

DON SAHONG MODIFICATION HYDROPOWER PROJECT

EXECUTIVE SUMMARY

AMENDMENT

OF

THE ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

Prepared by Mekong Environmental Consulting Co.

Ltd

for

Don Sahong Power Company Ltd.

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Abbreviations and Acronyms

asl	above sea level
DAFO	District Agriculture and Forestry Office of the GoL
DLF	Department of Livestock and Fisheries
DSFMC	Don Sahong Fisheries Management Committee; the organisation charged with implementing the <i>Fisheries Law 2009</i> in the Don Sahong project area; it comprises provincial and district representatives of the responsible government agencies, as well as village-level and village group representatives, with some funding support provided by DSPC.
DSFMP	Don Sahong Fisheries Management Plan
DSHP	Don Sahong Hydropower Project
DSPC	Don Sahong Power Company Ltd
EdC	Electricite du Cambodge
EIA	Environmental Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
ESMMP-CP	Environmental and Social Management and Monitoring Plan for the Construction Phase
ESMMP-OP	Environmental and Social Management and Monitoring Plan for the Operational Phase
FishMAP	Fisheries Monitoring and Action Plan (of the DSPC)
FCZ	Fish Conservation Zone, an area where fish and habitat are protected
GOL	Government of Lao PDR
Lao PDR	Lao People's Democratic Republic (Laos)
LAK	Lao Kip
LARReC	Living Aquatic Resources Research Centre
MONRE	Ministry of Natural Resources and Environment of Lao PDR
MRC	Mekong River Commission
NGO	Non-Governmental Organisation
NTFPs	Non-Timber Forest Products
PAFO	Provincial Agriculture and Forestry Office of the GoL
PNPCA	Procedures for Prior Notification, Consultation and Agreement of the MRC
SSESMMP	Site Specific Environmental and Social Management and Monitoring Plan

Glossary of some Lao words

<i>Ban</i>	Village
<i>Don</i>	Island
<i>Hang</i>	The tail or downstream tip of an island, often part of a village name, e.g. <i>Ban Hang Sadam</i> or Hang Sadam Village
<i>Hou</i>	A river or stream channel
<i>Hua</i>	The head, or upstream tip of an island, often part of a village name, e.g. <i>Ban Hua Sadam</i> or Hua Sadam Village
<i>Jib</i>	A trawl net which is set to hang stationary in the current of a river or stream
<i>Khone</i>	A place with one or more waterfalls
<i>Lee</i>	An 'inclined plane' fish trap

Luang khang A fishing gear with one or more fences that direct fish into a large box-shaped funnel trap

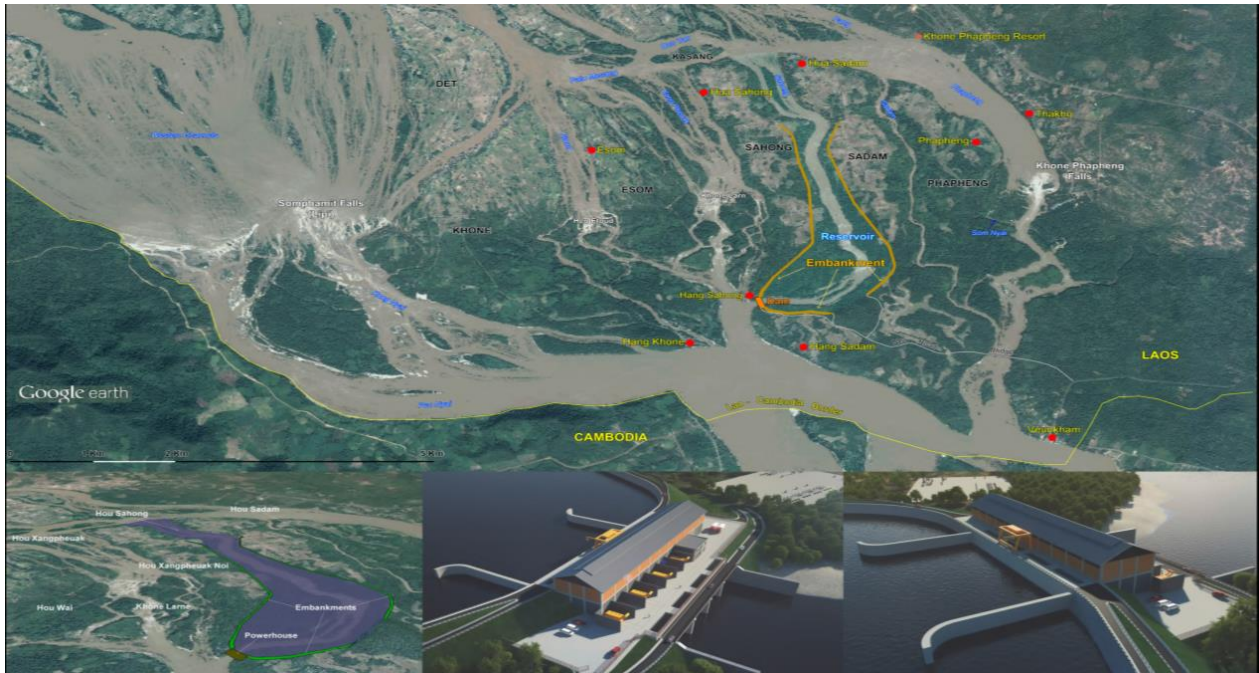
Siphandon Four thousand islands, a 45-km reach where the Mekong River splits and flows through several anabranches in southern Lao PDR. Khone Falls is in the downstream section of Siphandon.

1 INTRODUCTION

1.1 BACKGROUND

The Don Sahong Hydropower Project (DSHPP or “the project”) is a run-of-river project located on Hou Sahong – a channel between the islands of Don Sadam and Don Sahong in the Siphandone (four thousand islands) area of the Mekong River in Khong District, Champassak Province, Lao PDR, just above the border between Lao PDR and Cambodia (see **Figure 1-1**).

FIGURE 1-1 SATELLITE IMAGE SHOWING THE LOCATION OF THE DON SAHONG HYDROPOWER PROJECT



The area where the Project is located encompasses a series of low waterfalls or cascades known as the Khone Falls where the Mekong River crosses the Great Fault Line of southern Lao PDR and splits and flows through several anabranches, creating numerous islands in a 14 km wide wetland complex.

The project was constructed from 2015 to 2019 by the Don Sahong Power Company (DSPC) and started commercial operations officially in October 2020. The project comprises a 25 m high concrete barrage across the mouth of Hou Sahong and a powerhouse with 4 bulb turbine and generator units with a combined installed capacity of 260 Megawatt (MW).

Considering the recent increasing power demand from Cambodia and the necessity of having a spare or back-up unit, the Don Sahong Power Company has studied and found that it would be technically, financially and environmentally feasible to add one more 65 MW bulb turbine and generator unit to the project, and the Company has completed and submitted the required feasibility study together with this Amendment to the original EIA and ESMMP to the Government of Lao PDR for approval.

1.2 OBJECTIVES AND SCOPE OF THE ESIA AND ESMMP AMENDMENT

The original ESIA and Environmental and Social Management and Monitoring Plan (ESMMP) for the DSHPP were reviewed and approved by MONRE on 18 April 2012 and DSPC prepared and submitted a detailed ESMMP for the construction phase (ESMMP-CP) to MONRE on 29 January 2016. MONRE approved the ESMMP-CP on 07 March 2016.

The ESMMP-CP of January 2016 will remain the governing management plan for construction works and the ESMMP for the operational phase (ESMMP-OP) of June 2019 will remain the governing management plan for the operational phase.

The ESMMP Amendment supplements the ESMMP-CP and ESMMP-OP with respect to the planned modification works and includes detailed subplans providing specific mitigation and monitoring measures for the environmental and social impacts associated with the modification project. The subplans in the Amendment shall be read, understood and implemented together with the relevant subplans in the ESMMP-CP / ESMMP-OP, and shall prevail in case of any inconsistencies.

The amendments to the original ESIA and ESMMP have been prepared by the Mekong Environmental Consulting Company Ltd for the DSPC.

The Amendments have been prepared in three separate standalone documents (including this Executive Summary) as requested by the Ministry of Natural Resources and Environment.

The Amendments are based on the final Feasibility Study approved by the Ministry of Energy and Mines on 24 March 2020, and they have been prepared in accordance with the Terms of Reference as approved by the Ministry of Natural Resources and Environment on 06 May 2022.

The objectives of the amendments are:

- to identify and assess environmental and social impacts associated with the proposed modification of the Don Sahong Hydropower Project, and
- to develop mitigation and monitoring measures that prevent or otherwise minimize the impacts to an acceptable level.

The Amendments of the ESIA and ESMMP is supplementary to the original ESIA and ESMMP and the Amendments shall be read, understood and implemented together with the original ESMMP (ESMMP-CP, 2016 and ESMMP-OP, 2019). The supplementary ESMMP subplans in the Amendment will prevail.

In addition to the Amendments of the original ESIA and ESMMP, DSPC commissioned a Health Impact Assessment as requested by the Ministry of Health. The Health Impact Assessment was carried out by Company Tayhounghuangit Health Impact Assessment Sole Co. Ltd. and the final report was issued on 18 January 2022. The Ministry of Health, Department of Hygiene and Health Promotion has issued a certificate No. 107/DHHP dated 18 January 2022 endorsing the Health Impact Assessment. The Health Impact Assessment includes a 5-Year Public Health Management and Monitoring Action Plan and as stipulated in the Certificate, as part of the 5-Year Public Health Management and Monitoring Action Plan, DSPC will:

- carry out health checks of project affected communities, project employees and workers
- be responsible for treatment and rehabilitation of project workers suffering occupational injuries.
- Appoint a public health to coordinate coordinator to coordinate and collaborate with the public health agency at central, provincial and district levels in implementing the public health management and monitoring action plan
- fully and accurately implement all health mitigation measures identified in the health impact assessment report, including the public health management and monitoring action plan.
- be responsible for mitigation of unforeseen health effects caused by the project.

- be responsible for and verify all information set out in the health impact assessment report, as well as collecting basic community and individual health information.
- provide adequate annual budgets in accordance with the 5-Year Public Health Management and Monitoring Action Plan (2022 – 2026) to the Ministry of Health, the Champasack Provincial Health Department and the Khong District Health Office.
- Inform the District Health Office within 24 hours in case of serious injuries or death.

1.3 OVERALL TIMETABLE FOR THE MODIFICATION PROJECT

The timetable for the completion of the modification project is depicted in **Table 1-1**. This is an ambitious yet realistic timeframe, subject to meeting key milestones in the course of the project construction.

The EPC contract is planned to be awarded in time for the construction work to start in the beginning of the dry season and the construction will be completed within 30 months.

TABLE 1-1 OVERALL TIMETABLE FOR THE DEVELOPMENT AND CONSTRUCTION OF THE MODIFICATION PROJECT

Activity	Q4 Year 1	Q1 Year 2	Q2 Year 2	Q3 Year 2	Q4 Year 2	Q1 Year 3	Q2 Year 3	Q3 Year 3	Q4 Year 3	Q1 Year 4
Construction Works										
• Excavation										
• Embankments and Powerhouse										
• Hydro- and Electromechanical										
Testing and Commissioning										

1.4 PRESENTATION OF THE ESIA CONSULTANT – AUTHORS OF THE AMENDMENT

Mekong Environmental Consulting Company Ltd. or MEC is a newly established Lao company certified by the Ministry of Natural Resources and Environment to undertake environmental and social impact assessment.

The principal author of the Amendment is Mr Peter Gammelgaard JENSEN, and Mr Kent G. HORTLE has authored the sections on Khone Falls aquatic environment and mitigation of impacts on fish migration.

Mr Jensen has more than 30 years of experience as environmental consultant and project manager including 25 years as Chief Technical Adviser for the International consulting company SWECO (1989-2015), and 4 years as Senior Environmental Specialist for the Nam Ngiep 1 Power Company in Lao PDR responsible for overseeing and supervising compliance with the project's environmental and social obligations, preparation of the project's construction phase and operation phase ESMMP. Over the past three years, Mr Jensen has developed EIA guidelines for MONRE (hydropower, mining and road projects) and he has prepared environmental impact assessments for 5 landfills and 6 wastewater treatment plants in Cambodia. Mr Jensen has recently drafted the Resettlement Action Plan for the Deedoke Hydropower Project in Myanmar and he is currently advising Electricity Vietnam (EVN) on environmental and social management in relation to the expansion of the Hoa Binh Hydropower Project – the second largest hydropower plant in Vietnam.

Mr HORTLE has more than 30 years of experience in fisheries and environmental science, and has worked mainly in the Mekong region since 2001, including as Chief Technical Adviser for the MRC Assessment of Mekong Fisheries Project (2001-2005) and for the MRC Fisheries Program (2009-2011). His other recent clients include WorldFish Cambodia, the Challenge Programme on Water and Food, National Heritage Institute, the Asian Development Bank, and Wetland Research & Management. Since 2013 he has been advising and reporting for DSPC on their fisheries monitoring and mitigation programs for the DSHPP.

Hydraulic engineers and hydrodynamic modelling experts of Powerchina Kunming Engineering Corp. Ltd. and Shanghai Estuarine and Coastal Science Research Centre provided the hydraulic modelling data and predictions for the modification project.

2 LEGAL FRAMEWORK

The Lao laws and regulations issued since the original ESIA Report was approved and which are relevant to the Modification Project include:

- Electricity Law No. 19/NA dated 09 May 2017
- The Water and Water Resources Law No. 23/NA dated 11 May 2017
- Decree on National Environmental Standards, No. 81/GOL dated 02 February 2017
- Decree on Environmental Impact Assessment, No. 21/GOL dated 31 January 2019
- The Labour Law No. 43/NA, dated 24-Dec-2013

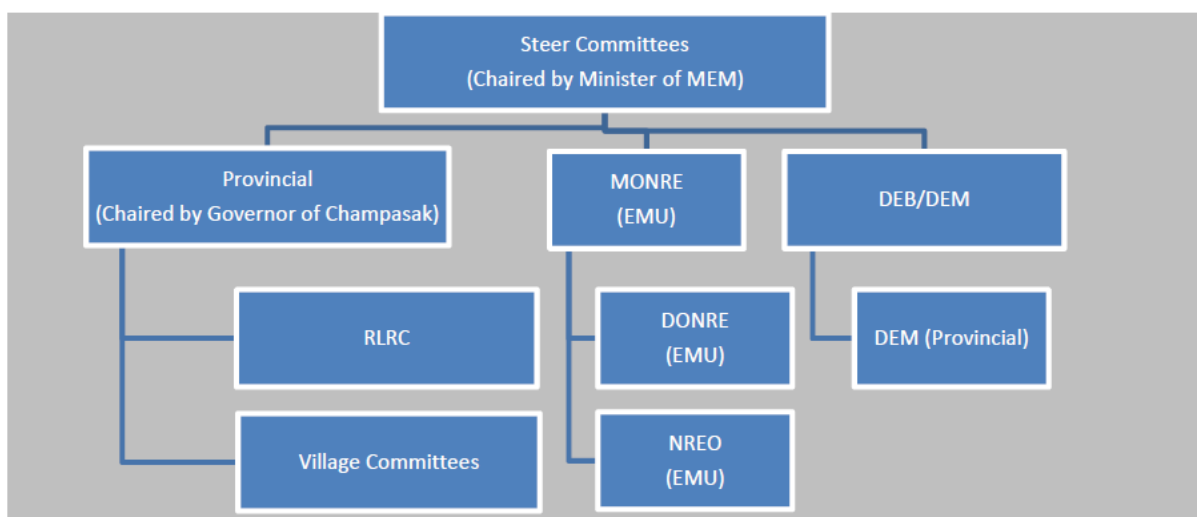
3 INSTITUTIONAL ARRANGEMENTS

DSPC will continue to provide sufficient resources (financial, equipment, organizational, engineering, environmental and social management) for the effective implementation of all mitigation and monitoring measures determined in the ESMMP-CP, ESMMP-OP and in the supplementary Subplans of the ESMMP for the Modification Project.

3.1 GOVERNMENT LEVEL

The overall institutional arrangements at the Government level for the Don Sahong Hydropower Project are illustrated in **Figure 3-1**.

FIGURE 3-1 OVERALL GOVERNMENT LEVEL INSTITUTIONAL ARRANGEMENTS FOR DON SAHONG HYDROPOWER PROJECT



The institutional arrangements are based on the Concession Agreement and reflect the roles and responsibilities of the involved GOL ministries and departments.

The Joint Steering Committee comprises representatives of the Company, the GOL and concerned ministries and agencies of the Lao PDR having administrative jurisdiction over the Project, to oversee, coordinate and collaborate on all matters in connection with the Project.

The Ministry of Energy and Mines (MEM) is the implementing agency exercising the GOL's rights and performing the GOL's obligations under the Concession Agreement. The Resettlement and Livelihood Restoration Committee (RLRC) established for the Project, is the GOL body with overall responsibility for supervising and ensuring the correct and timely implementation of the Company's obligations relating to compensation, resettlement and livelihood restoration under the Concession Agreement.

DSPC is responsible for the operating budgets and costs of the RLRC, RMU and village committees

The Ministry of Natural Resources and Environment (MONRE) is the environmental oversight body responsible for ensuring compliance by the Company with its obligations relating to environmental and social issues. MONRE conducts its monitoring and inspection roles through Environmental Management Units (EMUs) at central, provincial and district level.

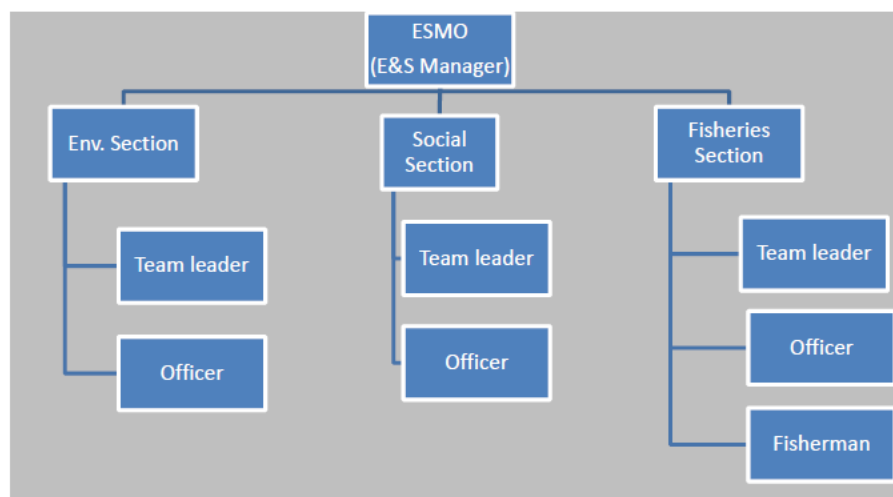
The Don Sahong Fisheries Management Committee (DSFMC) has been established and is responsible for fisheries planning and management in the Project area.

3.2 DON SAHONG POWER COMPANY LEVEL

DSCP has established an Environmental and Social Management Office (ESMO) to manage all environmental and social matters. The organizational structure of the ESMO is presented in **Figure 3-2**.

The ESMO is the focal point for all environmental and social matters of the project, and it is responsible for the effective implementation of all environmental and social obligations of the Project.

FIGURE 3-2 ORGANIZATIONAL STRUCTURE OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT OFFICE (ESMO)



4 DESCRIPTION OF THE MODIFICATION PROJECT

4.1 MODIFICATION PROJECT COMPONENTS

A full description of the Modification Project and the associated potential social and environmental impacts are presented in the separate ESIA Amendment of August 2022.

The planned modification of the Don Sahong Hydropower Project entails installation of a fifth bulb turbine and generator unit with an installed capacity of 65 MW and a design flow of 400 m³/s. The total design flow after the modifications would be 5 x 400 m³/s = 2000 m³/s.

With the modification, the total installed capacity of the project will be 325 MW (5 x 65 MW) and the average annual energy generation will increase by 234 GWh.

The 5th turbine and generator unit will be installed in a powerhouse annex to be built at the right abutment next to the existing powerhouse. The switchyard will also be extended.

Two new concrete gravity embankments connected to the existing embankment will be constructed forming a headrace channel. The embankment on the left side will be 94 m long and the embankment on the right side will be 65 m long. The maximum height of the embankments is 25.9 m.

The modification project will utilise the existing 230-kV transmission line for dispatching the energy.

The location of the main components of the existing project is indicated in **Figure 4-1**, and the location of the new powerhouse in the modification project is shown in **Figure 4-2**.

FIGURE 4-1 MAIN PROJECT COMPONENTS

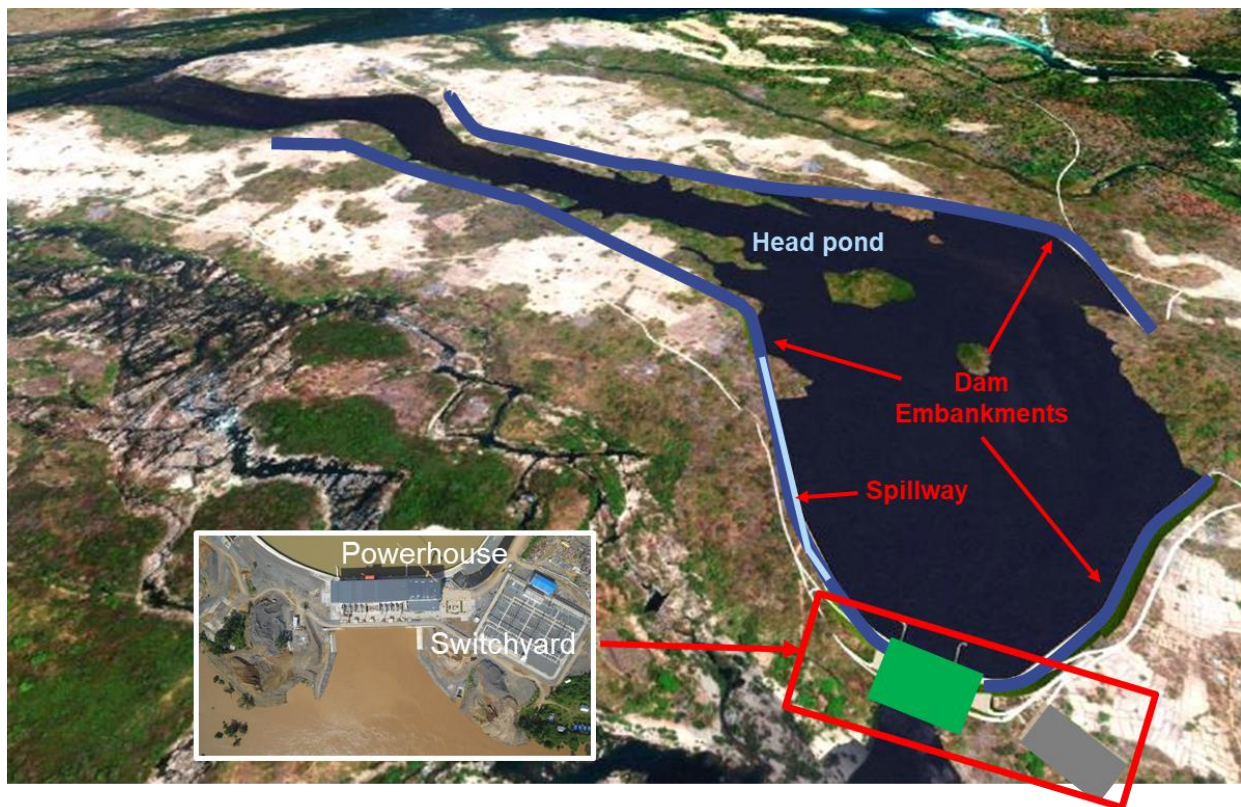


FIGURE 4-2 APPROXIMATE LOCATION OF THE MODIFICATION PROJECT



The construction of the modifications to the project has three main components:

1. Establishment and operation of a concrete batching plant and aggregate crushing plant
2. Construction of a powerhouse annex with left and right-side embankments enclosing the headrace, and installation of a 65 MW bulb turbine and generator unit
3. Modification of the switchyard

The construction is planned to be completed within 30 months.

In terms of project operations, the modification project will utilise available upstream flows diverting additional water into Hou Sahong for power generation. Compared to the existing project, the modification project will affect the flows in the Hou Sahong, Hou Sadam and Hou Phapheng and to a lesser extent possibly also Hou Xang Pheuk, however, only in the wet season, when all 5 turbines are in operation.

Comprehensive hydraulic modelling indicates that in the wet season, when the flow in Mekong River at Pakse increases above 7,000 m³/s there will be sufficient water available for generation of power from all 5 turbines while at the same time complying with the minimum flow requirements.

With all 5 units in full operation, the powerhouse discharge will increase above the original design flow of 1,600 m³/s to a maximum of 2,000 m³/s and the flow in Hou Phapheng will be 400 m³/s lower than the flow with the existing 4 units in operation. The hydraulic modelling indicates that in the wet season when all 5 units are in operation, the reduced flow in Hou Phapheng would lower the water level at Thakho Village with ~ 0.4 m compared to full operation of the existing project (4 units), and the water level would be ~ 1.2 m lower compared to the baseline prior to DSHPP.

Considering that the natural daily variations in flows during the wet season are rather significant and that the average depth of the channel is about 6 m, the additional decrease in water level is assessed not to have any significant impact on navigation or any other use of the water; however, inspections will be carried out to detect any unanticipated impacts.

5 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

The potential environmental and social risks and impacts associated with the construction and operation of the modification project are summarized in **Table 5-1** and **Table 5-2** respectively.

For all the identified environmental aspects, the risks and impacts are well-known and generally of moderate significance. With proper management and mitigation as outlined in the relevant Environmental and Social Management and Monitoring Subplans and as demonstrated during the course of the construction phase for the existing project, these risks and impacts can be managed and mitigated to an acceptable level in compliance with DSPC's compliance obligations.

The main potential impacts during the construction period include:

- Generation of noise and dust from powerhouse excavation (incl. limited control blasting), aggregate crushing, concrete batching and heavy vehicle movement,
- Generation of sediment-laden surface water runoff and effluents with elevated pH, and
- Increased traffic.

The potential construction phase environmental and social impacts are transient and localized and will be mitigated through strict implementation of well-proven engineering measures and close inspection and monitoring to document compliance with applicable standards and identify any unanticipated impacts.

In the operational phase of the Project, full compliance with the minimum flow requirements for Hou Phapheng (800 m³/s) and for Hou Sadam (10 m³/s) will be ensured through operation of 5 automatic gauging stations in the project area and one station at Pakse. The stations will provide real-time flow data and enable the dam operators to ensure compliance.

In terms of impacts on fisheries, the increase in flow through the plant and reduced flow down Hou Phapheng during the wet season will attract more upstream-migrating fish towards the Sahong discharge, where they can then enter Hou Xang Pheuk as an upstream fish passage route.

Therefore, the approach to monitoring and mitigation set out in the ESMMP will not change as a result of the modification, and fisheries impacts will continue to be mitigated by removing large illegal gears and by improving natural channels to allow fish migration.

5.1 CONCLUSIONS

- The Modification Project includes installation of one more turbine in an adjacent powerhouse annex, and extension of the switchyard;
- All works and installations are within the boundary of the existing Project Site;
- Construction phase environmental and social impacts are manageable and will be mitigated by well-known technologies;
- Environmental monitoring will ensure strict adherence to dust, noise and effluent limits during construction;
- In terms of project operations, all 5 units will only be operated at the same time during the wet season;

- When all 5 units are in operation (during the wet season) the flow through the plant will increase with 400 m³/s from 1600 m³/s to 2000 m³/s and concurrently the flow through Hou Phapheng will decrease with 400 m³/s.
- The decrease in flow through Hou Phapheng when all 5 units are in operation (in the wet season) will lower the water level at Thakho Village with about 0.4 m compared to operation of the existing project;
- The increase in flow through the plant and reduced flow down Hou Phapheng during the wet season will attract more upstream-migrating fish towards the Sahong discharge, where they can then enter Hou Xang Pheuak as an upstream fish passage route;
- The approach to monitoring and mitigation set out in the ESMMP will not change as a result of the modification, and fisheries impacts will continue to be mitigated by removing large illegal gears and by improving natural channels to allow fish migration;
- Real-time automatic and continual monitoring of river flow at 5 stations in the project area and one station in Pakse will provide data to the dam operator and ensure compliance with minimum flow requirements.

TABLE 5-1 CONSTRUCTION PHASE OVERVIEW OF POTENTIAL RISKS AND IMPACTS ASSOCIATED WITH THE MODIFICATION PROJECT

Environmental Aspect	Potential Impacts/Risks	Site/Area	Impact Significance without Mitigation	Mitigation Plans	Residual Impacts/Risks with Mitigation
Land take	There will be no additional land acquisition and no additional inundation as all activities will be carried out within the DSHPP's boundaries on previously cleared areas. The project will not cause any loss of terrestrial wildlife habitats, and the project will not give rise to any economic or physical displacement of people	Not relevant	Not relevant	Unnecessary	None
Vegetation clearance	No vegetation clearance necessary	Not relevant	Not relevant	Unnecessary	None
Earth moving, excavation, drilling and blasting, hauling of materials	Noise pollution affecting nearby communities and project workers	Powerhouse site Batching Plant Stockpiles Switchyard extension Haul roads	Moderately Significant	ESMMP-CP Subplan SP10 Amendment Subplan SP16	Occasional minor noise nuisances but no health risks
Same as above	Pollution of the ambient air with particulate matter affecting nearby communities and project workers	As above	Moderately Significant	ESMMP-CP Subplan SP09 Amendment Subplan SP17	Occasional minor nuisances but no health risks
Same as above	Vibration impacts on Irrawady Dolphin	Downstream the dam	Moderately Significant	No underwater blasting ESMMP-CP Subplan SP10 Amendment Subplan SP16	Minor, infrequent impact
Disposal of spoils (soil, rock)	Excavated rock will be reused as aggregate in the concrete for the powerhouse, as riprap for erosion protection or for backfilling and landscaping	Switchyard Right bank areas	Moderately Significant	ESMMP-CP Subplan SP01 ESMMP-CP Subplan SP11 Amendment Subplan SP18	None
Construction and removal of cofferdam	Risk of suspension of sediments in the river causing harm to aquatic life	Downstream cofferdam at the powerhouse site	Moderately Significant	ESMMP-CP Subplan SP01 Amendment Subplan SP18	Temporary and localized minor negative impact
Surface water runoff and effluents at construction sites,	Discharge of polluted water into natural waterways causing harm to aquatic life	Powerhouse site Batching Plant Stockpiles	Significant	ESMMP-CP Subplan SP01 Amendment Subplan SP18	Temporary and localized minor negative impact

Environmental Aspect	Potential Impacts/Risks	Site/Area	Impact Significance without Mitigation	Mitigation Plans	Residual Impacts/Risks with Mitigation
disposal areas and processing plants					
Storage and handling of hazardous materials and operation of vehicles and installations	Harm to the environment from pollution of soil or water caused by leakages or spills. Risk to worker's health	Powerhouse site Batching Plant	Significant	ESMMP-CP Subplan SP03 ESMMP-CP Subplan SP07 ESMMP-CP Subplan SP13	None
Handling and disposal of non-hazardous waste	Harm to people and the environment from uncontrolled burning of waste or from littering or dumping of waste on land or in waterways	Project Site and surrounding environment	Moderately Significant	ESMMP-CP Subplan SP05 ESMMP-CP Subplan SP13	None
Sanitary wastewater management	Discharge of sanitary wastewater into natural waterways	Existing sanitary wastewater treatment facilities at labour camps and workshops	Moderately Significant	ESMMP-CP Subplan SP01	None
Labour Camp facilities and management	Unsanitary conditions for workers. Unsuitable or unhealthy facilities, lack of suitable amenities.	Existing labour camp	Moderately Significant	ESMMP-CP Subplan SP14	None
Influx of labour force for construction work	Spread of sexually transmitted infection (STI) or sexually transmitted disease (STD) and/or other disease in the local and between company's employees.	Project site and local communities	Moderately Significant	ESMMP-CP Subplan SP12	None
Influx of labour force for construction work	Spread of infectious diseases including COVID-19 among the workforce and project employees as well as in the local communities and beyond	Project site and local communities with potential to spread regionally	Significant	Prevent airborne transmission through: Wearing face masks Physical distancing Testing and health monitoring Vaccination programme when vaccine becomes available. Coordinate with district and provincial health authorities to support health care system	Manageable

Environmental Aspect	Potential Impacts/Risks	Site/Area	Impact Significance without Mitigation	Mitigation Plans	Residual Impacts/Risks with Mitigation
				to prevent, control and provide medical treatment. Provide education on health and hygiene. Amendment Subplan SP20	
Project related traffic	Risk of traffic accidents with harm to people	Public access road Haul roads	Significant	ESMMP-CP Subplan SP06 Amendment Subplan SP19	Manageable

TABLE 5-2 OPERATIONAL PHASE OVERVIEW OF POTENTIAL RISKS AND IMPACTS ASSOCIATED WITH THE MODIFICATION PROJECT

Environmental Aspect	Potential Impacts/Risks	Site/Area	Impact Significance without Mitigation	Mitigation Plans	Residual Impacts/Risks with Mitigation
Power Plant operations	Changes in flow regime during the operational phase. Increased wet season flows in Hou Sahong and reduced wet season flows in Hou Phapheng and Hou Sadam. Lower wet season water levels in Hou Phapheng.	<ul style="list-style-type: none"> - Tailrace - Hou Phapheng - Hou Sadam - Hou Xang Pheuak 	Moderately Significant	Continual intensive monitoring and analysis of fish (species, abundance) and hydraulic conditions in the channels as a basis for tailored excavations and other improvements to fish migration ESMMP-CP Subplan SP02 ESMMP-OP Site Specific Plan SS01 Fish-Map ESMMP-OP Site Specific Plan SS03 Amendment Subplan SP21	Manageable
Power Plant operations	Fish larvae harmed by passage through the turbines	<ul style="list-style-type: none"> - Don Sahong head pond - Upstream and downstream the powerhouse - Pbaew Nyai main channel - Hou Phapheng 	Moderately Significant	Continual intensive monitoring and analysis of fish larvae drift and survival rates. Implementation of the Fisheries Monitoring and Action Plan	Manageable

Environmental Aspect	Potential Impacts/Risks	Site/Area	Impact Significance without Mitigation	Mitigation Plans	Residual Impacts/Risks with Mitigation
Presence of dam structure at the mouth of Hou Sahong and formation of a reservoir	Blocking of upstream fish migration in Hou Sahong	<ul style="list-style-type: none"> - Hou Sahong - Tailrace - Hou Phapheng - Hou Sadam - Hou Xang Pheuak 	Significant	Continual intensive monitoring and analysis of fish migration (species, abundance) and hydraulic conditions in the channels as a basis for tailored excavations and other improvements to fish migration. Implementation of the Fisheries Monitoring and Action Plan and the Don Sahong Fisheries Management Plan	Manageable
Sediment flushing	Same as for the existing project, sediment flushing will not be required for project operations	- Not relevant	Not relevant	Unnecessary	None