as the assessment of **thematic development sub-scenarios**)

In the end, the Council Study will produce a set of clear, strategic, pragmatic and actionable recommendations directly addressing potential uncertainties, risks and the information needs for

development planning in the mainstream of the Lower Mekong Basin (LMB) including recommendations for impact avoidance and mitigation measures.

## 2 Development Scenarios

The development scenarios will be formulated by defining levels of developments in six thematic areas for each scenario. The six thematic areas are:

- Irrigation; including water use, return flows, water quality, proposed diversions, etc.
- Agriculture and Land use; including watershed management, deforestation, livestock and aquaculture, fisheries etc.
- Domestic and Industrial use; including mining, sediment extraction, waste water disposal, urban development, water quality etc.
- Flood protection structures and floodplain infrastructure, including roads on major floodplains
- Hydropower, including potential of alternative energy options.
- Navigation, specifically on infrastructure to aid navigation

The development scenarios will be of two types namely cumulative development scenarios and thematic sub-scenarios.

### 2.1 **Cumulative Scenarios**

For Navigation the cumulative scenarios are based on the current 2015, and planned (2020 and 2040) basin-wide developments in the six thematic areas. These cumulative scenarios will allow the assessment of cumulative positive and negative environmental and socio-economic impacts associated with planned developments by the MCs. The assessment will show the predicted changes in the environmental and socio-economic conditions in the LMB in space and time and potentially reveal clear indications of geographic hotspots and rapid transitions in time as a result of combined developments in the six thematic areas. Along with the results of the assessment of selected thematic sub-scenarios under which impacts of specific-thematic developments can be better understood, realistic, reasonable, and thus actionable development options and management measures can be identified to enhance positive impacts and minimize negative impacts of the planned developments. Strategic measures for long-term negative impact avoidance and risk mitigation can also be identified for development planning considerations by the MCs.

During the 4<sup>th</sup> RTWG Meeting, the following cumulative development scenarios were approved for the Council Study.

Development Scenario/Situation (2015): This scenario includes the water infrastructure in the Navigation thematic areas in 2015.

Definite Future Scenario (2020): This scenario includes all planned construction, and national plans in the Navigation thematic areas which are expected to be in place by 2020.

Planned Development Scenario (2040): This scenario includes all water resources development that is planned for Navigation in the Mekong Basin and are expected to be in place by 2040 assuming these plans are fully implemented.

## 2.2 Thematic Sub-Scenarios

The Thematic Sub-Scenarios represent plausible thematic-specific scenarios for 2040. These thematic-specific scenarios reflect level of uncertainties and potentials in the full implementation of the planned development level for the thematic area of interest as per the 2040 Planned Scenarios. It should be noted that while a different level of development is used for the thematic area of interest, the levels of development for the other thematic areas are held equal to the planned 2040 levels.

The assessment of these thematic sub-scenarios will provide the following understanding:

- Sensitivity of impacts to deviations from planned development levels
- Better understanding of impacts of specific development stressors (i.e., closing knowledge gaps)
- In-depth analysis of the plans and plausible deviations in the plans (i.e., understand uncertainty in the plans and identify measure to minimize deviations)
- Increase understanding and capability to explore options and measures to enhance positive impacts and mitigate/reduce negative impacts

As per the Inception Report, a maximum of three thematic sub-scenarios per thematic area will be assessed. However, the Thematic Team may identify more than three potential thematic sub-scenarios. These thematic sub-scenarios will be presented to the MCs to get their input and final concurrence on what thematic sub-scenarios to assess.

## 2.3 Proposed Thematic Sub-Scenarios for the Thematic Area Navigation

### SHORT AND LONG TERM DEVELOPMENT SCENARIOS

The 2020 and 2040 Development Scenarios for Navigation will relate to the objectives of the design of the MRC Master Plan for Regional Waterborne Transportation which is:

“To design a short term and a long term development programme which implementation will rehabilitate and improve the national and international transport network using the Mekong River in the Mekong River Commission Member Countries including Actions to:

- fully realise the regional trade and transport potential of the Mekong River which is the most cost-effective mode of the regional transport system, and to attract foreign and domestic investments.
- fully use the vast potential for waterborne tourism, and ecotourism as well in the upper part as in the lower part of the Mekong River Basin as a major impulse to private sector growth in all MRC Member Countries.
- gear, where possible, the economic and financial function of navigation also towards opportunities for poverty reduction. For many riparian people, the river is the lifeline to the outside world and the only way to access basic social services and this transport of people and goods by small craft might grow considerably if rural navigation networks can be linked to regional networks.
- make navigation safer and more sustainable, for the people and for the environment”

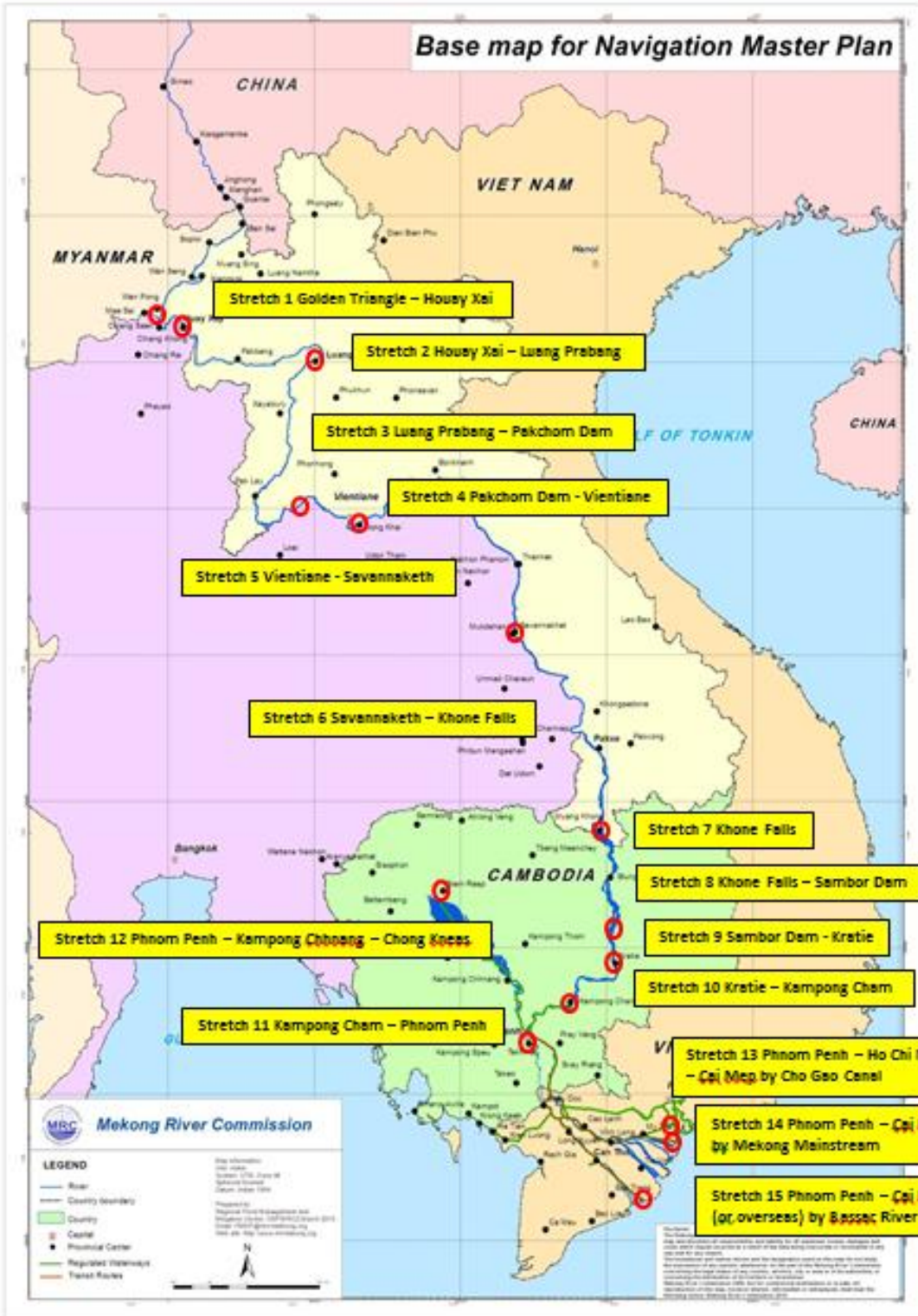
To this extent, the goal of the Master Plan needs to be defined based on transport economy needs and forecasts. The following scenario objectives need to be considered for 2020 and 2040:

- The use of larger ships than actually used over the total length of the Mekong River and over the whole year, including the use of sea-river ships in the Mekong Delta;
- The improvement of safety of all types of ships, including passenger ships and ships carrying dangerous goods
- Promotion of the concept of “clean” river transportation, focusing on strategic prevention of environmental damage from waterway infrastructures or from shipping or port accidents
- The development of safe and efficient passenger ports and multimodal nodal points in the main cargo ports and dry ports;
- The creation of a safe navigation channel, able to accommodate the larger ships over the whole year;
- The coordination of a regional river information service and waterborne transport marketing and promotion;
- The establishment of education and training courses on all aspects of inland waterway transport;
- The full implementation of cross-border agreements and harmonization of standards, rules and regulations;
- The creation of positive social and environmental impacts in the global MRB transport sector.

To develop short term (2020) and long term (2040) development scenarios for Regional Waterborne Transport in the Mekong River Basin, the River has been subdivided into 15 stretches.



# Base map for Navigation Master Plan



The Scenarios will need to include the most important navigational aspects and the following matrix could be proposed for each of the 15 stretches:

	<b>CURRENT SITUATION (2015 BASELINE CONDITION)</b>	<b>SHORT TERM SCENARIO (2020)</b>	<b>LONG TERM SCENARIO (2040)</b>
<b>FLEET</b>			
<b>WATERWAY</b>			
<b>PORTS</b>			
<b>SAFETY</b>			
<b>LEGAL ASPECTS</b>			
<b>ENVIRONM. ASPECTS</b>			
<b>SOCIAL ASPECTS</b>			

### 3 Data Requirements

SUBJECT TO AVAILABILITY OF FUNDS

Scenario elements to be investigated for Navigation	Data required (different for each scenario)	Current Status (2015, 2020, and 2040 scenarios)	MC Line Agencies to Contact	Known Data Gaps/Assumptions to Make
<b>FLEET</b>				
<b>WATERWAY</b>				
<b>PORTS</b>				
<b>SAFETY</b>				
<b>LEGAL ASPECTS</b>				
<b>ENVIRONM. ASPECTS</b>				
<b>SOCIAL ASPECTS</b>				

## QUESTIONNAIRES:

<b>QUESTIONNAIRE WATERWAY DESIGN AND WORKS ALONG THE RIVER THAT IMPACT NAVIGATION IN CAMBODIA</b>	
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<b>4</b>	<b>MORPHOLOGICAL CHANGES</b>

<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>
<b>1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR DREDGING</b>	
<i>Detail all known ongoing dredging works, national plans and project proposals for the period 2010-2040 for the following stretches + quantify how much + please also specify when it is capital dredging and when it is maintenance dredging</i>	
1.1.1 Between Khone Falls and Kratie	
1.1.2 Between Kratie and Kampong Cham	
1.1.3 Between Kampong Cham and Phnom Penh	
1.1.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
1.1.5 Between Chhong Kneas and Phnom Penh	
<b>1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR RIVER REGULATING WORKS (GROYNES – OVERFLOW DIKES ...)</b>	
<i>Detail all known ongoing river regulating works, national plans and project proposals for the period 2010-2040 for the following stretches + quantify how much</i>	
1.2.1 Between Khone Falls and Kratie	
1.2.2 Between Kratie and Kampong Cham	
1.2.3 Between Kampong Cham and Phnom Penh	
1.2.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
1.2.5 Between Chhong Kneas and Phnom Penh	
<b>1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR BRIDGES AND POWER LINES</b>	
<i>Detail all known ongoing bridge construction works or power cables over the river, national plans and project proposals for the period 2010-2040 for the following stretches + give height above Highest High Water Level + Main span, air clearance, reduction of wet section under the bridge, velocity increase of the current compared to the pre-construction period.</i>	
1.3.1 Between Khone Falls and Kratie	
1.3.2 Between Kratie and Kampong Cham	
1.3.3 Between Kampong Cham and Phnom Penh	

1.3.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
1.3.5 Between Chhong Kneas and Phnom Penh	
<b>1.4 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PIERS EXTENDED" INTO THE NAVIGATION CHANNEL, KNOWN SHIP WRECKS INSIDE THE CHANNEL</b>	
<i>Detail all known piers that extend into the river, ship wrecks inside the channel.</i>	
14.1 Between Khone Falls and Kratie	
1.4.2 Between Kratie and Kampong Cham	
14.3 Between Kampong Cham and Phnom Penh	
1.4.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
1.4.5 Between Chhong Kneas and Phnom Penh	

<b>2</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER</b>
<b>2.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER</b>	
<p><i>Give the following details:</i></p> <ul style="list-style-type: none"> <li>- exact location (in UTM coordinates, and river km marker)</li> <li>- Dam crest</li> <li>- Exact Highest Operating Level</li> <li>- Exact Medium Operating Level</li> <li>- Exact Lowest Operating Level</li> <li>- Extent of the Tailwater upstream</li> </ul>	
2.1.1 Between Khone Falls and Kratie	
2.1.2 Between Kratie and Kampong Cham	
<b>2.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER SHIP LOCKS</b>	
<p><i>Give the following details:</i></p> <ul style="list-style-type: none"> <li>- Number of locks</li> <li>- Exact dimensions (Length, beam, depth)</li> <li>- how many per dam</li> <li>- will there be a means to transport small boats over/next to the dam ?</li> </ul>	

2.1.1 Between Khone Falls and Kratie	
2.1.2 Between Kratie and Kampong Cham	

3	OTHER OBSTRUCTIONS TO NAVIGATION
<b>3.1 Provide detailed information on fixed fishing nets which are obviously intruding into the navigation channel Which authority is in charge and responsible? Which authority is controlling the authorization? Who is responsible for law enforcement?</b>	
3.1.1 Between Khone Falls and Kratie	
3.1.2 Between Kratie and Kampong Cham	
3.1.3 Between Kampong Cham and Phnom Penh	
3.1.4 Between Phnom Penh and the Cambodia-Viet Nam Border	k. List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project or since the recent update mentioned and listed under b. above;
3.1.5 Between Chhong Kneas and Phnom Penh	

4	MORPHOLOGICAL CHANGES
<b>4.1 List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project</b>	
4.1.1 Between Khone Falls and Kratie	
4.1.2 Between Kratie and Kampong Cham	
4.1.3 Between Kampong Cham and Phnom Penh	
4.1.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
4.1.5 Between Chhong Kneas and Phnom Penh	

**QUESTIONNAIRE WATERWAY DESIGN AND WORKS ALONG THE RIVER THAT IMPACT NAVIGATION  
IN THE LAO PDR**

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1.1.1	Between Green Triangle and Golden Triangle	
1.1.2	Between Golden Triangle and Houei Sai	
1.1.3	Between Houei Sai and Luang Prabang	
1.1.4	Between Luang Prabang and Pakchom Dam	
1.1.5	Between Pakchom Dam and Vientiane	
1.1.6	Between Vientiane and Savannakhet	
1.1.7	Between Savannakhet and Khone Falls	
1.1.8	In Khone Falls area	
<b>1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR RIVER REGULATING WORKS (GROYNES – OVERFLOW DIKES ...)</b>		
<i>Detail all known ongoing river regulating works, national plans and project proposals for the period 2010-2040 for the following stretches + quantify how much</i>		
1.2.1	Between Green Triangle and Golden Triangle	
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1.2.4	Between Luang Prabang and Pakchom Dam	
1.2.5	Between Pakchom Dam and Vientiane	
1.2.6	Between Vientiane and Savannakhet	

1.2.7 Between Savannakhet and Khone Falls	
1.2.8 In Khone Falls area	
<b>1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR BRIDGES AND POWER LINES</b>	
<i>Detail all known ongoing bridge construction works or power cables over the river, national plans and project proposals for the period 2010-2040 for the following stretches + give height above Highest High Water Level + Main span, air clearance, reduction of wet section under the bridge, velocity increase of the current compared to the pre-construction period.</i>	
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1.3.5 Between Pakchom Dam and Vientiane	
1.3.6 Between Vientiane and Savannakhet	
1.3.7 Between Savannakhet and Khone Falls	
1.3.8 In Khone Falls area	
<b>1.4. ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PIERS EXTENDED" INTO THE NAVIGATION CHANNEL, KNOWN SHIP WRECKS INSIDE THE CHANNEL</b>	
<i>Detail all known piers that extend into the river, ship wrecks inside the channel.</i>	
1.4.1 Between Green Triangle and Golden Triangle	
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1.4.3 Between Houei Sai and Luang Prabang	
1.4.4 Between Luang Prabang and Pakchom Dam	
1.4.5 Between Pakchom Dam and Vientiane	
1.4.6 Between Vientiane and Savannakhet	

1.4.7 Between Savannakhet and Khone Falls	
1.4.8 In Khone Falls area	

<b>2</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER</b>
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<b>2.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER</b>
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*Give the following details:*

- exact location (in UTM coordinates, and river km marker)
- Dam crest
- Exact Highest Operating Level
- Exact Medium Operating Level
- Exact Lowest Operating Level
- Extent of the Tail water upstream

2.1.1 Between Houei Sai and Luang Prabang	
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2.1.2 Between Luang Prabang and Pak Chom	
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2.1.3 Between Savannakhet and Khong Falls	
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<b>2.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER SHIP LOCKS</b>
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*Give the following details:*

- Number of locks
- Exact dimensions (Length, beam, depth)
- how many per dam
- will there be a means to transport small boats over/next to the dam ?

2.2.1 Between Houei Sai and Luang Prabang	
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2.2.2 Between Luang Prabang and Pak Chom	
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2.2.3 Between Savannakhet and Khong Falls	
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<b>3</b>	<b>OTHER OBSTRUCTIONS TO NAVIGATION</b>
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3.1.8 In Khone Falls area	

<b>4</b>	<b>MORPHOLOGICAL CHANGES</b>
<b>4.1 List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project</b>	
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4.1.8 In Khone Falls area

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1.3.3 Between Pak Huang and Vientiane	
1.3.4 Between Vientiane and Savannakhet	
1.3.5 Between Savannakhet and Pak Moun	

<b>1.4. ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PIERS EXTENDED" INTO THE NAVIGATION CHANNEL, KNOWN SHIP WRECKS INSIDE THE CHANNEL</b>	
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1.4.1 Between Golden Triangle and Houei Sai	
1.4.2 Between Houei Sai and Pha Dai	
1.4.3 Between Pak Huang and Vientiane	
1.4.4 Between Vientiane and Savannakhet	
1.4.5 Between Savannakhet and Pak Moun	

<b>2</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER</b>
<b>2.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER</b>	
<p><i>Give the following details:</i></p> <ul style="list-style-type: none"> <li>- exact location (in UTM coordinates, and river km marker)</li> <li>- Dam crest</li> <li>- Exact Highest Operating Level</li> <li>- Exact Medium Operating Level</li> <li>- Exact Lowest Operating Level</li> <li>- Extent of the Tailwater upstream</li> </ul>	
2.1.1 Between Pak Chom Dam and Vientiane	
2.1.2 Between Savannakhet and Pak Moun	
<b>2.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER SHIP LOCKS</b>	
<p><i>Give the following details:</i></p> <ul style="list-style-type: none"> <li>- Number of locks</li> <li>- Exact dimensions (Length, beam, depth)</li> <li>- how many per dam</li> <li>- will there be a means to transport small boats over/next to the dam ?</li> </ul>	
2.2.1 Between Pak Chom Dam and Vientiane	
2.2.2 Between Savannakhet and Pak Moun	

<b>3</b>	<b>OTHER OBSTRUCTIONS TO NAVIGATION</b>
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<b>3.1. Provide detailed information on fixed fishing nets which are obviously intruding into the navigation channel Which authority is in charge and responsible? Which authority is controlling the authorization? Who is responsible for law enforcement?</b>	
3.1.1 Between Golden Triangle and Houei Sai	
3.1.2 Between Houei Sai and Pha Dai	
3.1.3 Between Pak Huang and Vientiane	
3.1.4 Between Vientiane and Savannakhet	k. List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project or since the recent update mentioned and listed under b. above;
3.1.5 Between Savannakhet and Pak Moun	

<b>4</b>	<b>MORPHOLOGICAL CHANGES</b>
<b>4.1 List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project</b>	
4.1.1 Between Golden Triangle and Houei Sai	
4.1.2 Between Houei Sai and Pha Dai	
4.1.3 Between Pak Huang and Vientiane	
4.1.4 Between Vientiane and Savannakhet	
4.1.5 Between Savannakhet and Pak Moun	

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<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>
<b>1.1</b>	ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR DREDGING
<b>1.2</b>	ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR RIVER REGULATING WORKS (GROYNES – OVERFLOW DIKES ...)
<b>1.3</b>	ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR BRIDGES AND POWER LINES
<b>1.4</b>	ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PIERS EXTENDED” INTO THE NAVIGATION CHANNEL, KNOWN SHIP WRECKS INSIDE THE CHANNEL
<b>2</b>	<b>OTHER OBSTRUCTIONS TO NAVIGATION</b>
<b>3</b>	<b>MORPHOLOGICAL CHANGES</b>

<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>	
<b>1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR DREDGING</b>		
<i>Detail all known ongoing dredging works, national plans and project proposals for the period 2010-2040 for the following stretches + quantify how much + please also specify when it is capital dredging and when it is maintenance dredging</i>		
1.1.1 Between Cambodian-Viet Nam Border and Mekong Estuary		
1.1.2 Between Mekong River and Vam Nao West		
1.1.3 Between Vam Nao West and Bassac Estuary		
<b>1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR RIVER REGULATING WORKS (GROYNES – OVERFLOW DIKES ...)</b>		
<i>Detail all known ongoing river regulating works, national plans and project proposals for the period 2010-2040 for the following stretches + quantify how much</i>		
1.2.1 Between Cambodian-Viet Nam Border and Mekong Estuary		
1.2.2 Between Mekong River and Vam Nao West		
1.2.3 Between Vam Nao West and Bassac Estuary		
<b>1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR BRIDGES AND POWER LINES</b>		
<i>Detail all known ongoing bridge construction works or power cables over the river, national plans and project proposals for the period 2010-2040 for the following stretches + give height above Highest High Water Level + Main span, air clearance, reduction of wet section under the bridge, velocity increase of the current compared to the pre-construction period.</i>		
1.3.1 Between Cambodian-Viet Nam Border and Mekong Estuary		
1.3.2 Between Mekong River and Vam Nao West		
1.3.3 Between Vam Nao West and Bassac Estuary		
<b>1.4. ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PIERS EXTENDED” INTO THE NAVIGATION CHANNEL, KNOWN SHIP WRECKS INSIDE THE CHANNEL</b>		
<i>Detail all known piers that extend into the river, ship wrecks inside the channel.</i>		

1.4.1 Between Cambodian-Viet Nam Border and Mekong Estuary	
1.4.2 Between Mekong River and Vam Nao West	
1.4.3 Between Vam Nao West and Bassac Estuary	

2	OTHER OBSTRUCTIONS TO NAVIGATION
<b>2.1. Provide detailed information on fixed fishing nets which are obviously intruding into the navigation channel Which authority is in charge and responsible? Which authority is controlling the authorization? Who is responsible for law enforcement?</b>	
2.1.1 Between Cambodian-Viet Nam Border and Mekong Estuary	
2.1.2 Between Mekong River and Vam Nao West	k. List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project or since the recent update mentioned and listed under b. above;
2.1.3 Between Vam Nao West and Bassac Estuary	

3	MORPHOLOGICAL CHANGES
<b>3.1 List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project</b>	
3.1.1 Between Cambodian-Viet Nam Border and Mekong Estuary	
3.1.2 Between Mekong River and Vam Nao West	
3.1.3 Between Vam Nao West and Bassac Estuary	

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<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>
<b>1.1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR CONSTRUCTING OR IMPROVING NEW PORTS, TERMINALS AND LANDING FACILITIES</b>
<b>1.2</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS</b>
<b>1.3</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PASSENGER AND CRUISE TERMINAL</b>
<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1</b>	<b>ENVIRONMENTAL CONSIDERATIONS</b>
<b>2.2</b>	<b>EMERGENCY RESPONSE</b>

<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>
<b>1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR CONSTRUCTING OR IMPROVING NEW PORTS, TERMINALS AND LANDING FACILITIES</b>	
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected annual cargo throughput</li> <li>- specify what kind of cargo</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>	
1.1.1 Between Khone Falls and Kratie	
1.1.2 Between Kratie and Kampong Cham	
1.1.3 Between Kampong Cham and Phnom Penh	
1.1.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
1.1.5 Between Chhong Kneas and Phnom Penh	
<b>1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS</b>	
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- <b>what specific dangerous cargo: diesel oil, gasoline, chemicals ?</b></li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected annual cargo throughput</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>	
1.2.1 Between Khone Falls and Kratie	
1.2.2 Between Kratie and Kampong Cham	

1.2.3 Between Kampong Cham and Phnom Penh	
1.2.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
1.2.5 Between Chhong Kneas and Phnom Penh	
<b>1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PASSENGER AND CRUISE TERMINAL</b>	
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected number of passengers throughput</li> <li>- tourists or local passengers ?</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>	
1.3.1 Between Khone Falls and Kratie	
1.3.2 Between Kratie and Kampong Cham	
1.3.3 Between Kampong Cham and Phnom Penh	
1.3.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
1.3.5 Between Chhong Kneas and Phnom Penh	

<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1 ENVIRONMENTAL CONSIDERATIONS</b>	
Are the ports and terminals in this area equipped with proper like waste reception facilities ?	
2.1.1 Between Khone Falls and Kratie	
2.1.2 Between Kratie and Kampong Cham	
2.1.3 Between Kampong Cham and Phnom Penh	
2.1.4 Between Phnom Penh and the Cambodia-Viet Nam Border	

2.1.5 Between Chhong Kneas and Phnom Penh	
<b>2.2 EMERGENCY RESPONSE</b>	
Have the ports and terminals in this area developed a system to manage emergency response and water quality incidents, including notifications and coordination with national/local authorities? What kind of equipment ?	
2.2.1 Between Khone Falls and Kratie	
2.2.2 Between Kratie and Kampong Cham	
2.2.3 Between Kampong Cham and Phnom Penh	
2.2.4 Between Phnom Penh and the Cambodia-Viet Nam Border	
2.2.5 Between Chhong Kneas and Phnom Penh	



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<b>1.2</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS</b>
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<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1</b>	<b>ENVIRONMENTAL CONSIDERATIONS</b>
<b>2.2</b>	<b>EMERGENCY RESPONSE</b>

<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>	
<b>1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR CONSTRUCTING OR IMPROVING NEW PORTS, TERMINALS AND LANDING FACILITIES</b>		
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected annual cargo throughput</li> <li>- specify what kind of cargo</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>		
1.1.1	Between Green Triangle and Golden Triangle	
1.1.2	Between Golden Triangle and Houei Sai	
1.1.3	Between Houei Sai and Luang Prabang	
1.1.4	Between Luang Prabang and Pakchom Dam	
1.1.5	Between Pakchom Dam and Vientiane	
1.1.6	Between Vientiane and Savannakhet	
1.1.7	Between Savannakhet and Khone Falls	
1.1.8	In Khone Falls area	
<b>1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS</b>		

*Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:*

- Year built or year to be built ?
- Name of the port or terminal
- **what specific dangerous cargo: diesel oil, gasoline, chemicals ?**
- exact location
- link with road or rail ?
- expected annual cargo throughput
- size of the port ?
- how far protruding in the river ?

1.2.1 Between Green Triangle and Golden Triangle	
1.2.2 Between Golden Triangle and Houei Sai	
1.2.3 Between Houei Sai and Luang Prabang	
1.2.4 Between Luang Prabang and Pakchom Dam	
1.2.5 Between Pakchom Dam and Vientiane	
1.2.6 Between Vientiane and Savannakhet	
1.2.7 Between Savannakhet and Khone Falls	
1.2.8 In Khone Falls area	

### **1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PASSENGER AND CRUISE TERMINAL**

*Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:*

- Year built or year to be built ?
- Name of the port or terminal
- exact location
- link with road or rail ?
- expected number of passengers throughput
- tourists or local passengers ?
- size of the port ?
- how far protruding in the river ?

1.3.1 Between Green Triangle and Golden Triangle	
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1.3.2 Between Golden Triangle and Houei Sai	
1.3.3 Between Houei Sai and Luang Prabang	
1.3.4 Between Luang Prabang and Pakchom Dam	
1.3.5 Between Pakchom Dam and Vientiane	
1.3.6 Between Vientiane and Savannakhet	
1.3.7 Between Savannakhet and Khone Falls	
1.3.8 In Khone Falls area	

<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1 ENVIRONMENTAL CONSIDERATIONS</b>	
Are the ports and terminals in this area equipped with proper like waste reception facilities ?	
2.1.1 Between Green Triangle and Golden Triangle	
2.1.2 Between Golden Triangle and Houei Sai	
2.1.3 Between Houei Sai and Luang Prabang	
2.1.4 Between Luang Prabang and Pakchom Dam	
2.1.5 Between Pakchom Dam and Vientiane	
2.1.6 Between Vientiane and Savannakhet	
2.1.7 Between Savannakhet and Khone Falls	
2.1.8 In Khone Falls area	
<b>2.2 EMERGENCY RESPONSE</b>	
Have the ports and terminals in this area developed a system to manage emergency response and water quality incidents, including notifications and coordination with national/local authorities? What kind of equipment ?	
2.2.1 Between Green Triangle and Golden Triangle	

2.2.2 Between Golden Triangle and Houei Sai	
2.2.3 Between Houei Sai and Luang Prabang	
2.2.4 Between Luang Prabang and Pakchom Dam	
2.2.5 Between Pakchom Dam and Vientiane	
2.2.6 Between Vientiane and Savannakhet	
2.2.7 Between Savannakhet and Khone Falls	
2.2.8 In Khone Falls area	

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<b>1.2</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS</b>
<b>1.3</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PASSENGER AND CRUISE TERMINAL</b>
<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1</b>	<b>ENVIRONMENTAL CONSIDERATIONS</b>
<b>2.2</b>	<b>EMERGENCY RESPONSE</b>

<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>
<b>1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR CONSTRUCTING OR IMPROVING NEW PORTS, TERMINALS AND LANDING FACILITIES</b>	
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected annual cargo throughput</li> <li>- specify what kind of cargo</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>	
1.1.1 Between Golden Triangle and Houei Sai	
1.1.2 Between Houei Sai and Pha Dai	
1.1.3 Between Pak Huang and Vientiane	
1.1.4 Between Vientiane and Savannakhet	
1.1.5 Between Savannakhet and Pak Moun	
<b>1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS</b>	
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- <b>what specific dangerous cargo: diesel oil, gasoline, chemicals ?</b></li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected annual cargo throughput</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>	
1.2.1 Between Golden Triangle and Houei Sai	
1.2.2 Between Houei Sai and Pha Dai	
1.2.3 Between Pak Huang and Vientiane	

1.2.4 Between Vientiane and Savannakhet	
1.2.5 Between Savannakhet and Pak Moun	
1.2.1 Between Green Triangle and Golden Triangle	
<b>1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PASSENGER AND CRUISE TERMINAL</b>	
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected number of passengers throughput</li> <li>- tourists or local passengers ?</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>	
1.3.1 Between Golden Triangle and Houei Sai	
1.3.2 Between Houei Sai and Pha Dai	
1.3.3 Between Pak Huang and Vientiane	
1.3.4 Between Vientiane and Savannakhet	
1.3.5 Between Savannakhet and Pak Moun	

<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1 ENVIRONMENTAL CONSIDERATIONS</b>	
Are the ports and terminals in this area equipped with proper like waste reception facilities ?	
2.1.1 Between Golden Triangle and Houei Sai	
2.1.2 Between Houei Sai and Pha Dai	
2.1.3 Between Pak Huang and Vientiane	
2.1.4 Between Vientiane and Savannakhet	
2.1.5 Between Savannakhet and Pak Moun	
<b>2.2 EMERGENCY RESPONSE</b>	
Have the ports and terminals in this area developed a system to manage emergency response and water quality incidents, including notifications and coordination with national/local authorities? What kind of equipment ?	



2.2.1 Between Golden Triangle and Houei Sai	
2.2.2 Between Houei Sai and Pha Dai	
2.2.3 Between Pak Huang and Vientiane	
2.2.4 Between Vientiane and Savannakhet	
2.2.5 Between Savannakhet and Pak Moun	

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<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1</b>	<b>ENVIRONMENTAL CONSIDERATIONS</b>
<b>2.2</b>	<b>EMERGENCY RESPONSE</b>

<b>1</b>	<b>ONGOING WORKS, NATIONAL PLANS AND PROJECTS</b>	
<b>1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR CONSTRUCTING OR IMPROVING NEW PORTS, TERMINALS AND LANDING FACILITIES</b>		
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected annual cargo throughput</li> <li>- specify what kind of cargo</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>		
1.1.1 Between Cambodian-Viet Nam Border and Mekong Estuary		
1.1.2 Between Mekong River and Vam Nao West		
1.1.3 Between Vam Nao West and Bassac Estuary		
<b>1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS</b>		
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- <b>what specific dangerous cargo: diesel oil, gasoline, chemicals ?</b></li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected annual cargo throughput</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>		
1.2.1 Between Cambodian-Viet Nam Border and Mekong Estuary		
1.2.2 Between Mekong River and Vam Nao West		

1.2.3 Between Vam Nao West and Bassac Estuary	
<b>1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PASSENGER AND CRUISE TERMINAL</b>	
<p><i>Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:</i></p> <ul style="list-style-type: none"> <li>- Year built or year to be built ?</li> <li>- Name of the port or terminal</li> <li>- exact location</li> <li>- link with road or rail ?</li> <li>- expected number of passengers throughput</li> <li>- tourists or local passengers ?</li> <li>- size of the port ?</li> <li>- how far protruding in the river ?</li> </ul>	
1.3.1 Between Cambodian-Viet Nam Border and Mekong Estuary	
1.3.2 Between Mekong River and Vam Nao West	
1.3.3 Between Vam Nao West and Bassac Estuary	

<b>2</b>	<b>ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE</b>
<b>2.1 ENVIRONMENTAL CONSIDERATIONS</b>	
Are the ports and terminals in this area equipped with proper like waste reception facilities ?	
2.1.1 Between Cambodian-Viet Nam Border and Mekong Estuary	
2.1.2 Between Mekong River and Vam Nao West	
2.1.3 Between Vam Nao West and Bassac Estuary	
<b>2.2 EMERGENCY RESPONSE</b>	
Have the ports and terminals in this area developed a system to manage emergency response and water quality incidents, including notifications and coordination with national/local authorities? What kind of equipment ?	
2.2.1 Between Cambodian-Viet Nam Border and Mekong Estuary	
2.2.2 Between Mekong River and Vam Nao West	

2.2.3 Between Vam Nao West and Bassac Estuary



## 4 Handling of Data Gaps

Once the budget is available data collection can be commenced.

Mekong water transportation consists of two main types: Inland Waterway Transportation (IWT) and Maritime Transportation. Both types of navigation can be on a national level (domestic commerce and trade – rural water transportation – or access by sea-going vessels to Can Tho in Viet Nam for example), and on a trans-boundary level, or so-called navigation without frontiers (as a mechanism for regional and international trade – for example boats plying the area between the Lao PDR and Thailand or sea-going vessels between the sea and Phnom Penh port). In defining possible roles for the MRC, it needs to be recognised that national navigation development remains that country's responsibility. However, there are valid roles – according to the above mandates – for MRC to assist the riparian countries in improving the national water transportation infrastructure and services that will have regional implications.

Regarding data collection and analysis:

Data Collection: it is already decided what kind of data and information is required for the Development Scenarios. These can be obtained through literature, review of national plans and strategies, data and information on the current economic situation with planned and ongoing projects, questionnaires (included herewith), site visits, Interviews, mapping, meetings and workshops. Should include review of the “Master Plan for Waterborne Transport on the Mekong River System in Cambodia” and the Vietnamese “Mekong Delta Sector plans”.

Data Processing, Visualization and Analysis

Analysis and assessment of the baseline conditions based on the collected data and information, including identification of opportunities and obstacles.

Data collection, including data and information on the current economic situation with planned and ongoing projects, but also for vessels and fleet, waterway design, waterway safety, port development, socio-environmental aspects and legal aspects in order to draft the “Baseline conditions Report”.

Development Scenarios, where a future situation assessment for waterborne transport activities should lead to a short-term (5 years) and long-term (25 years) development scenario for fleet, waterway design, port development and waterway safety in order to draft a “Development Scenario Report”.

At national level, the National Mekong Committees (NMCs) of the MRC member countries will serve as the Coordinating Agencies. Through the National Navigation Coordinators (NCCs), the agencies will assist the MRCS in liaising with the national line agencies to obtain any other additional information necessary and will assist MRCS to inform, with regular intervals, the related line agencies about the progress and the results of the study.

## 5 Detailed Schedule

The table below shows the proposed detailed schedule for formulating the development scenarios for the Navigation Thematic Team.

### Detailed Schedule Navigation Thematic Team

Activity	Author/Lead	Due Date	Note
Submit Draft Work Plan for the Formulation of Development Scenarios to CS Coordinator	Navigation Thematic Team	9 June 2015	Work Plan includes approach, data inventory/request, analytical method for processing data, addressing data gaps, detailed schedule, and concept of thematic sub-scenarios
Submit Final Draft Work Plan to CS Coordinator	Navigation Thematic Team	12 June 2015	
Follow-up with line agencies in collecting data. Conducting small group technical consultations with appropriate experts from line agencies <b>SUBJECT TO AVAILABILITY OF FUNDS</b>	Navigation Thematic Team	22 June to 24 August 2015	Discuss concept of sub-scenarios and potential sub-scenarios when available  Data processing and analysis should be started as soon as data are received <b>SUBJECT TO AVAILABILITY OF FUNDS</b>
Conduct remaining data processing and analysis including identification of remaining data gaps and formulation of thematic sub-scenarios <b>SUBJECT TO AVAILABILITY OF FUNDS</b>	Thematic Team (in consultation with Review Team)	27 July – half September 2015	
Conduct national Consultations (separate meetings with 4 MCs) <b>SUBJECT</b>	All Thematic Teams (together)	September-October 2015	Present draft formulated scenarios and associated data, and thematic sub-scenarios

<p><b>TO AVAILABILITY OF FUNDS</b></p>			<p>This will be planned/scheduled/facilitated by the CS Coordinator</p>
<p>Conduct final data collection, data gap filling and analysis and submit Development Scenarios/Sub-scenarios Data/Map Specification Document to CS Coordinator <b>SUBJECT TO AVAILABILITY OF FUNDS</b></p>	<p>Thematic Teams in consultation with Review Team*</p>	<p>September-October 2015</p>	<p>Address comments from national consultations</p>