



1 Consultancy Summary

Project Title: *Review and Update of a Basin-wide for Sustainable Hydropower Development Strategy for the Lower Mekong Basin*

Activities and Budget Codes: 2.1.4

Title of Consultancy: *Consultancy for the Review and Update of a Basin-wide for Sustainable Hydropower Development Strategy for the Lower Mekong Basin*

Type of Consultancy: Medium term consultancy

Division: Planning Division

Duration: 12 months

Duty Station: Home base, with travelling to MRCS and regional events in the MRC's member countries

Indicative Starting Date: March 2018

Reporting to: Director of Planning Division through Sustainable Hydropower Specialist

Total number of days for this consultancy: 258 Expert Working Days of input

Required deliverables for this consultancy:

Update of a Basin-wide for Sustainable Hydropower Development Strategy for the Lower Mekong Basin.

Daily timesheet requirement: Yes, submitted with invoice.

Monthly work plan requirement: At inception of the work

Monthly timesheet requirement: Yes, submitted with invoice.

2 Background

Hydropower is recognized as an important development opportunity for the Mekong River Basin and the people living within it. As set out in the Mekong River Commission's Strategic Plan (2016 to 2020) and the Basin Development Strategy (2016-2020), this basin development is to follow Integrated Water Resource Management (IWRM) principles. The need to improve the sustainability of the basin's hydropower developments is a key Strategic Priority in the Mekong Basin Development Strategy. With the significantly increasing scale and prevalence of this energy option, all MRC member countries are taking steps to understand and employ sustainable hydropower considerations.

Hydropower in the LMB is embedded in a closely woven social and environmental fabric. The region's people derive a substantial proportion of their livelihood and nutrition from the tributaries and mainstream of the Mekong. Ecosystems services support both these livelihoods and a rich and globally unique biodiversity. The planning and implementation of hydropower should aim to ensure that these livelihoods are preserved and enhanced and that the supporting biodiversity is maintained wherever possible.

2.1 Status of Hydropower Development in the Lower Mekong Basin

Over the past decade, the national policies of member countries have emphasised the need to extend access to electricity to underpin poverty reduction strategies, improve regional energy security, reduce vulnerability to international energy price shocks and generate export earnings in countries such as Cambodia and Laos. These factors have led to accelerated development of hydropower and large investment in electrical infrastructure in the Lower Mekong Basin. Hydropower development is expanding on the Mekong mainstream and in tributaries and it is likely to intensify in the near future.

In 2001 there were approximately 17 hydropower projects in operation in the LMB with a capacity of less than 1,400 MW. During the period from 2002 to 2015 there were additional 40 hydropower projects built to provide a generation capacity of 6,442 MW. While some 14 dams with a total capacity around 3,000 MW are planned for commissioning during the period 2016-2020, another series of 30 dams with a total capacity around 6,653 MW are under planning status with the majority finalising Feasibility Studies.

Three mainstream dams have been submitted to the MRC under the PNPCA. The construction of the 1285MW Xayaburi Project is 80% complete and is expected to be commissioned in 2019, while the Don Sahong (260MW) will be commissioned in 2019. The Pak Beng project (912 MW) has recently completed the PNPCA review and related issues are to be dealt with in a Joint Action Plan, the expectation is that this project will be commissioned by 2024.

There are significant major hydropower investments planned in the LMB:

Lao PDR has signed agreements with its neighbours to supply power, as follows:

- 9000 MW to Thailand by 2025
- 5000 MW to Vietnam by 2030
- 1500 MW to Cambodia by 2025
- Cambodia is progressing with feasibility studies on the major mainstream developments in the Mekong floodplain (e.g. Sambor 2000 to 3000MW)

China has completed six major hydropower dams on the upper Mekong (Lancang) with a capacity of 15,700 MW and large inter-annual storage. A further 11 projects are under construction with a capacity of 11,800MW. In addition, there are another 10 projects planned in the upper basin with a capacity of approximately 3800MW.

2.2 The need for a Sustainable Hydropower Strategy

The rapid and large-scale development of hydropower in the Upper and Lower Mekong Basin, as detailed above, is forecast to have a substantial impact on the economic, social and environmental condition in the Mekong basin. The net economic benefits of these developments, once fully developed, is estimated to have a Net Present Value (NPV) of over \$70bn to the regional economies¹. However, it is also known that hydropower and other basin developments (e.g. irrigation) impact the natural resources across the basin. The resulting socio-economic impacts are not equally shared across the MRC Member Countries and are inevitably borne by those who are most dependent on river ecosystems and are vulnerable to these major changes to their livelihoods.

The MRC has studied alternative development pathways as part of the *Assessment of Basin-wide Development Scenarios*². In this analysis a range of Development Scenarios were considered and the benefits and costs analysed. Focusing particularly on main stream dams, this analysis allowed a comparison of the relative impacts of the alternative Scenarios on environmental and socio-economic

¹ MRC Council Study (Draft Macro-Economic Assessment) June 2017.

² Assessment of Basin-wide Development Scenarios, Main Report April 2011

indicators. Under the “LMB Long Term Development Scenario” with the Lancang hydropower development and all planned LMB mainstream dams, the loss in capture fisheries was estimated to be 1000kt/year, or 40% of the yield. The majority of this loss was shown to be affecting Cambodia.

Importantly, the Scenario Assessments of the MRC also show that some mainstream hydropower developments have more impact on the fisheries than others³. The MRC report indicates that 4.5million people would be at risk of losing livelihoods with a “Severely Negative” impact on livelihoods to those riparian residents.

In addition, the recently completed MRC Council Study has further highlighted these difficult trade-offs.

These major trade-offs in economic, environmental and social values is a major focus of this Sustainable Hydropower Development Strategy.

MRC studies and regional and international research recommend that basin-wide cooperation, integrated development planning, development and management is essential to achieve basin scale sustainable development and is critical for the Mekong Basin.

The intention is that alternative hydropower development pathways are properly considered in this Sustainable Hydropower Development Strategy (SHDS) so that the trade-offs between economic, social and environmental factors and the “energy, water and food nexus” are understood and openly discussed between Member Countries with a view to a balanced Basin Development Strategy.

Important Related MRC and LMB Studies and Initiatives are documented in ANNEX 1.

³ Figure 29, page 59, Assessment of Basin-wide Development Scenarios, Main Report April 2011

3 Objective and Approach

3.1 Objective of the SHDS2018

Given the MRC Strategic Plan 2016-2020 and the above context for the SHDS2018, the following Objective Statement is proposed:

Objective of the Sustainable Hydropower Develop Strategy 2018:

Optimal and sustainable hydropower development pathway alternatives are explored, proposed and discussed – taking into account opportunities to enhance benefits beyond national borders and minimise adverse transboundary impacts while supporting water, food and energy security.

3.2 Proposed Approach

The consultants in their Proposal will detail the approach they recommend taking to achieve the goals of this ToR.

The steps and process that follow is a proposal only. The Consultants may offer an alternative approach in their proposal that draws on their own innovative thinking, experience and expertise.

The approach to the study should include the following elements:

3.2.1 Consultation and Cooperation

The study will be executed in a **consultative and participatory manner**. For the final outputs to be useful, they must be understood and seen as relevant by the key stakeholders in the region, and in particular by the developers and agencies responsible for different aspects of strategic planning and project implementation in the hydropower sector. The consultants will establish strong links with these agencies and with the four National Mekong Committees at the earliest opportunity and will involve these agencies and developers in discussions at all stages of the execution of the study so that they are fully familiar and in agreement with the project outputs before they are finalized. The consultants will prepare a clear and structured consultation strategy for the study and will present it for consideration in the Inception Report.

3.2.2 Underlying Principles

The following Principles are proposed to guide the MRC Member Countries in the development of the SHDS 2018. These Principles are modified from those adopted by the Council in 1998.

- (1) *Planning and operational hydropower information is exchanged among the MRC member states as well as the GMS;*
- (2) *Close co-operation with international institutions, such as the Greater Mekong Sub-Region, ASEAN, Lancang Mekong Cooperation and multilateral funding agencies on regionally integrated energy and network planning and suitable options for sustainable development of hydropower projects within that context;*
- (3) *MRC's approach will focus the hydropower strategy on IWRM based planning of the mainstream and tributary hydropower towards the stated Objective of the Sustainable Hydropower Development Strategy 2018. The basin-wide strategy will support improvement of national energy and water sector planning and contributes to the overall Basin Development Strategy.*

- (4) *The MRC Sustainable Hydropower Strategy would thus also inform the ongoing preparation of a regional energy generation and transmission network expansion planning and power trade;*
- (5) *Good practice cumulative environmental and socio-economic impacts assessment, contemporary Design Guidance as well as a mechanism for public participation by stakeholders, should guide the MRC in its efforts to promote the most effective use of the natural resources in the Lower Mekong Basin; and*
- (6) *MRC should encourage the private sector to intensify its efforts to implement sustainable hydropower development practice in the basin with proper consideration to the environment and the well-being of the people living in the Basin.*

3.2.3 Key Strategic Issues to be addressed in the SHDS2018

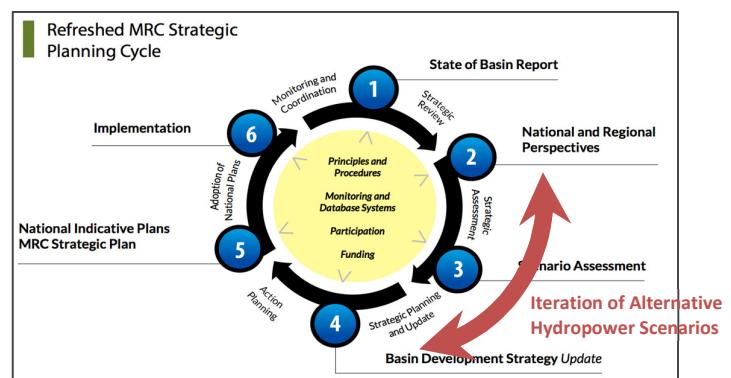
To achieve the above Key Results Areas and their Outcomes, a series of Strategic Issues must be addressed by the SHDS2018 to lead to potential measures/solutions to overcome the Basin concerns, needs and challenges⁴:

- ⇒ Support the **economic development** objectives of member countries (including navigation)
- ⇒ Protect and enhance **food and livelihood security**
- ⇒ Increase **resilience against Climate Change** including drought and flood management
- ⇒ Ensure continued **energy security** for all member countries
- ⇒ **Protection of valued ecosystems and ecosystem services**
- ⇒ **Further enhance trans-boundary cooperation**

3.2.4 SHDS2018 as Input to the Basin Planning Cycle 2021-2015

The Development of the SHDS2018 is embedded in the Planning Cycle used to develop the BDP 2021-2025.

State of Basin: The BDP reports on Status and Trends in the Mekong Basin⁵ (MRC, 2016), the State of the Basin Report and other relevant and tested information sources provide the relevant baseline information. Scenario Assessments have been undertaken in the Council Study and previously in the BDP2. It is envisaged that further Scenario testing of alternative Scenarios will be undertaken iteratively during and after the development of the SHDS to arrive at recommendations of alternative development pathways that may be put to decision makers (JC and Council).



National and Regional Perspectives essentially come from the National Plans for Power Development (PDP) and the National Indicative plans (NIPS) for other water resource developments. These may be partly gathered for the Council Study and Basin Planning work done in recent years, updated to reflect recent national priorities.

The SHDS is proposed to be a component of an interactive participatory planning stream and part of the Basin Development Strategy Process – to engage with cross sector, MRC relevant, regional

⁴ Basin Development Strategy (2016-2020), MRC (2016)

⁵ Ref to be added

stakeholders and sectors (NMCs, government agencies, relevant NGO and community groups) to achieve the Objective of the SHDS2018 and the Basin Strategy.

The SHDS2018 Process is intended to provide **alternative development pathways (Future Scenarios)** that may be proposed to achieve the Objective of the SHDS2018 as input to the Basin Development Plan 2021-2025.

The intention is that the outcomes of these alternative development pathways are tested against the Basin Needs, Opportunities and Challenges through the agreed Basin Indicator Framework. Revised National and Basin Plans may be proposed by the Planning Team in the Basin Strategy 2021-2025.

3.2.5 Joint and Integrated Planning

Joint and Integrated planning are to be implemented with the use of IWRM principles is proposed to be a key feature of the development of the SHDS2018. Figure 1 below illustrates the role that the SHDS2018 will play in meeting Mekong Basin Needs, Opportunities and Challenges when combined with all other sector strategies.

Link Energy and Water Planning

To properly reach the Objective and Principles of the SHDS2018, the implementation approach needs to clearly connect the regional energy and water planning frameworks at a whole of system scale. The approach must consider the power system design, meeting energy and capacity requirements for economic growth of member states while enhancing multisector water management opportunities and minimising risks to valued ecosystems. Development pathways selected should reduce impact on food security and improve livelihoods at a local and basin scale.

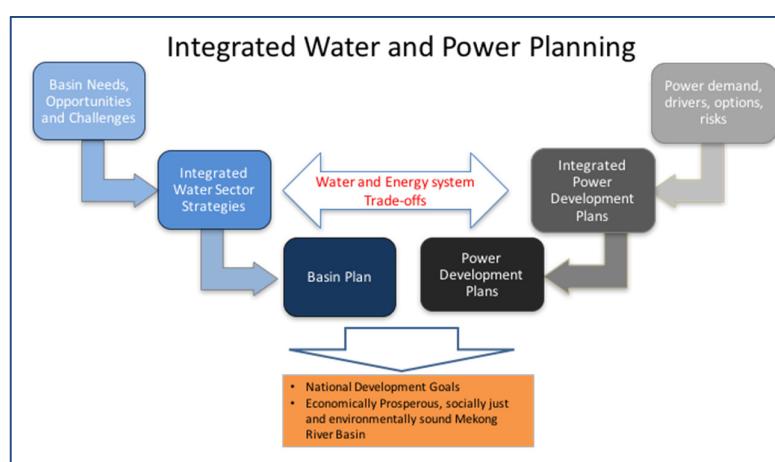


Figure 1: Integration of Water and Energy Sector Strategies to meet basin Needs and Challenges

the minimal environmental impacts to the LMB;

Necessarily the SHDS2018 will need to review with GMS and ASEAN electricity demand, cost-effective power supply, power inter-connection and regional power integration plans under the GMS Regional investment framework. The SHDS may promote further cooperation in these areas with the aim of improving the efficiency of the grid development and generation dispatch while reducing the impact on river systems and the basin as a whole. This may extend to joint planning and management and even joint development of electrical power infrastructure.

Integrated Water Resource Planning will need to ensure that the sector strategies are aligned and the trade-offs understood at a basin scale.

For joint activities to be successful, the sharing of information and learning experiences, in a structured and timely manner, should be established. Therefore, joint planning and data/information sharing through increased trans-boundary cooperation can help to produce optimal and high economic benefits with

3.3 Design of Alternative Development Pathways

Alternative Development Pathways are designed by the Technical Team in consultation with Member Countries and Stakeholders aimed at achieving the SHDS Objective and may include:

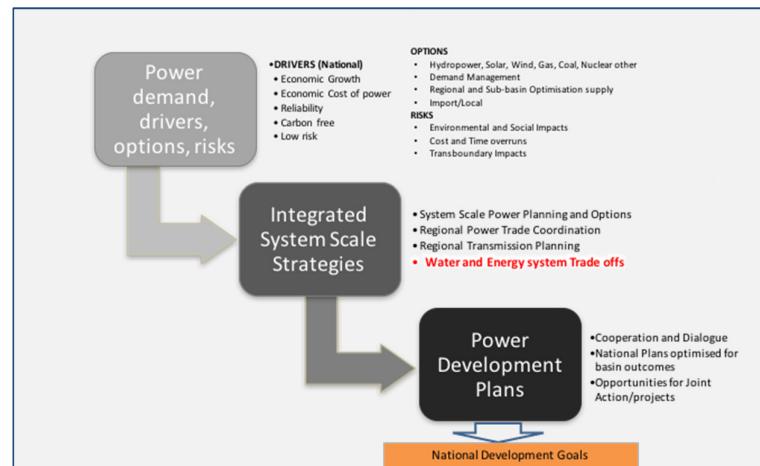
- ⇒ Alternative siting, design and operations for hydropower projects in the planning stage;
- ⇒ Inclusion of potential flood and drought management options for existing and planned projects;
- ⇒ Alternative regional energy integration and interconnection options to respond to regional demand and optimise the use of existing and planned hydropower;
- ⇒ Alternative governance, coordination and optimisation of mainstream and tributary hydropower cascades;
- ⇒ Avoidance, Mitigation and Compensation options to be built in to LMB SHDS;
- ⇒ Strong linkage to the Strategies and Masterplans for other sectors; and
- ⇒ Other factors deemed important by the MRC MC.

The following linkages to sector strategies are proposed:

3.3.1 Integrated National and Regional Power Planning

Selection of Energy Options to Meet Multi Sector Objectives

Cost and reliability would be primary drivers for National Power Development Plans (PDPs) in addition to a need to pursue low carbon solutions. Hydropower features prominently in these PDPs where suitably economic projects exist. The approach to the development of the SHDS2018 must therefore include an assessment of the alternative sources of electricity generation, their economic competitiveness and role that hydropower can play within that energy mix. This should be considered at a regional scale taking into account



perceived national risks associated with alternative solutions (e.g. vulnerability to fuel price fluctuations, regional conflicts etc). The evaluation of the alternative supply options should take into account the environmental and social impacts and economics. The regional supply options will need to consider potential transmission network enhancements associated with alternatives.

Sustainable and Optimal Hydropower Siting, Design and Operation at Basin and Sub-basin Scale

When investigating the optimal hydropower contribution to PDPs, the approach proposed is to seek economically efficient hydropower siting, design and operation at a sub basin scale and at a LMB scale. This requires linkage to power system planning to understand the role that hydropower can play in the power system. Hydropower has the ability to provide ancillary system services and can also provide backup for intermittent renewable energy sources such as solar and wind. This means the contribution of hydropower can go beyond the capacity (MW) and energy generation (GWh) delivery. These alternative roles need to be adequately valued in the system economics.

In addition, a cascade of hydropower projects in a sub basin can be optimised to maximise time of day and seasonal capacity availability and energy generation. In the LMB sub basin projects may be owned

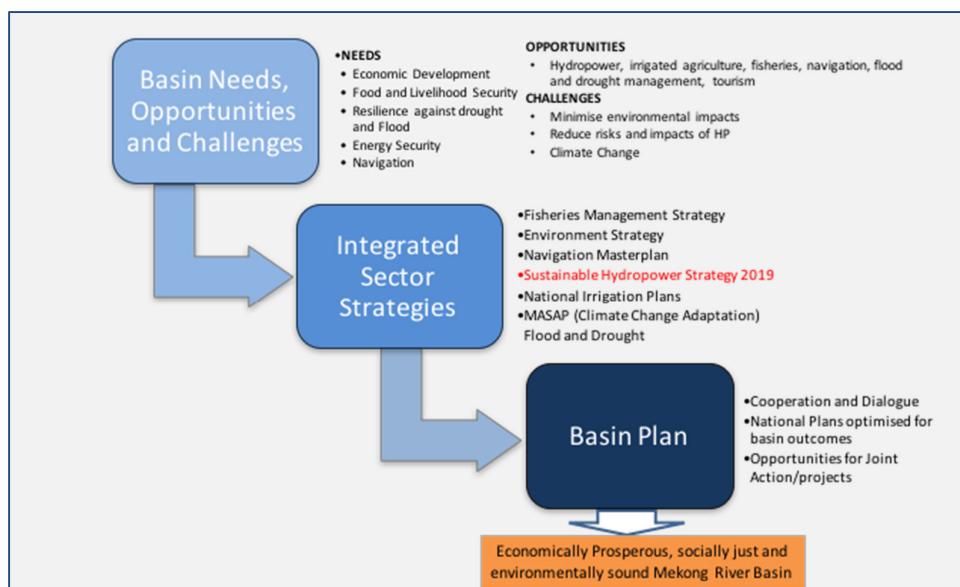
by several different companies. The optimal siting, design and operation of existing or planned cascades may require specific projects in a cascade to operate for system scale benefits rather than project scale benefits; related Concession Agreement (CA) and Power Purchase Agreement (PPA) modifications may result.

An optimal system scale dispatch of hydropower within an interconnected grid, linking the other generation sources, would also allow optimisation between sub-basins based on seasonal and intra-seasonal hydrology and system requirements. This however requires a more detailed technical analysis which may only be investigated at a high level in this SHDS2018.

3.3.2 Integrated Water Sector Planning

Figure 2 below illustrates the role that the SHDS2018 will play in meeting Mekong Basin Needs, Opportunities and Challenges when combined with all other sector strategies.

Figure 2: Integration of Water Sector Strategies



Opportunities for better integration of water sector plans including hydropower have again been highlighted in the MRC's Council Study. These will need to be investigated at a strategic level in this study taking into account:

- Sector Drought and Flood Management
- Fisheries Masterplan and SHDS2018
- Protection of Environmental Assets and the SHDS2018
- Navigation Master Planning
- Irrigation Planning
- Mekong Climate Change Adaptation Strategy and Action Plan (MASAP)
- Cooperation on Integrated Planning

3.4 Technical Evaluation Methodology

It is proposed to develop the SHDS2018 using a technical evaluation method that allows MRC to understand the supply/demand drivers for hydropower development and other supply options in the region and the relative impacts, costs and benefits of the hydropower developments in the Mekong basin at a strategic level. This will draw on the recent work of the Council Study, the Basin Development Planning process and Scenarios Assessment, the work of ISH and other regionally relevant work (SEA, Delta Study) to provide information and tools to support the evaluation.

The Technical Evaluation Method will support Interactive Participatory Planning under the Basin Development Strategy. The Technical Team will present all relevant and necessary sectoral, technical, economic, social and environmental information for an Interactive Participatory Planning Process.

3.4.1 Framework to Guide Approach

In order to address the above set of Strategic Issues through and suitable level of analysis and consultation with the four Member Countries and relevant stakeholders it is proposed to use the framework developed by the MRC and partners within the Rapid Basin-wide Hydropower Sustainability Assessment Tool (RSAT). This allows a comprehensive coverage of the issues to be addressed.

As this is a strategic planning exercise, it will be important to focus effort on those hydropower projects that affect Basin Scale and transboundary related issues.

Appendix 2 groups relevant Basin-Wide and Trans-boundary concerns into 10 RSAT topics with the suggestions for the use of MRC Tools, Guidelines and methods.

3.4.2 Proposed Process for Interactive and Iterative Development of the SHDS2018

Understanding the Basin Vision and Goals – Stakeholder Engagement

In order to include the above broad cross sector assessment of alternative sustainable hydropower development pathways it will be necessary to understand the priorities and agreed Mekong Basin outcomes. This vision for the status of the Mekong Basin in say 30 years is to some extent documented in the Basin Strategy. However, clarifying the specific targets and weighting of economic, social and environment indicators from the perspective of a range of stakeholders would be important first step⁶.

Gathering Inputs from Regionally Relevant Plans and Assessments

As noted above, gathering a detailed understanding of the regions PDPs and the underlying drivers, assumptions and options will be important.

A number of Cumulative Impact Assessments have been undertaken in recent years culminating in the MRC's Council Study but also including the VNMC's Delta Study, Case Study within ISH0306⁷ and the MRC's SEA⁸. In addition, there are a number of and other relevant resources and current ongoing CIAs and related investigations in sub-basins.

A large volume of information will have been assembled and analysed as part of the MRC's Council Study. It is envisaged that this information will be the core resource for evaluating at a preliminary level for alternative development pathways as part of the SHDS. The Council Study information is also likely to be the main source of information for the upcoming Basin Development Strategy.

⁶ Guideline for the Evaluation of Multipurpose Hydropower Project Portfolios (MRC, 2015)

⁷ Reference Guidelines for Hydropower Environmental Impact and Risk Mitigation in the Lower Mekong Basin Mainstream and Tributaries (MRC, 2017, in progress).

⁸ Strategic Environmental Assessment of Hydropower on the Mekong Mainstream (ICEM, 2011)

In addition, the work of past Basin Planning exercises (e.g. BDP2) should be taken into consideration as a resource, updated where necessary

It will be necessary to assemble the strategic information of other LMB sector strategies as they relate to the SHDS (e.g. Fisheries, Navigation, Environment, Flood and Drought, Climate Change). Some of these have been completed by the MRC in 2016, but others are under development.

Analysis and Preparation of Planning Tools

The outputs from the Council Study and other recent studies will form the basis for the cross-sector assessment of an initial set of alternative sustainable hydropower development pathways that may achieve the SHDS Objective. The Power Planning methods will need to be based either on the existing OptGen⁹ model or an alternative proposed by the Technical Team.

The Technical Team will be to become familiar information arising from regional GMS studies and be able to use this information to consider alternative sustainable hydropower and power development pathways in a suitable form to allow discussion of opportunities and trade-offs. It will be necessary for the Technical Team to evaluate alternative scenarios at a strategic level, with the MRC experts, to test certain development pathways that may be considered by the Stakeholders.

Stakeholder Interactive Planning Workshops

Interactive Planning Workshops with MC are envisaged to explain the development pathways and determine if further pathways should be considered. A number of alternative sustainable hydropower development pathways may be proposed from the outputs of the Workshops to be evaluated and relevant costs, benefits and indicators documented.

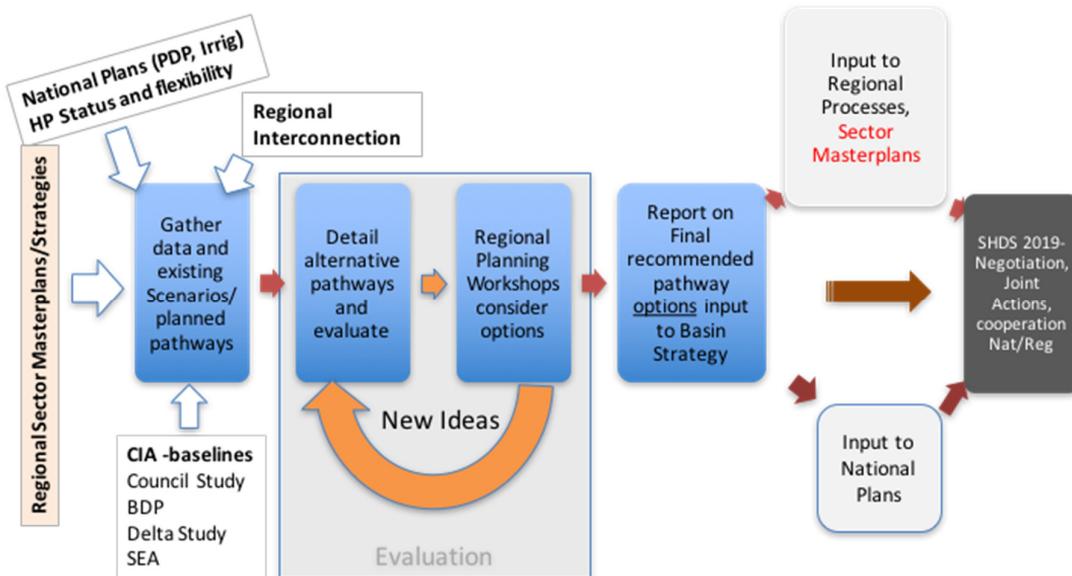
Additional interactive planning workshops with MC may be facilitated to explain the outcomes of the follow-up assessment and to further development pathways and determine if further pathways should be considered. Selected options for development pathways with their impact on basin Needs, Opportunities and Challenges (using Basin Indicator Framework) to MC for consideration as part of the Basin Strategy.

SHDS2018 as Input to National and Basin Planning

Outputs from the Stakeholder Workshops will be documented to provide detailed descriptions of sustainable hydropower development pathways for Basin Strategy work and provided to the MC for input to National Planning processes. The intention would be to revert back to high level Council Meeting with the SHDS2018 for their guidance.

Part of the SHDS Technical Team will participate in the Basin Strategy Process with other sectors to consider if there are alternative strategies that may be appropriate at a Basin Scale;

⁹ <https://www.psr-inc.com/softwares-en/?current=p4040>



Considerations in the Assessment of Hydropower Project Portfolio

The SHDS2018 may propose a re-assessment of the list of hydropower projects planned for construction in the years ahead. This may be in terms of a combination of location, scale or design of mitigation and operations using the above tools. It will be necessary to ensure that any changes to projects are practical given the development status on the projects. If a project is already well advanced along its development path it may not be possible to make significant changes to certain locational and design parameters.

Therefore, it is proposed to do an initial screening to identify:

- A list of hydropower projects which are already strongly committed such as projects having their Concession Agreements signed and/or being under construction or will be constructed in the near future;
- This screening will also need to reveal level of commitment (i.e. is it closer to pre-feasibility or financial close) to understand those projects that have greater ‘flexibility’ on siting and design and are able to be re-assessed within the Technical Stream; and
- The operational flexibility of all key projects.

Note that only projects which have significant transboundary impact at a basin-scale strategic level, will be evaluated on a case by case basis. General consideration of overall basin-scale requirements (e.g. additional flood storage, release of additional environmental flows) may be made where multiple tributary projects may have potential transboundary affects.

4 Outputs and Activities

4.1 The Outputs of the SHDS Study

The main output of the SHDS2018 planning process is anticipated to be a shortlist of hydropower development pathways with a clear description of the trade-offs that are analysed for each shortlisted option. The Sustainable Hydropower Development Strategy will detail these development options and the relative costs and benefits.

Specifically:

- ⇒ ***Documented alternative sustainable hydropower development pathways for more optimal development for hydropower resources of the Mekong mainstream and its tributaries;***
- ⇒ ***A description of opportunities to enhance benefits beyond national borders and avoid, minimise, mitigate or compensate for adverse transboundary impacts; and***
- ⇒ ***Outline proposals for role of hydropower in crosscutting sector strategies to be further considered in the Basin Strategy process for 2021 to 2025.***

In addition, an agreed set of **Strategic Actions** will be detailed to ensure the MRC is able to deliver on the expectations of the MC towards the SHDS objective and the implementation of a preferred Sustainable Hydropower Development Strategy.

The SHDS is proposed to be presented to the JC who will already have been briefed by their national members of the Planning Team. The JC will be asked for guidance on further advancing the SHDS.

The study methodology and work-plan should be prepared by the Consultant team to deliver the following outputs and activities:

[Output 1: Study scoping and planning, Inception Report and Regional Consultation](#)

Detail a methodology to cover the required SHDS2018 Outputs.

Develop a detailed work with milestones and resource plan for the execution of the study including timing of consultation with NMCs, line agencies, the development sector and hydropower operators and definition of the roles these organizations will need to take to complete the work.

Gather the available documentation on completed National Power Development Plans, Regional Interconnection, proposed national hydropower development pathways, Council Study outputs and details, SEAs, CIAs and EIAs and related studies for planned and existing projects in the LMB.

Assemble an assessment of the status of hydropower implementation in the basin; specifically, to understand the level of commitment for each project (Pre-feasibility, Feasibility, MOU, PDA, PPA, or Financial Close).

Gather information on other basin initiatives that may be linked to the development of the SHDS (e.g. World Bank funded TA in Lao PDR, IFC proposal for CIA in the Se Kong sub-basin, past MRC/ISH initiatives etc.).

Finalize the Inception report which describes the detail a methodology to cover the required SHDS2018 Outputs.

Regional Consultation on the Inception Report with MCs.

[Output 2: Analysis and Evaluation and Discussion Paper #1](#)

After the assembly of the information from the previous studies and the Council Study, the Consultant team, in discussion with the MRCS and national experts will propose alternative development

pathways as described above towards the objective of the SHDS. These will then be analysed through appropriate tools. This round of evaluation may be at a strategic level to allow discussion.

Discussion Paper #1 will cover the information gathered from the previous studies including the Council Study and the Consultants' further analysis. It will present the strategic assessment of the first version of the Development Pathways that may be considered by the Member Countries at the First Interactive Planning Workshop. It will also set out the results of the analysis undertaken by the Consultants of the strategic cross sectoral opportunities.

The trade-offs and the economic, social and environmental indicators will be presented.

National Consultations #1 on the Approach, Evaluation Methods and Discussion Paper #1 of will be conducted. (Facilitated by National Experts supported by Team Leader)

[Output 3: Interactive Participatory Workshop #1 \(Regional\)](#)

This Interactive Participatory Workshop (IPW) is proposed to be facilitated to present the Sustainable Hydropower Development pathways in such a way as to clearly show the available information on selected development pathways and the resulting trade-offs. This is aimed at allowing constructive transboundary dialogue on the alternative pathways that may be practical and implementable. The aim would be to find new options to more closely meet the objective of the SHDS and to seek to "optimise" certain trade-offs.

This Workshop may occur in the form of a series of separate national breakout sessions with regional plenary dialogue required. It is proposed to gain support for senior representatives to be at these workshops in order for the outputs to carry weight. The Consultants should detail how these workshops will be facilitated in their proposal document and inception report.

The output should be a short list of new ideas for development pathways that may be analysed by the Consultant Team.

[Output 4: Analysis and Evaluation and Discussion Paper #2](#)

Following the discussions and options raised at the Workshop#1, the Consultant team, again in discussion with the MRCS experts and national experts, will analyse the new or revised sustainable hydropower development pathways.

This Discussion Paper #2 will contain the information that would be needed for further dialogue at the Workshop#2.

[Output 5: Interactive Participatory Workshop #2](#)

This workshop will be facilitated to present the revised Sustainable Hydropower Development pathways. The aim would be to have a dialogue on the results of the Discussion Paper #2 and to seek agreement on the final shortlist of development pathways, and hence alternative SHDS options, for input to the Basin Planning process.

The output should be a description of preferred development pathways that may be written up by the Consultant Team.

[Output 6: Updated Sustainable Hydropower Development Strategy and Communication Documentation](#)

The final SHDS2019 documentation should summarise the preferred hydropower development pathways and full process followed for a range of audiences:

- Updated SHDS Volume 1: Summary for Decision Makers: Clearly setting out the preferred options and trade-offs. This may be presented to the Joint Committee and the Council for discussion.

- Updated SHDS Volume 2: A Technical Report covering the analysis methods and results.
- Suitable communication material.

5 Responsibilities and tasks

The Consultant or Consortium should assemble a team of suitably qualified experts to undertake this work under the direction of the Team Leader.

In addition, a vital part of this study will be to **utilise the skills within MRCS, NMCS and the National line agencies** and to build capacity of NMCS and line agency personnel where possible. The way this will be implemented will be determined during the Inception stage of the project but will likely include the designation of focal points in the NMCS and respective line agencies to work closely with the study team.

National Consultants

The MRC will engage national experts and/or consultants in each member country to assist the team and the NMC of that country in the acquisition of data, the analysis thereof and to contribute to the national implementation planning arrangements for the subsequent monitoring. The scope of work for these national consultants will be agreed jointly by the Team Leader and the MRC.

The study will be implemented over a 12 month period, with the following team members:

5.1 Core Technical Team

5.1.1 Team Leader/Sustainable Hydropower and IWRM Planning Expert (75 wd)

The Team Leader/Sustainable Hydropower Planning Expert will lead the development of the approach and technical methodology for the SHDS2018. They will guide and manage the implementation of the work and coordinate with the MRCS, national focal points and national agencies. He or she will also manage close integration of national, regional and international expert inputs in producing the SHDS2018; link the team's work with ongoing MRC initiatives and other regional studies. They will be primarily responsible for the coordination and final production of related documentation and Outputs. The Team Leader will prepare a summary of selected sustainable hydropower development pathways with associated comments and feedback from the interactive planning sessions. Based on those results, the team leader will come up with update sustainable hydropower development strategy.

Facilitation of Interactive Planning Workshops (Additional 11wd)

As set out in the TOR, these Interactive Planning Workshops are expected to engage the senior level policy and planning leaders in the energy and water sectors (e.g. Director General level). The hydropower planning topic is a politically sensitive matter in the Mekong and due care and skill will be needed to ensure progress of a discussion on meaningful HP development pathways. The suggested nature of the workshops should be described in the Proposal. Depending on the skill and credentials of the Team Leader, this person may design and facilitate these workshops. Alternatively, an additional resource may be included in the team to carry out this work. The time allocation and cost for preparation and facilitation should be detailed in the Proposal.

The MRCS may consider alternative resources for this particular role to ensure success of these workshops if deemed necessary.

Skills and Experience:

- Qualifications in engineering, science, economics or related field (preferably PHD) and at least 20 years professional experience and in sustainable hydropower planning and policy.

- Excellent understanding of the power sector planning and the role of hydropower and renewable energy development.
- Proven capability to facilitate interactive and participatory planning workshops with diverse stakeholders across sectors and across national boundaries;
- An in depth understanding of Integrated Water Resources Management (IWRM) and the impacts and opportunities associated with hydropower in large river basins;
- Substantial experience in the Mekong Region (or similar) on issues related to the power sector, sustainable development, environmental management and infrastructure assessment; and
- Proven experience in the management of multi-disciplinary teams and leading studies of complex technical nature and excellent communication skills.

5.1.2 Hydropower Design/Operations Engineer (43 wd)

The Hydropower Design and Operations Engineer will gain a detailed understanding of the available engineering and operational information on the existing proposed LMB hydropower structures. A clear understanding of the status of all projects in the basin should be gathered to understand specifically if they retain any flexibility to alter any of their key siting, design and operational characteristics.

He/she will work with other team members to propose strategic level sub-basin siting, design optimisation options as input to the sustainable hydropower development pathways in the context of the power and water system planning requirements. They will be present at consultations to explain the practicalities and economics of alternative engineering design and operations pathways.

Skills and Experience:

- Postgraduate degree civil engineering or equivalent, specialising on hydropower scheme planning, design and economics. At least 15 years professional experience covering hydropower scheme design and operations particularly covering the sustainability aspects of these schemes and related water infrastructure.
- Substantial experience in the design of large run-of-river hydropower schemes, cascades and their optimised operations including economic analysis of different hydropower layouts and generation operations alternatives.
- Experience in the Mekong Region (or similar environment) and experience in the integration of regional specific environmental impact mitigation into these hydropower schemes in the context of the regional natural resource pressures.
- Excellent communication skills for consultation and capacity building.

5.1.3 Energy and Power System Planning Specialist (43 wd)

The Energy and Power System Planning Specialist will focus on the analysis of power sector and the trends regarding the role of renewable energy, energy efficiency and hydropower. The specialist will contribute to the analysis of the interconnection between the power system, the planned hydropower operations and the water sector; under each of the proposed alternative sustainable hydropower development pathways. and provide an input at the Interactive Planning workshops.

They will become fully familiar with the work undertaken in the Council Study and the ADB RETA 7764¹⁰ will work with the regional experts on the costs and benefits of any potential alterations to the current GMS Power Transmission Master Plan suggested by alternative development pathways.

¹⁰ Ensuring Sustainability of GMS Regional Power Development Prepared for ADB – TA-7764 REG, ICEM 2013

The Energy and Power System Planning Specialist will lead the analysis of alternative generation scenarios with links to the GMS Power Transmission Master Plan, and will assist in identifying options for regional generation and interconnection projects and the role of hydropower. These options should be investigated at a master planning scale with associated economics to allow valid comparison of alternative hydropower development pathways. The Energy and Power System Planner will need to clearly present the options to decision makers at participatory planning session.

Skills and Experience

- Relevant higher degree qualifications and over 10 years' experience in generation and power system planning with a detailed knowledge of energy and power system planning within interconnected grid systems containing substantial hydropower generation;
- Excellent knowledge of power system economics related to alternative energy options, preferably in the GMS region and specifically the alternative roles that hydropower can play within those systems;
- Skills in power system modelling, expansion, optimization, and simulation of alternative scenarios.
- Excellent communication abilities and skills in training and capacity building.

5.1.4 Strategic Environmental Assessment Specialist (43 wd)

The SEA specialist will draw on the Council Study and a range of related regional CIAs and EIAs to set up the process to assess the environmental and ecosystem services trade-offs between the alternative sustainable hydropower development pathways. In particular, they will work with MRCS specialists and the Council Study outputs to identify specific ecologically sensitive areas, or ecosystem services, affected by hydropower development (Major tributary and mainstream) that may be the focus of the SHDS2018 (i.e. prioritised risks and impacts arising from the Council Study). They may also draw on the methods included in related ISH studies as set out in Annex 1. In addition, a suitable method for evaluation of suggested alternative development pathways should be developed, preferably using the Council Study methods.

This approach should be closely aligned to the MRC's development of the *Strategy for basin-wide environmental management for prioritised environmental assets*¹¹ which may be completed in parallel with this study. The SEA specialist will work with the team to propose alternative development pathways that reduce impacts on the "*prioritised environmental assets and ecosystem services*" and the health of the basin ecosystems and biodiversity generally particularly in the transboundary context.

The SEA specialist will assist the Energy/Resource Economist in the valuation of the natural resource assets (e.g. fisheries) and be a major contributor to the presentation of alternative sustainable hydropower development pathways at the interactive planning workshops. They will be responsible for and related reporting.

Skills and Experience

- Relevant higher degree qualification (preferably PhD) and at least 15 years' experience in sustainable hydropower, environmental impact assessment theory and practice.
- Relevant experience in EIA, SEA, planning, and policy;
- Experience in producing SEAs of power development plans and projects in the Mekong region is an advantage.
- Experience in the Mekong including basin scale CIA assessments will be essential.
- Strong understanding of the DRIFT model and recent Council Study assessment an advantage.

¹¹ As set out in the MRC's Strategic Plan 2016-2020.

- Experience in facilitation of stakeholder meetings and basin scale transboundary dialogues
- Excellence communication skills as well as experience in training and capacity building.

5.1.5 Energy/Resource/Socio Economist (43 wd)

The Economist will bring specialist knowledge to analyse the integration of all costs and benefits from the assessment of the alternative sustainable hydropower development pathways including the valuation of energy options (with HP Engineer and Power System Planner). They will develop and communicate a methodology that is accepted by the member countries for the evaluation of trade-offs between food, water and energy in economic terms drawing in the agreed approach used in the Council Study and in other ISH studies. In particular the Council Study and ISH methods to determine energy security, food security, macro-economic factors, valuation of the fisheries *inter alia* should be considered.

Both monetary and non-monetary evaluation methods will be needed. The latter to be developed with the SEA specialist. In particular the findings of the Council Study, on food security and the reduction in the value of the basin's commercial fisheries, should be considered.

Clear communication materials to be developed based on these methods and evaluations for decision makers.

Deliver analysis and analytical frameworks of strategic pathways to stakeholders. Assist the Team Leader to deliver project outputs specific to the analytical framework (as required).

Skills and Experience

- Postgraduate degree (at least Masters Level) in energy/resource planning economics or appropriate related field.
- At least 15 years professional experience covering particularly economic and environmental assessment of water infrastructure.
- Experience in the Mekong Region (or similar environment) highly regarded and experience in economic analysis of power sector development.
- Substantial experience in the economic analysis of different power /water alternatives that includes the assessment of their full economic costs including the valuation of social and environmental costs and benefits.
- Familiarity with methods and assessments undertaken in the Council Study and other recent ISH initiatives a particular advantage;
- Proven communications skills and excellence in writing in English.

5.2 Summary of Resource Requirements

An initial estimate has been made for planning purposes of the Expert Months required for this assignment. The breakdown per output is shown below. These estimates will need to be confirmed by the Team in the Inception Phase of the project.

It should be noted that the team will have access to MRCS Experts who are familiar with certain aspects of the Council Study detailed analysis. They will be able to assist with interpretation and transfer of information.

Expert	Allocated Working Days
Team Leader/Sustainable Hydropower and IWRM Planning Expert	75 WDs 11 WDs
• Facilitator for Interactive Planning Workshop ¹²	
Hydropower Design/Operations Engineer	43 WDs
Energy and Power System Planning Specialist	43 WDs
Strategic Environmental Assessment Specialist	43 WDs
Energy/Resource Economist	43 WDs
TOTAL ALLOCATED WORKING DAYS	258 WDs

¹² See Section 5.1.1

6 Timeframe, Milestones and Deliverables

The study will be conducted over a 12-month period, with the following milestones:

Deliverable	Working Days (Estimate only)	Delivery Date
Output 1: Study scoping and planning, Methodology, Inception Report and Regional Workshop	56 wd	30 April 2018
<ul style="list-style-type: none"> Detail a methodology to cover the required SHDS2018 Outputs, provide an Inception Report. Develop a detailed work, milestones and resource plan for the execution of the study including timing of consultation with NMCs, line agencies, the development sector and hydropower operators. 		
<ul style="list-style-type: none"> Gather the available documentation on completed National Power Development Plans, Regional Interconnection, Council Study outputs and details, SEAs, CIAs and EIAs and related studies for planned and existing projects in the LMB. Assess the status of hydropower implementation in the basin; specifically, to understand the level of commitment for each project (Pre-feasibility, Feasibility, MOU, PDA, PPA, or Financial Close). Gather information on other basin initiatives that may be linked to the development of the SHDS (e.g. World Bank funded TA in Lao PDR, IFC proposal for CIA in the Se Kong sub-basin, past MRC/ISH initiatives etc.) Regional Consultation on the Inception Report 	1 day	Late April 2018
Output 3: Analysis and Evaluation and Discussion Paper #1	96 wd	30 June 2018
<ul style="list-style-type: none"> Discussion with the MRCS and National experts Develop proposals for alternative development pathways; strategic level analysis with appropriate tools; using past MRC studies; at a strategic level to allow discussion. Develop Discussion Paper #1 covering information gathered from the previous studies and the Consultants' further analysis; first version of the Development Pathways; analysis of the strategic cross sectoral opportunities. Prepare presentations for IPW #1 on trade-offs and the economic, social and environmental indicators will be presented. 	Propose 3+weeks in region for discussions and analysis with full team	May 2018
<ul style="list-style-type: none"> National Consultations #1 on the Approach, Evaluation Methods and initial Version #1 of will be conducted. (Facilitated by National Experts supported by Team Leader) 	1 day	mid June 2018

Deliverable	Working Days (Estimate only)	Delivery Date
Output 4: Interactive Participatory Workshop #1 (Regional)	27 wd	31 August 2018
<ul style="list-style-type: none"> • Facilitate a two day IPW#1 • Prepare IPW#1 notes and communication- including new pathways that may be analysed by the Consultant Team. 	In Region	mid August 2018
Output 5: Analysis and Evaluation and Discussion Paper #2	43 wd	30 Sept 2018
<ul style="list-style-type: none"> • Revised Strategic Analysis of Pathways • Prepare Discussion Paper #2 - information that would be needed for further dialogue at the Workshop#2. 	Propose 2+ weeks in the region for discussions and analysis	Aug/Sep 2018
Output 6: Interactive Participatory Workshop #2	18 wd	31 Oct 018
<ul style="list-style-type: none"> • Facilitate a two day IPW#2 • Prepare IPW#2 notes and communication- including new pathways that may be analysed by the Consultant Team. 	In Region	Oct 2018
Output 7: Updated Sustainable Hydropower Development strategy (SHDS2019) and Communication Documentation	17 wd	31 Dec 2018
<ul style="list-style-type: none"> • The final SHDS2019 document should summarise the alternative development pathway preferences and the process followed. <ul style="list-style-type: none"> ○ SHDS Volume 1: Summary for Decision Makers: ○ SHDS Volume 2: Technical Report 		
Est Total	258 wd	

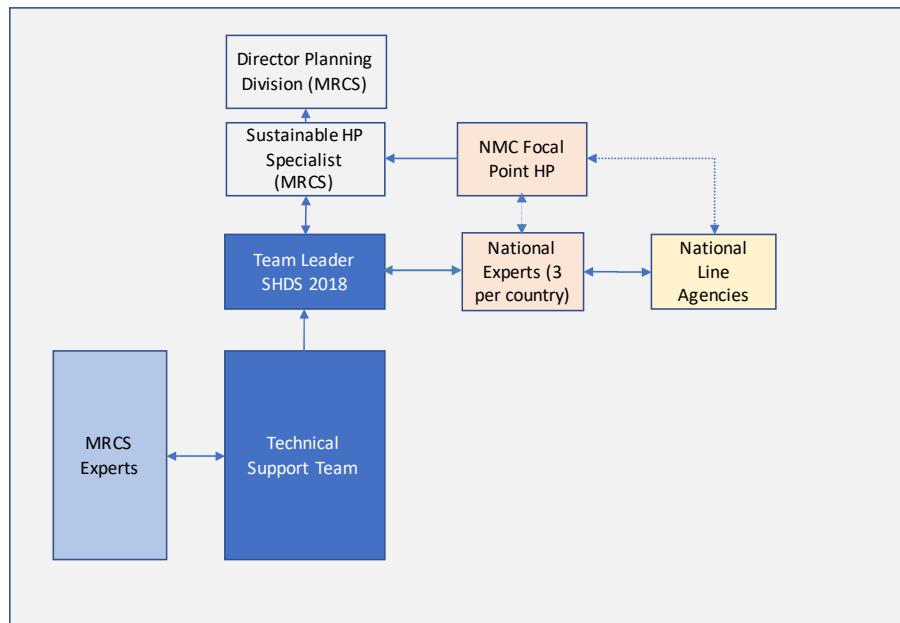
7 Working Arrangements

7.1 Reporting and Communication

The consultant team will report to Director of Planning Division through Sustainable Hydropower Specialist.

Communication with the MRC will as shown in the Figure 3 below.

Figure 3: Organisation and Communication Chart



7.2 Work Station

The Consultant will generally be home based, with travel to the MRCS and regional locations the MRC's member countries as required for consultations.

7.3 Intellectual property rights:

Intellectual property rights - IPR: Information, data, database, knowledge resources in the forms of briefings, reports, proceedings, articles, essays, etc. issued by and for the MRCS will be the MRCS property. Any utility, announcement and disclosure that are without MRCS highest levels of authority' permission is considered illegal and will be charged by relevant local and international legal procedures.

7.4 English competency:

All team members will require excellent English skills are required for the work with a TOEIC score >600 required except for those who have PhD from English Native Speaking countries.

7.5 Other requirements:

A work plan setting out monthly activities will be submitted with the inception report.

ANNEX 1: Hydropower Development and the MRC

Existing hydropower schemes as well as their future development take an important role in water resources management in the Lower Mekong River Basin (LMB) in relation to (i) the Mekong mainstream and (ii) its tributaries.

The Mekong River Commission (MRC) recognises the high potential of hydropower development for economic and financial returns through meeting electricity demand and generating revenues. The possibility of significant pressures and impacts on connected ecosystems as well as LMB livelihoods are also fully acknowledged.

The sustainable development and management of hydropower in synergy with the environment and livelihoods are crucial within the MRC cooperation framework.

Therefore, the LMB countries and the Mekong River Commission Secretariat via its Initiative for Sustainable Hydropower (ISH) are currently undertaking work that should enable this future sustainability based on complete and consolidated knowledge.

The MRC cooperation is firmly based on the 1995 Agreement and during the last years the MRC developed an applied framework to address the issue of hydropower development in a holistic way. The following describes this framework to set the scene for the performance of the content of these Terms of Reference.

1995 Mekong Agreement and the MRC Procedures

The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin signed by Cambodia, Lao PDR, Thailand and Viet Nam on 5 April 1995 defines a set of principles and processes for pursuing a coherent strategy of integrated water resources management (IWRM) on the regional scale.

The 1995 Mekong Agreement encourages cooperation amongst the LMB countries to optimise the multiple use and mutual benefits of all riparians while protecting the environmental and ecological balance in the basin.

The 1995 Agreement addresses different types of water use including proposed hydropower developments. In the latter respect, the following key chapters and articles are important:

- Chapter II: Definitions of Terms
- Article 1: Areas of cooperation
- Article 3: Protection of the Environment and Ecological Balance
- Article 4: Sovereign Equality and Territorial Integrity
- Article 5: Reasonable and Equitable Utilization
- Article 6: Maintenance of Flows on the mainstream
- Article 7: Prevention and Cessation of Damages of Harmful Effects
- Article 8: State Responsibility for Damages
- Article 9: Freedom of Navigation
- Article 10: Emergency Situations
- Article 26: Rules for Water Utilization and Inter-Basin Diversions
- Chapter V: Addressing Differences and Disputes

Article 1 of the Agreement expresses the intention of the four states to cooperate in all fields of sustainable development, utilisation, management and conservation of water and related resources of the Mekong river basin, including: irrigation, hydropower, navigation, flood control, fisheries, timber floating, recreation and tourism.

The article also states that activities should be carried out in a manner that optimises multiple-use and mutual benefits, and minimises harmful effects.

The latter is reinforced in **Article 3** which speaks of protection of the environment and ecological balance.

Article 2 emphasises joint and/or basin-wide development projects and basin programmes through the formulation of a Basin Development Plan which would be used to identify, categorise and prioritise the projects and programmes to seek assistance for and to implement at the Basin level.

Article 5 provides for the reasonable and equitable use of the waters of the river system with reference to rules for water utilisation to be prepared.

The Mekong River Commission (MRC) with its three bodies (Council, Joint Committee and Mekong River Commission Secretariat) serves as an international organization to ensure the implementation of the 1995 Mekong Agreement through its provisions and to adopt Procedures to facilitate addressing such issues in a cooperative and amicable manner.

The five adopted Procedures for implementation within the MRC framework are the (i) Procedures for Notification, Prior Consultation and Agreement (PNPCA; approved in 2003), (ii) Procedures for Data and Information Exchange and Sharing (PDIES; approved in 2001), (iii) Procedures for Water Use Monitoring (PWUM approved in 2003), (iv) Procedures for Maintenance Flows on the Mainstream (PMFM approved in 2006) and (v) Procedures for Water Quality (PWQ approved in 2011).

MRC Basin Plans and Initiative for Sustainable Hydropower (ISH) (Period 2001 to 2015)

The formulation and implementation of the Initiative for Sustainable Hydropower (ISH) was a key strategic intervention by the MRC toward fulfilment of the MRC role in the hydropower sector. ISH further advanced and implemented many of the strategies proposed in the HDS2001.

The range of reports and outputs that are relevant to this Strategy can be found on the [MRC website here](#).

The MRC has embedded this knowledge in the Basin Development Plan 2011 to 2015 (BDP2) and associated Scenario Analysis to understand the integrated costs and benefits of multi sector development in the Mekong Basin.

Key MRC Documents in Relation to Hydropower

Over the past years, the MRC has developed or commissioned key reports (see list below), which address issues related to hydropower dams in the LMB and provide a framework of basin-wide analysis, including transboundary and cumulative effects, within which individual projects can be considered:

- **IWRM-based Basin Development Strategy and its scenario and sector assessment** prepared by the Basin Development Plan Programme and approved by the MRC Council at its 17th Meeting on 26 January 2011²;

- ***Strategic Environmental Assessment of Hydropower on the Mekong Mainstream***¹³ (SEAMM) commissioned by MRC and completed on 15 October 2010 as part of an open 14-month process involving the National Mekong Committees and MRC stakeholders;
- ***Prior Consultation Project Review***¹⁴ of the MRC Secretariat that supported the LMB countries during the first ever implementation of the PNPCA during 2010/2011.
- ***Preliminary Design Guidance for Proposed Mainstream Dams*** in the Lower Mekong Basin (PDG) endorsed by the JC in 2009¹⁵, which has been developed by MRC Programmes in a process coordinated by the Initiative on Sustainable Hydropower consulting with a Technical Working Group of Member Countries;
- ***The MRC Council Study (Study on the Sustainable Management and Development of the Mekong River including Impacts of Hydropower Projects (MRC, 2017, in progress))*** is investigating the integrated cumulative impacts of all development in the Mekong Basin to be completed in 2017. The outputs of this study will be an important input to the SHDS2018.
- Other related material has been elaborated within the MRC framework including assessments of good-practice standards related to the five PDG topics (fish passage, navigation locks, sediment management, water quality and environmental flows and dam safety) and other topics relevant to Integrated Water Resources Management practice and sustainable hydropower.

The MRC Hydropower Strategy 2001

The Hydropower Development Strategy 2001 defined three strategy areas for the MRC to work on being:

Strategic Area 1: Consideration of Integrated Water Use, Environmental and Socio-economic Factors:

Strategic Area 2: Efficient Hydropower Generation and Distribution Mechanisms

Strategic Area 3: Information System and Capacity Building

The results emerged in the form of a variety of Studies, Guidelines and Tools which were used to provide guidance for MRC involvement in hydropower activities in the Basin including the provision of inputs for the Basin Development Plan (BDP). In addition, these principles guided the work of the MRC Core Programmes on Water Utilisation (WUP) and the Environment (ENP), as well as the relevant Sector Programmes such as the Fisheries Programme (FIP), the Agriculture, Irrigation, and Forestry Programme (AFP), the Navigation Programme, etc..

The Sustainable Hydropower Strategy and MRC Key Result Areas

For the five years 2016-2020, the MRC will focus its work in delivering outcomes under four key result areas. These represent concrete and highly focused priority areas that MRC seeks to influence to advance its mission and role as a regional river basin organization in the Mekong.

¹³Mekong River Commission (2011): Strategic Environmental Assessment of Hydropower on the Mekong Mainstream (www.mrcmekong.org/ish/sea.htm)

¹⁴ Mekong River Commission Secretariat (2011): Prior Consultation Project Review Report.

¹⁵ Mekong River Commission (2011): Preliminary Design Guidance for Proposed Mainstream Dams (www.mrcmekong.org/download/free_download/Preliminary-DG-of-LMB-Mainstream-dams-FinalVersion-Sept09.pdf)

Key Result Areas and their outcomes

I. Enhancement of national plans, projects and resources from basin-wide perspectives
II. Strengthening of regional cooperation
III. Better monitoring and communication of the Basin conditions
IV. Leaner River Basin Organisation

The “Key Result Area 1(KRA1)” (Enhancement of national plans, projects and resources from basin-wide perspectives) relates to the role that MRC plays in informing the development of plans and projects by Member Countries that affect, directly or indirectly in a positive or adverse manner, the management of the basin. Under KRA1, three strategic outcomes for the period of this plan are targeted:

Outcome 1: Increased common understanding and application of evidence-based knowledge by policy makers and project planners

Outcome 2: Environment management and sustainable water resources development optimized for basin-wide benefits by national sector planning agencies

Outcome 3: Guidance for the development and management of water and related projects and resources shared and applied by national planning and implementing agencies

7.6 Hydropower in the Strategic Plan 2016-2020

The BDS and SP underline the rising sense of urgency among stakeholders for **the need to move basin development towards more “optimal” and sustainable outcomes that can address long-term needs**, including environmental protection as well as ensuring water, food and energy security.

The Strategic Plan 2016-2020 with its basin wide perspective has provided, in the Annex A for the Output 2.1, some thoughts on the nature of the Basin-wide strategy for sustainable hydropower development:

- i. *‘Energy from hydropower projects plays an important role in each of the LMB country’s energy supply mix and also contributes to the growing regional inter-dependency from cross-border energy trading.*
- ii. *At the same time, the reservoir storage provided by these projects helps to regulate mainstream flows from the wet to the dry season, opening up opportunities for increased dry season abstractions and potentially for flood control. However, hydropower development has adverse transboundary impacts as well, e.g. on capture fish migration, rural livelihoods and sediment movement.*
- iii. *From a basin wide perspective, national plans are sub-optimal as they do not take into account opportunities to enhance benefits beyond national borders and minimise adverse transboundary impacts. According to MRC and other assessments, the location, number and size of mainstream and tributary hydropower have differing impacts across the basin.*
- iv. *Taking into account regional energy needs (GMS and ASEAN integration agenda), national economic development priorities, comparative national advantages in hydropower development, the development of storage for flood and drought management, and the preservation of key environmental assets for economic, social and environmental purposes, a basin-wide strategy is needed to address the difficult trade-offs and to design more optimal and sustainable hydropower development pathways. The basin-wide strategy will support improvement of national sector planning and contributes to the overall Basin Development Strategy’.*

APPENDIX 2: SHDS 2018 - Analysis framework:

RSAT Topics	Particular Basin-Scale and Trans-boundary concerns requiring special attention	Suggested MRC Tools, Guidelines, Methods, References etc.
Topic 1: Institutional Capacity	<p>Engage LMB governance mechanisms and transboundary cooperation using MA95 Articles and Procedures to form the basis for dialogue on SHDS</p> <p>Representation and engagement of national energy and water agencies in SHDS development.</p> <p>Reference to National sustainable development policy, standards and frameworks</p> <p>Consider requirements for Basin Governance in the hydropower sector.</p>	ISH02 ¹⁶ PNPCA, PDIES, PMFM, PWQ
Topic 2: Option assessment, siting and design	<p>Assess options for water services and energy supply, ensure demonstrated needs against national and regional supply/demand</p> <p>Siting selection, maximise energy production, minimisation of impacts; Multi-criteria options assessment; Risk Avoidance and mitigation measures</p> <p>Planning and coordination for effective operation of mainstream and tributary cascades; Implementation and operation of navigation locks;</p>	ISH01 ¹⁷ ISH02 ISH0306 ¹⁸

¹⁶ Guidelines for the Evaluation of Multipurpose Hydropower Project Portfolios (MRC, 2015)

¹⁷ Identification of Ecologically Sensitive Sub-basins for Sustainable Development of Hydropower on Mekong Tributaries (MRC, 2015)

¹⁸ Guidelines for Hydropower Environmental Impact Mitigation and Risk Management in the Lower Mekong Mainstream and Tributaries (MRC, 2017 in progress)

RSAT Topics	Particular Basin-Scale and Trans-boundary concerns requiring special attention	Suggested MRC Tools, Guidelines, Methods, References etc.
Topic 3: Economic contribution of hydropower	<p>True least net economic cost planning to maximise social and economic value; facilitated through regional integration of energy markets and electricity power transmission plans. System efficiency (national and regional); long term economic benefit from Power Development Plan, considering a realistic power production assessment,</p> <p>Optimisation use of hydropower in the power system to maximize its value (e.g. to support other renewables, integration between storage and run-of-river schemes).</p> <p>Regional macroeconomic assessment, SEA and Tb Economics benefits as well as Options for "Joint Action/Projects", etc.</p>	ISH02 Alignment with GMS and ASEAN integration ¹⁹ MRC Council study ²⁰
Topic 4: Equitable sharing of hydropower costs and benefits	Explore Potential for Joint Action/Project - mutual trans-boundary benefits Planning GMS and ASEAN interconnection, electricity power trading, etc. Exploration of Carbon finance, etc.	ISH02 Concept of Benefit Sharing as promoted by MRC/BDP ²¹
Topic 5: Social issues and stakeholder consultation	Broad Stakeholder Consultation and examination of past Stakeholder Consultation reports Baseline demographics, poverty, gender, ethnic matters – basin scale Food Security: multiple purpose dams, project selection and implementation that minimizes disruption to local communities, preservation of fisheries. Social risk assessment at basin scale, etc.	ISH02, SEA ²² , SIMVA ²³ , BDP ²⁴ Compare with BDP Scenario, GMS assessments Council Study MRC Fisheries Management Strategy

¹⁹ Ensuring Sustainability of GMS Power Development (ICEM, 2013)

²⁰ Study on the Sustainable Management and Development of the Mekong River including Impacts of Hydropower Projects (MRC, 2017, in progress)

²¹ Benefit Sharing Options for Hydropower on Mekong Tributaries, Regional Synthesis Paper; MRC, January 2014.

²² Strategic Environmental Assessment of Hydropower on the Mekong Mainstream (ICEM, 2011)

²³ Social Impact Monitoring and Vulnerability Assessment (MRC, 2014)

²⁴ Basin Development Plan (MRC, 2010); Assessment of Basin-wide Development Scenarios (MRC, 2011)

RSAT Topics	Particular Basin-Scale and Trans-boundary concerns requiring special attention	Suggested MRC Tools, Guidelines, Methods, References etc.
Topic 6: Environmental management and ecosystem integrity	Retention of “Intact River sub-Basins” Avoidance for Ecology sensitive areas and environmental Hot Spots Option to maximize multi-purpose use of HP Reservoirs - wetlands	ISH01, ISH02 ISH0306 MRC Environment Strategy
Topic 7: Flows and reservoir management	Optimization for the use of HP capacity and storage in basin and cascade; Design and operations both locally and at a basin scale to include the possibility to regulate flows from the wet to the dry season, opening up opportunities for increased dry season abstractions and potentially for flood control. Address climate change, water poverty challenges in the basin. (e.g. through provision of adequate information on potential effect of CC on HP and ways HP can help to mitigate CC) Environmental flows in cascades.	ISH01, ISH02 ISH0306 MRC Climate Change Reports
Topic 8: Erosion, sediment transport and geomorphological impacts	Planning to mitigate risks related to sediment trapping at basin scale; Design for sediment transmission Nutrients Transmission	ISH11 ²⁵ ISH0306 MRC Environment Strategy
Topic 9: Management of fisheries resources	Basin scale river fishery resources through baseline monitoring surveys, Cumulative impact assessment and mitigation both upstream and downstream fisheries, Consider changes in flows, water levels and water quality, fish biodiversity and threatened species, etc.	ISH11 ISH0306 MRC Fisheries Strategy
Topic 10:	Basin Scale Standards, risk assessment, monitoring;	ISH0306

²⁵ Improved Socio-economic and Environmental Information for Hydropower Planning (MRC 2012)

RSAT Topics	Particular Basin-Scale and Trans-boundary concerns requiring special attention	Suggested MRC Tools, Guidelines, Methods, References etc.
Dam and Community Safety	<p>Regional seismic and flood standards - investigations</p> <p>Address cascade operations, dam safety, Community safety and emergency response at a basin scale</p> <p>Transboundary warning systems, collaboration on flushing etc.</p>	National Standards