

KINGDOM OF CAMBODIA

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Ministry of Water Resources and
Meteorology



Ministry of Agriculture, Forestry, and
Fisheries



Cambodia Water Security Improvement Project (P176615)

DRAFT ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Kantout Subproject – Kratie Province

Component 2 and 3

Version

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ABBREVIATIONS

| | |
|----------|--|
| AH | Affected Household |
| C-ESMP | Contractor-Environmental and Social Management Plan |
| COI | Corridor of Impact |
| COVID-19 | Corona Virus Infection Disease 19 |
| CWSIP | Cambodia Water Security Improvement Project |
| DDIS | Detailed Design Implementation and Supervision (Consultants) |
| ESIA | Environmental and Social Impact Assessment |
| ESMF | Environmental and Social Management Framework |
| ESMP | Environmental and Social Management Plan |
| EPP | Emergency Preparedness Plan |
| GRM | Grievance Redress Mechanism |
| HIV/AIDS | Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome |
| IESIA | Initial Environmental and Social Impact Assessment |
| IP | Indigenous Peoples |
| IPPF | Indigenous Peoples Planning Framework |
| IPP | Indigenous Peoples Plan |
| LMP | Labor Management Procedures |
| MOWRAM | Ministry of Water Resources and Meteorology |
| OHS | Occupational Health and Safety |
| PDWRAM | Provincial Department of Water Resources and Meteorology |
| RGC | Royal Government of Cambodia |
| ROW | Right of Way |
| RP | Resettlement Plan |
| SEA/SH | Sexual Exploitation and Abuse/Sexual Harassment |
| SEO | Social and Environmental Officer |
| SEP | Stakeholder Engagement Plan |
| UXO | Unexploded Ordinance |
| WB | The World Bank |

EXECUTIVE SUMMARY

1. Introduction

Project overview

The Cambodia Water Security Improvement Project (CWSIP, P176615) aims to improve water security and increase water productivity in selected river basins of Cambodia, and to provide immediate and effective response in case of an eligible crisis of emergency.

The Project Development Objective (PDO) will be measured through the following indicators:

1. Increased water availability for agriculture and domestic water supply in water scarce areas (MCM);
2. Area provided with improved irrigation or drainage services (ha);
3. Increased agricultural productivity (percentage)

The project will be implemented from 2023 to 2030 – through various investment activities organized in five project components:

- Component 1. Improve Water Resources Planning and Institutions (US\$ 10m)
- Component 2. Improve and sustain water service delivery for irrigation and domestic use (US\$ 110m)
- Component 3. Support services to increase climate resilience in irrigated agriculture (US\$ 20m)
- Component 4. Project Management, Coordination, and Monitoring and Evaluation (US\$ 5m)
- Component 5: Contingency Emergency Response Component (CERC) (US\$0m).

Kantout Subproject overview

The Kantout dam is located in Kantout village, Kantout commune, Chetr Borei district, Kratie province in the upper catchment of the Ou Kchoung River. Currently the reservoir is serving 30 ha in one village for supplementary wet season irrigation and water is not sufficient. After rehabilitation under this subproject, the reservoir could provide reliable irrigation access for 330 ha in Serey Pheap village of Dar commune.

The subproject plan to implement the following key construction activities:

Under Component 2 (Improve and sustain water service delivery for irrigation and domestic use)

- Rehabilitation of the existing earth dam of length 3.5km to store water up to 1.5 MCM at level of 35m asl
- New construction of three cross regulators along Kantout stream
- Stream dredging and main canal rehabilitation
- Demolition of one existing spillway and new construction of one spillway with detour road,
- New construction of one twin under sluice box culvert with detour road,
- New construction of two head work regulators,
- Demolition of three existing structures on Dam (3 culverts)
- New construction of three check structures,
- New construction of two cross drainage structures,
- New construction of three offtake structures,
- New construction of 2 Road Crossing Structure (Pipe Culvert 0.8m),
- New construction 1 Tail escape Structure (Pipe Culvert 0.6m).
- Removal of aquatic weeds in reservoir
- Construction of 3 new short section of roads totaling 4.5km.

Under Component 3 (Increased Agricultural Productivity at Farm Level)

- **Finance technical assistance for development and adoption of climate smart agricultural methods** (e.g. solar-powered modern irrigation, land reformation, land leveling, providing quality seeds, improve the soil condition) to improve water access, land productivity and crop diversification. This includes optimizing the use of water in the irrigation schemes.
- **Enhance capacity for scaling up labor, water, and crop productivity improvement techniques** through raising awareness and building capacity at different levels to promote and scale up labor, water, and crop productivity improvement techniques and practices. MAFF will (a) identify and prioritize technically and commercially suitable crops and cropping systems under both irrigated and rainfed conditions for each subproject location, b) implement a multi-faceted plan for inducting extension service and training officers, and c) conducting demonstrations to provide the evidence base for further developing the techniques.
- **Increased private sector engagement for agricultural services and sectoral improvement** through seeking collaborative arrangements with private sectors to develop value chain and construct market facilities (e.g. collection centers, storage facilities, and market sheds). Key activities include a) build capacity, b) facilitate loan access, c) promote innovative models, d) facilitate contract farming between farmers and agricultural cooperatives, producer groups (PG), and private sector, e) facilitate linkages between agricultural inputs and market for products.

2. Purpose and Scope of the ESMP for Kantout Subproject

This Environmental and Social Management (ESMP) for Kantout subproject was prepared in accordance with the Environmental and Social Management Framework (ESMF) developed for the Cambodia Water Security Improvement Project. The ESMP aims to ensure identified E&S risks and impacts that arise during implementation of Kantout subproject are managed timely, effectively, and in line with the project's ESMF which is prepared on the basis of the national legislation and the World Bank's Environmental and Social Framework (ESF). To this end, the ESMP sets out measures and procedures that guide the updated and implementation of the ESMP, particularly when detailed subproject design is available at a later stage during project implementation.

The ESMP identifies potential environmental and social risks and impacts that are likely associated with planned subproject investments, and propose key measures that should be taken – as a minimum, to address identified E&S risks and impacts. The ESMP also suggests measures that could be taken to reduce the likelihood of environmental and social risks and to minimize anticipated subproject impacts, including actions that should be taken to build and ensure sufficient capacity are in place to assure effective E&S risks and impact management, particularly the capacity of the contractors who are accountable to managing E&S risks and impacts that would arise while their workforce are present in the subproject area to carry out planned construction activities.

The ESMP also sets forth implementation arrangements which will be led by MOWRAM (for project component 2) and by MAFF (for project component 3). These implementation arrangements aim to ensure environmental and social risks and potential impacts are identified and managed timely and effectively during project implementation, and during operation phase when the project's water infrastructure is put into use. The ESMP also estimate a tentative total cost for budget planning purpose. This aims to ensure finance is timely available to facilitate the process of environmental and social risk and impact management for all subprojects that the project finances during project implementation.

3. Environmental and Social Risks and Impacts anticipated for Kantout Subproject

The E&S risks and impacts presented in this ESMP cover both activities under Component 2 (led by MOWRAM) and Component 3 (led by MAFF). The E&S risks and impacts are identified as those potentially associated with key investment activities at Kantout subproject. These impacts, and risks, are *direct* and *indirect* – as defined in the WB's ESF, and are anticipated based on the following key factors: a) proposed **investment activities at the subproject**, b) **scope, scale, and nature** of such activities, c) **area of influence** (based on the first three identified subprojects), d) **capacity of key project stakeholders** (e.g. MOWRAM,

MAFF, GDR, and their implementation agencies at provincial, district, and subproject levels), e) **E&S management practices** in the same type of project (e.g. legal framework and current practices), and f) **expected capacity of contractors**. The assessment of E&S risk and impact is made assuming that financial and human resources, including risks management capacity, are sufficiently and timely available to bring all inherent risks – wherever they are (e.g., *substantial, moderate*), down to *low* level.

ENVIRONMENTAL RISKS AND IMPACTS

- Generation of noise and vibration due to construction operation (temporary during construction stage)
- Pollution of air, water, soil (temporary during construction stage)
- Generation of solid, hazardous, domestic waste (temporary during construction stage)
- Potential impact on biodiversity due to inundation of an estimated 95.69 ha of forest land in Kantout reservoir, and farming ecosystem due to increased crop intensification in the target command area)
- Occupational health and safety (for project workers, particularly contractors' workforce)
- Disease transmission (for project workers, particularly contractors' workforce)
- Road and Traffic safety (for project workers, particularly contractors' workforce)
- Unexploded ordinance (associated with physical construction activities that involve ground-breaking, excavation...).

SOCIAL RISKS AND IMPACTS

- Land acquisition of about 1.42ha (both public and private land) to allow construction of 4 roads (total length: 3,550m), and rehabilitation/construction of irrigation canals)
- Temporary restricted water access for farmers in target command area during construction phase.
- Temporary loss of income during construction phase due to construction operation restricting customer access due to road condition, environmental pollution, and so forth.
- Reduced downstream water access (beyond the subproject area)
- Gender inequality (e.g., during the process of crop intensification)
- Sexual Exploitation and Abuse, Sexual Harassment, and Violence against Children due to labor influx
- Child Labor
- Exclusion of Vulnerable/ Disadvantaged Groups (e.g. because of their restricted access to project information, language...)
- Disease transmission (due to labor influx and locations that is specific for certain diseases)
- Road and traffic safety (during to increased transportation activities during construction)
- Hunting, trading, and consumption of animal from the wild (due to labor influx).

4. Mitigation Measures

To mitigate environmental and social risks and impacts, the following mitigation hierarchy is adopted:

- Environmental and social risks and potential impacts will be anticipated and avoided;
- Where avoidance is not possible, risks and potential impacts are minimized or reduced to acceptable levels;
- Once risks and potential impacts have been minimized or reduced, further mitigate; and
- Where significant residual impacts remain, compensate for or offset these impacts, where technically and financially feasible.

Based on the risks and potential impacts discussed in Chapter 4, Chapter 5 (Mitigation Measures) outlines the overall approach to Environmental and Social Risk and Impact Management. Mitigation measures will be taken by the MOWRAM and MAFF to mitigate environmental risks and impacts during project

implementation, including construction and operation phases. Proposed mitigation measures will be adopted to guide the update of ESMP by MOWRAM and MAFF, and guide the preparation of the contractor's ESMP which the Contractor will prepare respective approval of MOWRAM and MAFF before contractors could commence any construction activities at the site.

5. Consultation and Information Disclosure

During subproject preparation, various meetings have been organized to consult with local people in the subproject area, and relevant governmental agencies at village and provincial levels. Two consultation rounds have been conducted in March and April 2023. Each consultation meetings have its own purpose. The first consultation (March 2023) consulted with affected people on the purpose of the subproject, including its initial design and potential environmental and social risks and impacts. The second meeting (April 2023) solicited feedback of affected households on the updated design and relevant E&S risks and impacts, and proposed mitigation measures. The meeting also followed up with affected people on issues affected households raised, and explained how such issues have been addressed in the updated design, including the availability of project's grievance redress procedures that affected people may use in case they need.

6. Information Disclosure during Project Preparation

Before project appraisal, site-specific ESMP for Kantout will be disclosed for public consultation. In particular, at national level, the full document (English) and its Executive Summary (Khmer) will be disclosed on the websites of MOWRAM and MAFF. At project level, the same document will be disclosed in hard copy at the office of Kratie Provincial Department of Water Resources and Meteorology and the Provincial Department of Agriculture, Forestry and Fisheries. At subproject site, the Executive Summary (Khmer) of the ESMP will be posted at Communes' Hall where the subprojects is located. The ESMP will be finalized following project appraisal and will be re-disclosed through the same channels. The final English version of the ESMP will also be disclosed on the WB's website.

7. Grievance Redress Mechanism (GRM)

The project has in place four complaint handling procedures for four types of risks and potential impacts: 1) land acquisition, 2) labor and working conditions, 3) sexual exploitation and abuse and sexual harassment (SEA/SH), and 4) procedure for general complaints. These procedures are established based on the above principles for project's GRM, and in accordance with the requirements set out in pertinent national legislation. The GRM for complaints related to land acquisition is summarized in the project's Resettlement and Policy Framework (RPF) and provides steps to guide complainants through complaint resolution process, including timeframe specified for each step (see RPF for details).

The GRM for workers regarding employment, wages, payment, working conditions, health, safety, etc. follows different procedure and are described in project's Labor Management Procedures (see LMP for details). The GRM related to sexual exploitation and abuse/ sexual harassment (SEA/SH) is also established in accordance with the pertinent national laws and the World Bank's guidance on SEA/SH, and is described in project's LMP (see LMP for details). During subproject implementation, SEA/SH risk will be evaluated at subproject level taking into account the local SEA/SH status, feedback from local people and other stakeholders (e.g. health services, NGOs...). In case of need, local SEA/SH service provider(s) will be engaged by PMU before contractors are mobilized to subproject site.

The GRM Focal Point, Project Manager and Project Director within the MOWRAM are responsible for establishment and effective functioning of a Project Grievance database. In case there is serious complaint, such as road accidents, SEA/SH cases, the World Bank shall be notified within 48 hours of complaint receipt and/or report on the incidence (See also Annex 3 of the SEP).

All grievances and concerns submitted to any project implementation agencies, either in written or verbal forms, are documented diligently by the agency in charge of GRM. Grievance resolution process is recorded and monitored by GRM Focal Point of MOWRAM and MAFF, respectively.

8. Monitoring and Reporting

Monitoring aims to collect, periodically, necessary information to support the review/evaluation of the E&S monitoring process, and its E&S performance outcome. The MOWRAM is responsible for overall regular monitoring of E&S implementation process and outcomes under the subproject. Monitoring by MOWRAM will cover all risks and potential impacts associated with all project components, except for Component 3 (Water Productivity at a farm level) which MAFF is in charge of implementation. MOWRAM will monitor how these risks and potential impacts are avoided or mitigated by relevant project stakeholders, particularly contractors who will be engaged to build identified subprojects and consultants to be engaged to carry out trainings for E&S capacity building to ensure effective project implementation, and relevant project stakeholders whose works are associated with the identified E&S risks and impacts.

MOWRAM's PMU is responsible for conducting internal E&S monitoring. External monitoring will be carried through a qualified independent consulting firm, or think-tank to undertake independent quarterly monitoring of the process and results achieved in E&S implementation that will be carried out by construction contractors and relevant stakeholders involved as per principles and requirement prescribed in project's ESMF (including RPF, IPPF, LMP), and SEP. Both internal and external (independent) E&S monitoring will be carried out. An end-of-subproject review of E&S implementation process will be conducted by MOWRAM's PMU (through technical support of independent E&S monitoring firm) to confirm whether the objectives set forth in the subproject ESMP, including abbreviated Resettlement Plan (to be prepared during project implementation) have been achieved.

9. Costs and Budgets

The indicative cost for implementation of this subproject ESMP is estimated at USD 235,000 during project life. Costs for independent monitoring of E&S actions on the part of MOWRAM is estimated separately in ESMF. This also includes capacity building (e.g., trainings, workshop), consultation meetings, recruitment of additional consultants to support PMU. This budget is estimated for planning purpose at subproject preparation stage and will be updated at the later stage, particularly when detailed subproject designed is available to finalize the scope, scale, and nature of impacts, particularly to take into account the capacity of the contractors who will be engaged to manage directly E&S risks associated with their construction activities at the Kantout subproject site. It is noted that funding for compensating impacts related to acquisition of land, livelihoods restoration, and so forth, to allow construction of new irrigation canals in the command area will be provided using government's own funding.

1. INTRODUCTION

1.1 SUBPROJECT RATIONALE

The Kantout dam is located in Kantout village, Kantout commune, Chetr Borei district, Kratie province in the upper catchment of the Ou Kchoung River. The reservoir was first constructed during Pol Pot time in around 1976 and was used until 1979. During that time the reservoir was used for supplementary wet season irrigation and the irrigation method during that period was done by lifting water using human labor from the Ou Kchoung. A series of low head earth weir were cascading constructed across the Ou Kchoung stream to raise head creating pool of water for lifting. Currently the reservoir is serving 30 ha in one village for supplementary wet season irrigation and water is not sufficient. After rehabilitation under this subproject, the reservoir could provide reliable irrigation access for 375 ha in Serey Pheap village of Dar commune.

The supply scheme operates mainly as a river diversion scheme with farmer pumping from the waterway. There a no diversion weirs. Thus, the current practice is farmers constructing low earthen banks across the waterway to create enough depth to operate their small (50 mm) pumps. The high flows during the wet season wash away these earthen banks. Building an expanded canal network would require land acquisition and would be complicated and expensive due to the relatively steep and uneven topography and the need to allow for many cross drainage flows. During scoping exercise with the project beneficiaries, which included farmers, commune council and the Kratie Provincial Department of Water Resources and Meteorology the beneficiaries preferred the proposed supply system to an expanded canal scheme.

Figure 1 – Overview of Kantout Reservoir (near spillway)

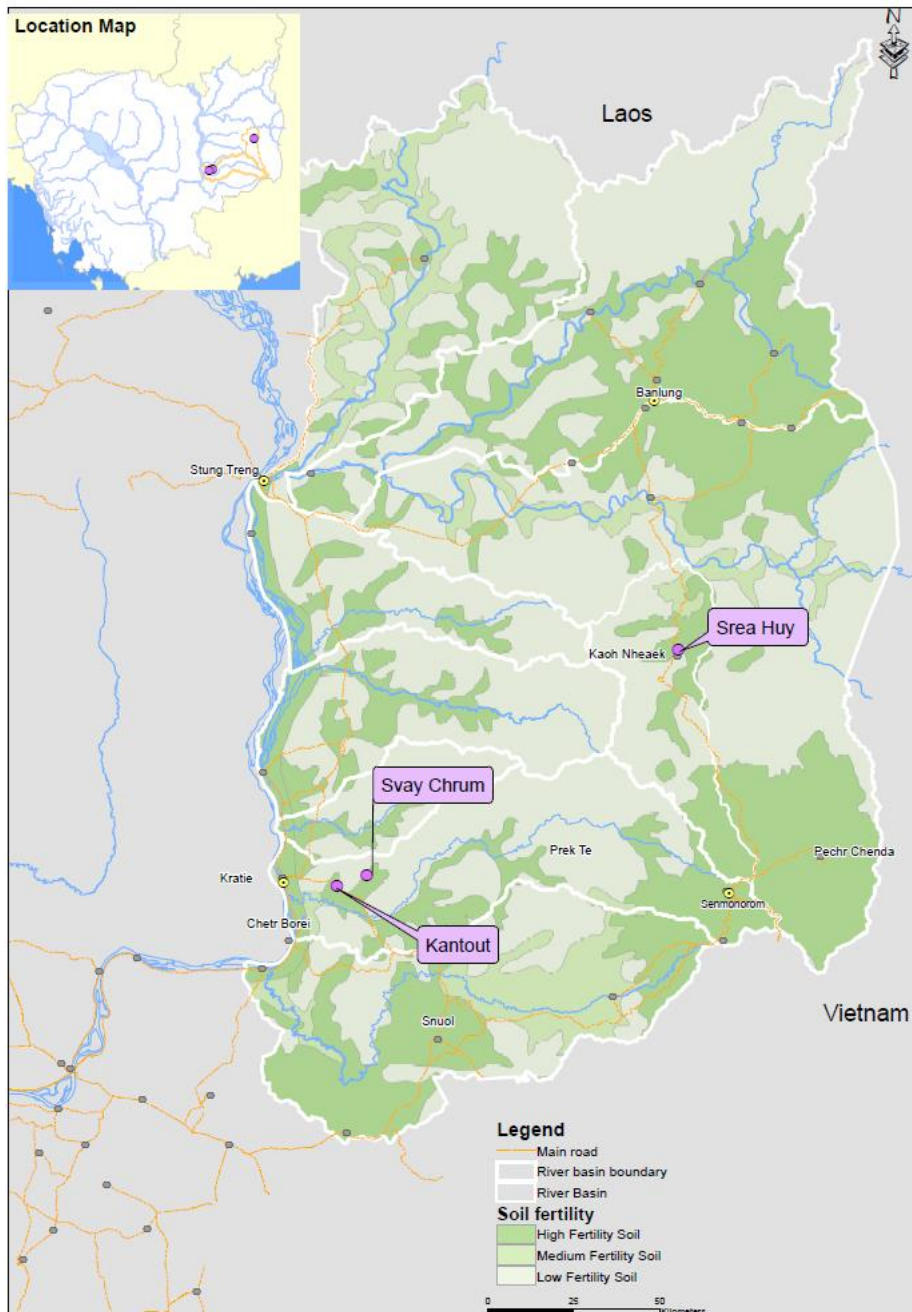




1.2 PROJECT LOCATION, SCOPE OF WORKS OF THIS ESMP

The Kantuot reservoir is located in the Kantuot village, Kantuot commune, Chetr Borey district, Kratie province (See Figure below).

Figure 2 - Map of Kantout Reservoir



The subproject aims to improve existing water distribution system by physical intervention at two key areas: reservoir and command areas. In particular, in the reservoir area, the subproject will:

- Raise storage to increase capacity from 0.25 to **1.5** MCM
- Rectify storage leakage

In the command area, the subproject will:

- Construct river diversion scheme using series of on-stream regulators to control flows and to provide diversion pools
- Control and measure releases from storage to match supply with demand

During subproject operation, the improved subproject will enable PDWRAM to:

- Improve farmers' water access from diversion pools – by either pumping or gravity

- Introduce water resource management
- Adopt seasonal water planning – areas, crop types, storage losses....
- Control and measure releases from storage to match supply with demand
- Monitor storage volume versus seasonal water plan
- Update plan to reflect seasonal conditions
- Share information via FWUC with PDWRAM and MOWRAM

As a result of the above activities, farmers can:

- Diversify/increase crop production – through seasonal crop production, as estimated in table below.

PLANNED CROP AREA

Kantout Command area 285 ha
Existing

| Crop pattern | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Start date | End date | Total planting days | Irrigated area (ha) | % of annual cropped irrigated area | |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|----------|---------------------|---------------------|------------------------------------|-----|
| Wet season | | | | | | | | | | | | | | | | | | |
| Irrigated WS paddy-long/medium term | | | | | | | | | | | | | 7-Jun | 30-Nov | 177 | 30 | 100% | |
| Monthly irrigated area | - | - | - | - | - | 30 | 30 | 30 | 30 | 30 | 30 | - | | | | | | |
| Annual cropped irrigated area | | | | | | | | | | | | | | | | | 30 | |
| As a % of the command area | | | | | | | | | | | | | | | | | | 11% |

Rehabilitated

| Crop pattern | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Start date | End date | Total planting days | Irrigated area (ha) | % of annual cropped irrigated area | |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|----------|---------------------|---------------------|------------------------------------|------|
| Wet season | | | | | | | | | | | | | | | | | | |
| Irrigated WS paddy-medium/short term | | | | | | | | | | | | | 1-Jul | 30-Nov | 150 | 285 | 76% | |
| Dry season | | | | | | | | | | | | | | | | | | |
| Watermelon | | | | | | | | | | | | | 1-Dec | 30-Mar | 120 | 20 | 5% | |
| Maize | | | | | | | | | | | | | 1-Dec | 31-Mar | 120 | 20 | 5% | |
| Mung bean | | | | | | | | | | | | | 1-Dec | 28-Feb | 90 | 50 | 13% | |
| Monthly irrigated area | 90 | 90 | 40 | | | 285 | 285 | 285 | 285 | 285 | 90 | | | | | | | |
| Annual cropped irrigated area | | | | | | | | | | | | | | | | | 375 | |
| As a % of the command area | | | | | | | | | | | | | | | | | | 132% |

See also Annex 2.2 for proposed crop patterns (for crop diversification).

With the smooth operation of the reservoir and improvement of agricultural activities at the command area, the subproject will bring about the following key expected outcomes

- ❖ **Diversified crop for better income**
 - Reformat fields for better water and machine movement
 - Demonstrated diversification options for locations with good and lesser water access
 - Strategic solar pumping for better water supply
 - Drip irrigation for high yielding, water productive, quality vegetables
- ❖ **Improved mechanization for labor productivity**
 - Reformat fields for better machine access and movement
 - Roadways for better machine access and product movement
- ❖ **Increased and stabilized rice productivity**
 - Shorter-season varieties in main wet season for better yield
 - Supplementary irrigation for better yield
 - Direct seed rice with Eli seeders
- ❖ **Improved capacity for sustainability**
 - PDAFF Officers involved in the project for continuing support farmers in the province

- Agriculture trainers and lead farmers: local human resources for better agriculture extension and adaptation
- Relevant private companies: to update the service provided to beneficiaries
- ❖ **Better engagement of private sectors for better market linkage and profitability**
 - Link financial institutions and beneficiaries for better loan access
 - Support the establishment of input, service, and output market linkage for better access to input and service and better market for outputs lead to better profit
 - Support in small and medium infrastructure for better value chain development and improvement

1.3 KEY CONSTRUCTION ACTIVITIES

Different options are described below and one will be recommended. As part of the Feasibility Study, three design options have been proposed for Kantout. Option 0 assumes that no project will be implemented and as such, only 285 ha could be irrigated vis-à-vis 375 ha that could be irrigated if Option 1 (below) is carried out.

• Option 1

Hydraulic structures

- 1) Removal and replacement of two headwork regulators.
- 2) Removal and replacement of one spillway.
- 3) New construction of three cascading cross regulators along Kantout stream.
- 4) New construction of one twin under sluice box culvert.
- 5) Planning for detour for the demolition and new construction work activities of the head work structures at the dike.
- 6) New construction of three check structures,
- 7) New construction of two cross drainage structures,
- 8) New construction of three offtake structures,
- 9) New construction of 2 Road Crossing Structure (Pipe Culvert 0.8m),
- 10) New construction 1 Tail escape Structure (Pipe Culvert 0.6m).
- 11) Construction of 4 new roads (total length: 3,550m, width: 4m).

Earth works

- 1) Rehabilitation of the existing earth dam of length 1.02 km to store water up to 1.5 MCM.
- 2) Rehabilitation of the existing left main canals of length 0.86 km
- 3) Planning for 2 roads with total length of about 2.5 km

• Option 2

Hydraulic Structures

| | | |
|------------------------|------|----|
| Spillway (length 30 m) | unit | 1 |
| Head Regulator | unit | 2 |
| Under Sluice | unit | 1 |
| Connection chamber | unit | 3 |
| Cross Drainage | unit | 26 |
| Main canal check | unit | 18 |
| Main canal offtake | unit | 18 |

| | | |
|---------------------------|------|-----|
| Pumping Stations | unit | 1 |
| Road crossing | unit | 4 |
| Secondary canal checks | unit | 11 |
| Secondary canal offtakes | unit | 9 |
| Secondary tail structures | unit | 16 |
| Tertiary tail structures | unit | 9 |
| Stream cross regulators | unit | 2 |
| Connection pipeline | m | 230 |

Earth works

| For Kantout | Unit | Quantity |
|-----------------|------|----------|
| Dam Kantout | m | 2250 |
| Main Canal | m | 6150 |
| Secondary Canal | m | 5635 |
| Tertiary Canal | m | 2690 |
| Access Roads | m | 2500 |

• **Option 3**

Activities and scope under Option 3 is similar to those in Option 2, except that the canal is made of cement concrete. Under this subproject, option 1 is highly recommended because of its lowest costs. Please see layouts of Options in Annex 2.

1.4 ANALYSIS OF ALTERNATIVES

No Project Option: Without project, the reservoir can serve only 30 ha in one village for supplementary wet season irrigation and water is not sufficient. With Option 1 adopted, 285 ha that could be irrigated.

As mentioned in Section 1.3 above, three options were considered during feasibility study: (1) Option 1: Limited system/earthen canals, (2) Option 2: Complete system/earthen canals, and (3) Option 3: Complete system/concrete canals. Each of these options involved numerous considerations such as water storage sizes, irrigation networks, preferred cropping patterns, agricultural extension services, and other external factors such as hydrology, terrain, potential downstream impact, and so forth. The analysis conducted as part of the feasibility study has proposed concluded Option 1 is the recommended option for project financing given its cost-effectiveness (compared to the other two options). In addition, Option 1 offers the following key benefits:

| Water users | With project |
|----------------------------------|--|
| Domestic-urban | NA |
| Domestic use | The regular flows along the Kantout Stream would allow adjacent houses to access domestic supply during the dry season (they don't have this access if there is no subproject) |
| Fishing - storage | The increased storage volume and the generally higher carryover volume will provide an opportunity for fishing. |
| Eco-system – downstream waterway | Small reduction in wet season flows. Increase in dry season flows. Thus, it is anticipated that aquatic life in downstream waterway would not be adversely affected during dry seasons. |
| Eco-system – downstream river | The Kantout Stream discharges into the O'Kchoung Stream which then discharges into the Prek Te River. The Kantout dam catchment is only 0.2% of the Prek Te catchment area and so its flow contribution is negligible. |

It is noted that there are no industry, power, navigation activities downstream reliant on water from this catchment.

1.5 AREA OF INFLUENCE

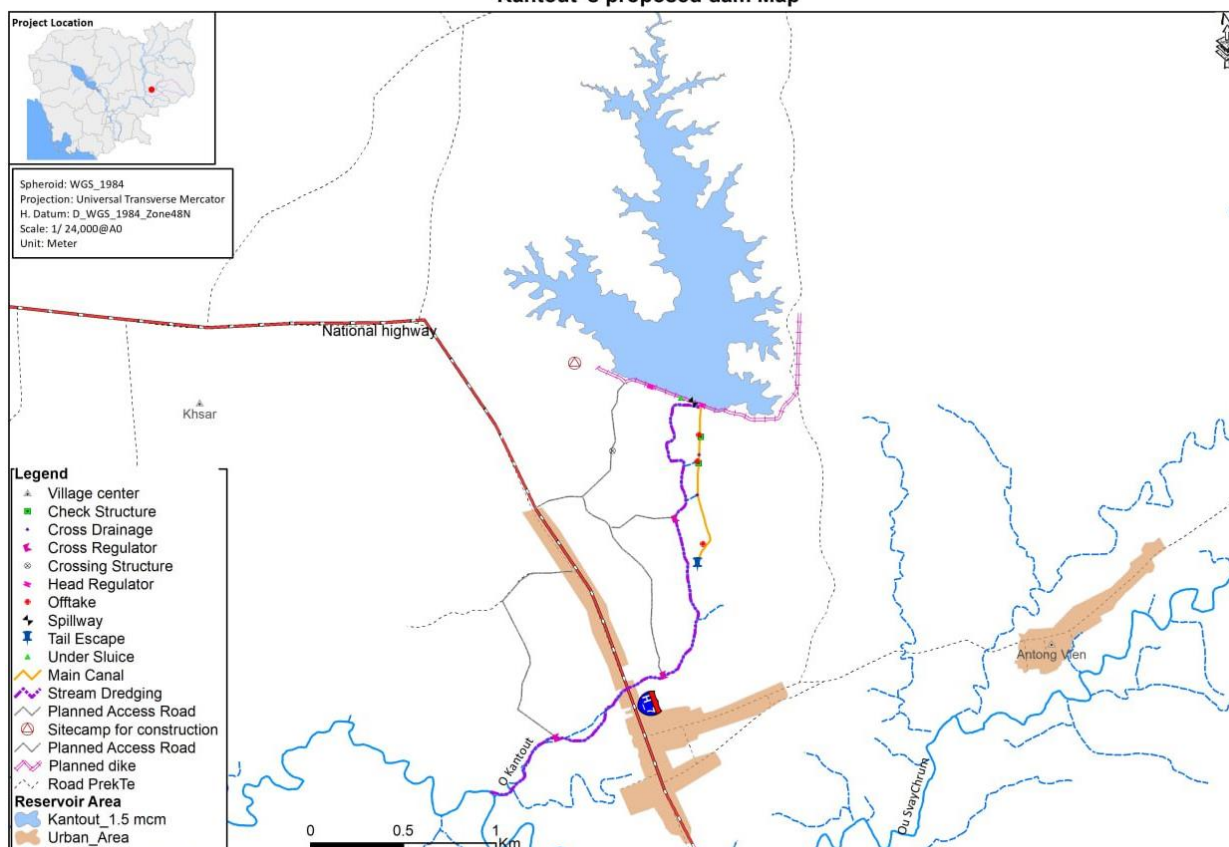
Based on investment activities proposed under project component 2 (Sustainable Water Service delivery) and component 3 (Water Productivity at a farm level) for Kantout subproject (subject to final Feasibility Study), the subproject's area of influence is defined by the following investment activities:

- **Reservoir area:** The reservoir area is defined by the followings:
 - Submerged area (to the maximum water level)
 - Area that is subject to physical construction, including a) new embankments, b) dam body (including gate, spillway, drainage gallery, sluice gate, stilling basin
 - Any repaired canal that connect the dam gate and command areas
 - Areas where two major embankments (polder) are built to prevent flooding to existing two graveyards owned by local ethnic minority (Phnong people).
- **Command area:**
 - New irrigation canals
 - Repaired irrigation canals
 - Extended irrigation canals
 - New regulators to be installed at certain place in the renovated water distribution network connected with the reservoir
 - Areas with increased number of crop per years (under Component 3 - Increased Agricultural Productivity at Farm Level)
- **Construction areas**
 - Workers' camps
 - Areas where construction materials are stockpiled and machineries and construction vehicles are parked, repaired, subject to routine maintenance
 - All routes that are used by contractors and subcontractors' vehicles and machinery for construction purpose (e.g. access roads, communal roads)
- **Road networks**
 - All roads, routes that connect construction sites and sites for such purposes as a) disposal site, b) construction material supply site, c) borrow pits, d) quarries, etc.
- **Disposal site(s), borrow pit(s)**
- **Any area affected by environmental footprint**
 - As defined by the area subject to noise, vibration, air, soil, water pollution due to project activities.
- **Associated facilities**
 - Any investments (financed by government, and/or other donors) that are connected to the subproject as an associated facilities (as defined in ESMF)
- **Land impacts**
 - Any area of land in the downstream, or upstream (to be confirmed) that may be affected due to land acquisition for the purpose of construction of the reservoir and irrigation canals and/or its associated physical structures such as gates, regulators, etc.

This map will be updated to reflect the location of workers' camps, disposal sites, and routes through which project vehicles (owned by contractor and subprojects) use for transportation.

Figure 3 – Map of Subproject Area of Influence

Kantout 's proposed dam Map



1.6 OBJECTIVES OF ESMP

When implementing the above activities, some E&S risks and impacts are envisaged. The purposes of this site-specific ESMP are to provide the detail information on environmental and social risks and potential impacts, mitigation measures, implementation arrangement and responsible institution, including how relevant potential affected households and interested stakeholders at local level are engaged during the preparation of this site specific ESMP and implementation (construction and operation phases) through out the project cycle. It is also aimed to disseminate the grievance redress mechanism and procedures (in line project's ESMP) to all potential affected households and interested stakeholders as well as to estimate the costs for supporting the implementation of this site specific ESMP during the implementation phase. The objectives of this site specific ESMP include, but not limited to:

- Ensuring compliance with the applicable national laws, regulations, standards, and guidelines;
- Ensuring environmental and social risks and potential impacts associated with the construction and operation of the Kantout Reservoir are effectively managed;
- Responsiveness to emerging and unforeseen environmental and social risks not identified during ESMP preparation;
- Ensuring sufficient resources and budgets are allocated for timely availability during implementation of ESMP-related activities;
- Using as a guideline for Contractors to develop its own version of Contractors' ESMP; and
- Maintaining ongoing engagement of potential affected households and interested stakeholders, particularly those who live in the area of influence, as well as relevant authorities at commune, district, and provincial levels.

2. LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter summarized key laws and regulations that may apply to the implementation of the subproject. Details of these legal documents are provided in Appendix 12 of the project's ESMF.

2.1 NATIONAL LEGAL FRAMEWORK RELATED TO ENVIRONMENTAL ISSUES

The following laws and regulations are relevant to the subproject:

- Law on Environmental Protection and Natural Resources Management (1996)
- Law on Forestry Management
- Law on Fisheries (March 30, 2016)
- Sub-Decree on Environmental Impact Assessment Process #72 ANRK.BK (1999)
- Prakas on the Classification of Environmental and Social Impact Assessment for Development Projects
- Guidelines on the Delegation of Power to Municipal/Provincial Departments of Environment (2005)
- Sub-Decree on the Control of Air Pollution and Noise Disturbance, #42 ANK/BK1 (2000)
- Sub-Decree on Solid Waste Management (No. 36 ANRK.BK 2009)
- Draft Environmental and Natural Resources Code
- International Conventions and Treaties on Environment
- Law on the Management of Pesticides and Fertilizers
- Law on Seed Management and Plant Breeder's Rights

2.2 NATIONAL LEGAL FRAMEWORK RELATED TO SOCIAL ISSUES

The following laws and regulations applies to the subproject:

- Law on Protection of Cultural and National Heritage (1996)
- Labor Law (1997)
- The Land Law (2001)
- Law on the Prevention of Domestic Violence and the Protection of Victims, (NS/RPM/1005/031),
- Law on Road Traffic, PREAH REACH KRAM NS/RKAM/0115/001, 2015
- Law on the Protection and Promotion of the Rights of Persons with Disabilities 2009 (Royal Kram NS/RKM/ 0709/010))
- Expropriation Law (2010)
- Prakas on the Prohibition of Hazardous Child Labor (MoSALVY #106, April 28, 2004)
- Prakas on Light Work (2008)
- Standard Operating Procedures for Externally Financed Projects in Cambodia on Land Acquisition and Involuntary Resettlement (2018), Sub-Decree No. 22 ANK/BK
- National Policy on the Development of Indigenous Peoples (2009)
- Policy on Registration and Right to Use of Indigenous Communities (2009)
- The Organic Law (2008)
- Relevant International Agreements on Indigenous Peoples

2.3 NATIONAL REGULATIONS ON DAM SAFETY, IRRIGATION, WATER SUPPLY

The following laws and regulations are related to the subproject:

- Law on Water Resources Management (June 29 ,2007).
- Law on Agricultural Cooperative (2013)
- Royal Decree (Preah Reach Kret) NS/RKT/0701/234 on the establishment and functioning of agricultural cooperatives, Union of the Agricultural Cooperatives and the Pre-Agricultural Cooperatives.

¹ http://www.bigpond.com.kh/Council_of_Jurists/a00-Anukret/ANK00_07_42_E.htm80

- Sub-Decree No. 73 on the establishment of the department of water farmers' communities of the ministry of water resources and meteorology
- Royal Decree on The Establishment and Management of the Tonle Sap Biosphere Reserve (2001)
- Sub-Decree on Water Pollution Control #27 ANRK.BK2 (1999)
- Law on Water Resources Management
- Sub-Decree FWUC
- Drinking Water Quality Standards

2.4 WORLD BANK E&S STANDARDS & ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINES

- ESS1: Assessment and Management of Environmental and Social Risks and Impacts
- ESS2: Labor and Working Conditions
- ESS3: Resource Efficiency and Pollution Prevention and Management
- ESS4: Community Health and Safety
- ESS5: Land acquisition, Restrictions and Land Use and Involuntary Resettlement
- ESS6: Biodiversity
- ESS7: Indigenous Peoples
- ESS8: Cultural Heritage
- ESS10: Stakeholder Engagement and Information Disclosure, and
- Environmental, Health, and Safety (EHS) Guidelines (general EHS guidelines: introduction) that covers 1) Environmental, 2) Occupational Health and Safety, 3) Community Health and Safety, and 4) Construction and Decommissioning.

3. BASELINE CONDITIONS

3.1 PHYSICAL CONDITIONS

- **Chetr Borei district:**
 - **Geography.** Chetr Borei district is situated on the east of the Kratie province. Chetr Borei district has a total land area of 5,290 km² and consists of ten communes (Bos Leav, Changrang, Dar, Kantuot, Kou Loab, Kaoh Chraeng, Sambok, Thma Andaeuk, Thma Krea, and Thmei). According to the national census (2021), the district population is 70,907 persons (49.3% is male and 50.7% is female). The total households are 16,490. Average household size is 4.3 person. The population density is 4.03/km².
 - **Topography and Land Use.** Chetr Borei district is located at elevation 20-29m with flat to gently sloping terrain. It is located on the Northern Plains which feature either flat sandstone plains or rolling terrain interrupted by occasional flat-topped hills or scarps, and rounded hills of Andesite and Basalt. Land use patterns in Chetr Borei district consists of forest, grazing, shrub, and farming land. Due to economic development pressures, the use and control of the forests have significantly changed. Forest lands have been converted into plantations and rice paddies by farmers. Agriculture in Chetr Borei district continues to grow and produces rice, maize, cassava, sesame, sweet potato, sugarcane, and soya beans, among others.
 - **Land tenure.** In Cambodia, there has been a recognition that progress towards economic and social development requires strengthening land tenure right system, as well as improved land management and administration. The latest Land Law 2002 recognizes three domains of land ownership in Cambodia: 1) state public property (e.g. forests, protected areas) for resource conservation, 2) state private property for economic and social development, and 3) private property (e.g. residential or agricultural land). Within the private domain, ownership can be

² http://www.cambodiainvestment.gov.kh/wp-content/uploads/2011/09/Sub-Decree-27-on-Water-Pollution-Control_990406.pdf

individual, communal, undivided or by co-ownership³. The current command area in Kantout is 30 ha which is individually owned and used for farming by local people for years. It is expected that the current command area will be increased under the subproject – from existing 30 ha to 330 ha. Thus additional command area will be reviewed.

- **Climate Condition.** The climate of Chetr Borei district is the same as climate in Kratie province as a whole. The Chetr Borei follows a monsoonal climate, with a cool season from November to March, a hot season from March to May, and a rainy season from May to October. Temperatures may range from 22° Celsius (C) to 36° C annually. The district's climate has three seasons: a cool season from November to March (22° – 28°C), a hot season from March to May (28°– 36°C), and a rainy season from May to October (24° – 32°C, with humidity up to 90%).
- **Meteorological Condition.** The data on meteorological condition in Chetr Borei district is not currently available.
- **Hydrological Conditions.** The annual flow of the Mekong River in Kratie province from 1985 to 2009 has been determined to be 401 cubic kilometers. The Mekong River may overflow its riverbanks by as much as 4 meters (m) during the rainy season, resulting in frequent and prolonged flooding. The peak of the flood is during September where the monthly discharge averages in excess of 36,000 cubic meters per second. There are a record on high flood years in Kratie have included 1961, 1978, and 2000. However, the Mekong floods at Kratie have been declining for the past two decades, and in 2012, flood volumes were almost 40% below the normal rate. Kratie is increasingly experiencing severe drought, which has affected rice production and other agricultural crops. Notable drought years have included 1977, 2004, and 2008.
- **Kantuot commune:**
 - **Geography.** Kantuot commune is located within Chetr Borei district in Kratie province. Kantuot commune consists of five villages (A loch, Antong Vien, Chrava, Kantuot, and Srae Non). According to the national census (2021), the population in Kantuot commune is 8,202 persons (50.22% is male and 49.78% is female). The total households are 1,820. Average household size is 4.5 person. The population density is 4.02/km².
 - Majority of households in Kantuot commune is Khmer (74.56%). The remaining (25.44%) are IP (Bunon community). The Bunon IP live in mainly A Lorch village. In Kantuot village where the reservoir and command area are located, there is no IP.
 - **Topography and Land Use.** The topography of Kantuot commune is located at elevation 20-29m with flat to gently sloping terrain. It is located on the Northern Plains, which features either flat sandstone plains or rolling terrain interrupted by occasional flat-topped hills or scarps, and rounded hills of Andesite and Basalt. Mainly, the people in Kantuot commune grow rice. The total wet rice land in Kantuot commune is 960 ha, with average wet rice yield 1.0 ton/ha. The rice production per capita is 114kg/person. The average rice price is 1,060 riels/kg. There is less than 1% of the total population in Kantuot commune who own rice land less than one ha and less than 1% who has no cultivated land.
 - **Climate Condition:** The climate condition in Kantuot commune is not available. However, it is likely that the climate condition at commune level is not different from district level. The climate condition in Kantuot commune follows a monsoonal climate, with a cool season from November to March, a hot season from March to May, and a rainy season from May to October. Temperatures may range from 22° Celsius (C) to 36° C annually. The district's climate has three seasons: a cool season from November to March (22° – 28°C), a hot season from March to May (28°– 36°C), and a rainy season from May to October (24° – 32°C, with humidity up to 90%).
 - **Meteorological Condition.** The data on meteorological condition in Kantuot commune is not

available.

- **Hydrological Conditions.** There are no hydrological studies have been found in Kantuot commune. According to the PDWRAM in Kratie and local farmers in the area, usually water depth flow over the spill is in the range from about 0.5m to about 1m. This implies that the upstream watershed could generate sufficient run-off filling the reservoir annually. Flow over the weir usually happened from June when there is rainfall within the upstream watershed. And usually at the end of Oct there is no flow over the weir, however as the reservoir is located close to the upstream reach of the watershed, it gets response from rainfall quickly, meaning when there is rainfall upstream, runoff flowing over the weir is generated accordingly. During pre-reservoir rehabilitation, usually there is no base flow within the Ou Kchoung tributary river during dry season from a round Jan until June, however during after-reservoir rehabilitation there is base flow in the stream occurring.
- **Climate Change:** The data on climate change at commune level is not currently available. It is observed that the people in Kantuot commune are mainly impacted by flooding.

3.2 ENVIRONMENTAL CONDITIONS

Regional level.

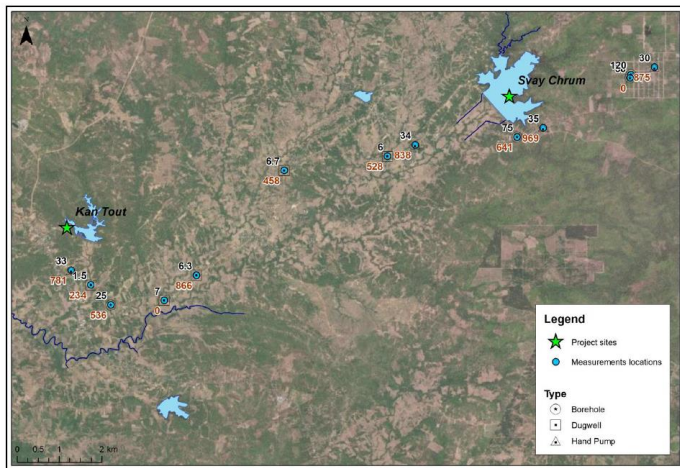
Air quality. According to the result of air quality index in Mondulkiri of the Ministry of Environment dated on 27 September 2023 showed that the AQI is 5, rating excellent (0-50) and good for outdoor activities and tourist. There is no air quality monitoring in Kratie yet. However, the online source showed that AQI in Kratie is 49, rating excellent, which is also good for outdoor activities and tourist.⁴

Surface Water.

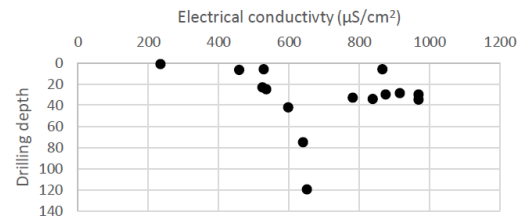
In the northeast region, only surface water quality is monitored via the Mekong River Commission Water Quality Monitoring Network (WQMN) that is implemented by MOWRAM. Under WQMN there are two water quality monitoring sites in the northeast region: one located a Kratie and Stung Trung Townships. Since 2013 an 'Excellent' (water) quality rating for human health and a mixture of 'Good' and 'Excellent' quality rating has been recorded at Kratie covering pH, EC, NH₃, DO, NO₃-2, TP, and COD water quality indicators (MRC, 2023). PDWRAMs, PDAFFs, and private water utilities advised that there has been no reporting of water quality issues in the region. Some concern, however, was raised of the potential impact from increasing use of pesticides, and the need to start regular water quality monitoring.

Groundwater. A quick field assessment was conducted in March 2023 with 8 location of measurements (see location in map below). The lowest EC values were found in dug wells in the shallow alluvial aquifer, suggesting active annual recharge and modest residence times. However, shallow groundwater is more vulnerable to pollution from the land surface. The underlying sandstone aquifer shows much higher EC values. Figure below summarizes findings across the two subproject (Svay Chrum and Kantout) during a rapid field investigation. Interestingly, the two boreholes at a depth greater than 40 m had lower EC than most of the <40 m deep boreholes suggesting that deeper water has lower content in dissolved solids.

⁴ Source: <https://www.iqair.com/au/cambodia/kratie> (accessed 10 October 2023).



Electrical conductivity (red numbers) and depth (black) across Kantout-Svay Chrum site



Electrical conductivity in relation to drilling depth across the two sub-project areas

Ground water use and demand. Field surveys and interviews with local communities showed that groundwater is still vital for communities in the area, although piped water provision has led to a significant reduction of reliance of the local population on groundwater. People (often low-income) living relatively far away from networks still rely on groundwater extracted by hand pumps. Alternatively, they depend on buying tanker truck delivery of (surface) water.

Soil quality. Mondulkiri province has a large area of arable land and fertile soil. The soil quality is good and make it suitable for the agro-industry plantations such as rubber, cassava, pepper, maize and cashew nut. Kratie province can be divided into two specific regions; the northeast and southwest. Northeast segment of the province is a plateau consisting of thick forests, a variety of grasses and fertile red soil. The soil quality is fertile which is favorable to livestock rearing, and agro-industry plantations such as rubber, pepper, and cashew nuts.

Noise. Being a rural environment, noise levels are generally low nearby the project area. Noise sources are primarily from livestock or are anthropogenic. Any vehicle noise is intermittent and confined to locations close to the road. Anthropogenic noise sources predominate in the village with the loudest sounds attributed to schoolchildren, or similar.

Chetr Borei district (Kratie)

- Ambient Air quality, Noise and vibration: The data on ambient air quality, noise, and vibration in Kaoh Nheaek district does not exist. The ambient air quality, noise, and vibration is being linked to increases in industrial development, and the rapid urbanization. However, the district is located in the rural settings and far from the major population centers and industrial areas. The baseline ambient air quality, noise and vibration is considered generally good. Ambient air quality is sometime affected by dust from tillage and unpaved road users, including smoke from burning of rice stubble after harvest and burning from swidden cultivation activities. Whilst noise and vibration disturbance are sometime affected by motorist and boat. However, the impacts are minor and short time.
- Surface water quality: The data on surface water quality in Chetr Borei district is currently not available. The surface water is generally considered in good quality.
- Groundwater quality. There are no studies on groundwater quality in Chetr Borei district. Though, it is considered that the groundwater quality in Chetr Borei district is generally good.
- Soil Quality: The data on soil quality is not available in the Chetr Borei district. Based on visual observation, the soil quality is generally good in the absence of nearby industrial zones or

wastewater discharges. The soil is generally fertile.

Kantout commune:

- Ambient Air quality, Noise and vibration: The data on ambient air quality, noise, and vibration in Kaoh Nheaek district does not exist. The ambient air quality, noise, and vibration is being linked to increases in industrial development, and the rapid urbanization. However, the district is located in the rural settings and far from the major population centers and industrial areas. The baseline ambient air quality, noise and vibration is considered generally good. Ambient air quality is sometime affected by dust from tillage and unpaved road users, including smoke from burning of rice stubble after harvest and burning from swidden cultivation activities. Whilst noise and vibration disturbance are sometime affected by motorist and boat. However, the impacts are minor and short time.
- Surface water quality: The data on surface water quality in Kantuot commune is currently not available. The surface water is generally considered in good quality.
- Groundwater quality: There is no studies on groundwater quality in Kantuot commune. Though, it is considered that the groundwater quality in Kantuot commune is generally good.
- Soil Quality. The data on soil quality is not available in Kantuot commune. Based on visual observation, the soil quality is generally good in the absence of nearby industrial zones or wastewater discharges. The soil is generally fertile.

Climate change in Cambodia

- Cambodia is highly vulnerable to climate change. Climate change has exacerbated flood risk – through changes in precipitations and sea level rise. Climate change impacts are expected to intensify in the next few decades. These are manifested with more frequent heat waves, forest fires, droughts, thunderstorms, tropical cyclones, and floods. These natural disasters have been recognized as an annual impact of climate change in Cambodia. In addition, climate change also poses a variety of challenges to sustaining economic development in Cambodia. According to NCSO (2020b), the country’s annual average GDP growth fell by 6.6% (with absolute GDP dropped by 0.4% by 2020, 2.5% by 2030, and 9.8% by 2050) due to potential impacts of climate change.
- The potential impacts of climate change on socioeconomic aspects of people’s livelihoods are high since it affects agriculture, water resources, ecosystem, forestry, health, energy, transportation, tourism, etc. Effective climate adaptation measures are essential to mitigating the impacts of climate stresses on human made and natural systems. Measures that could be taken to enhance the adaptation to climate change include multitude of behavioral, structural and technological adjustments. According to the General Secretariat of the National Council for Sustainable Development (NCSO) (2020), Cambodia has estimated some precursors’ emissions due to limited information. These emissions include carbon monoxide (CO), oxides of nitrogen (NO_x), non-methane volatile organic compounds (NMVOCs), and Sulphur dioxide (SO₂). The details of the emissions by sector are provided in Table 1. Of the total emissions, forest and other land use (FOLU) sector was extremely high (91.69%) compared to other sectors, followed by Energy sector (6.40%).

Table 1 – Emissions by sector and gas in mass unit (Gg) in 2016

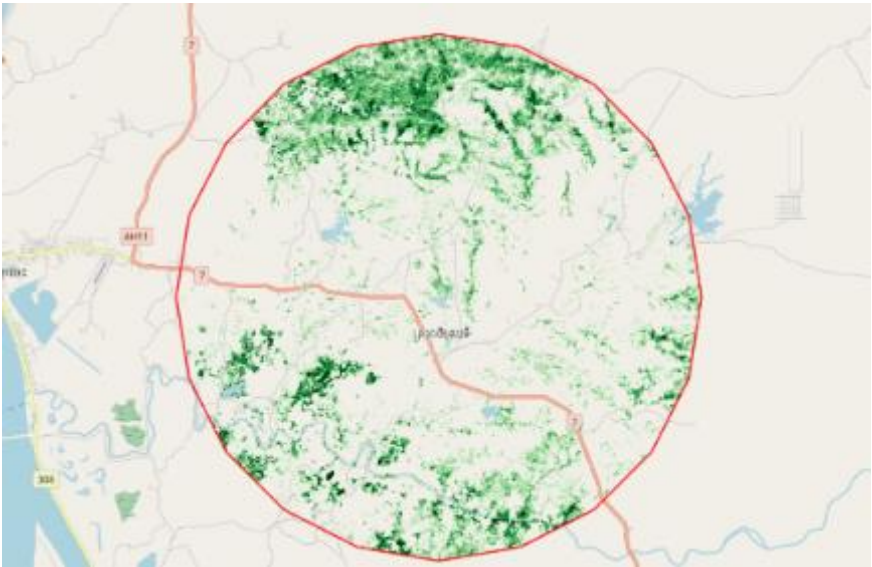
| Inventory Sector | CO ₂ | CH ₄ | N ₂ O | NO _x | CO | NMVOC | SO _x |
|----------------------------------|-----------------|-----------------|------------------|-----------------|--------|-------|-----------------|
| Energy | 8,845.29 | 23.04 | 0.61 | 43.43 | 160.46 | 45.03 | 32.61 |
| IPPU | 1,449.46 | n/a | n/a | n/a | n/a | n/a | n/a |
| Waste | 525.56 | 79.70 | 0.82 | n/a | n/a | n/a | n/a |
| Agriculture | 17.42 | 645.00 | 7.56 | n/a | n/a | n/a | n/a |
| Forest and Other Land Use (FOLU) | 131,011.25 | n/a | n/a | n/a | n/a | n/a | n/a |
| Total (without FOLU) | 10,837.73 | 747.74 | 8.99 | 43.43 | 160.46 | 45.03 | 32.61 |
| Total (with FOLU) | 141,848.98 | 747.74 | 8.99 | 43.43 | 160.46 | 45.03 | 32.61 |

Source: NCSO (2020)

A report by Ministry of Environment (MOE) in 2016 projected that the greenhouse gas (GHG) emission in BAU in 2030 and 2050 will be increased approximately to 20,245 ktCO₂eq./year and 120,523 ktCO₂eq./year, respectively.

3.3 BIOLOGICAL RESOURCES

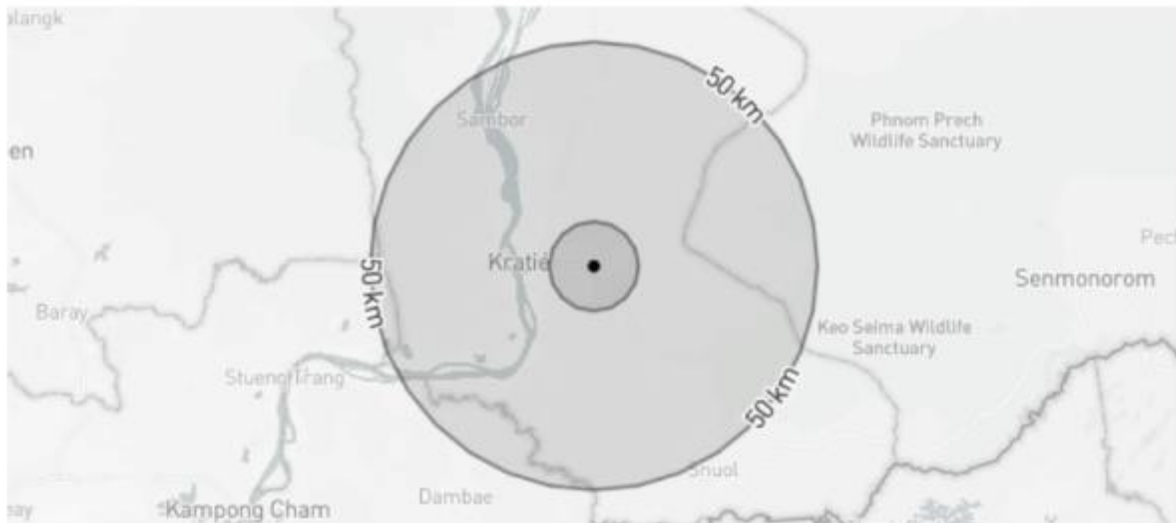
Kantout reservoir was constructed during Pol Pot regime (Khmer Rouge) in 1975. The reservoir is located in Kantout village, Kantout commune, Chetr Borey District, Kratie province. The reservoir is located inside the community forestry called “Kantout Community Forestry” which is currently under the management of Ministry of Agriculture, Forestry, and Fishery. This community forestry was officially established in 2011. The forest covers a total area of 716 hectares with about 200 households who are members of the community forest. In addition to the community fores, there is a community fishery called “Kantout Community Fishery” located inside the watershed. Currently, this community forest is not working well because of degrading aquatic resources in the reservoir.



Source: World Bank Group Geospatial Platform (2023)

Kantout reservoir possesses a rich biodiversity, including fauna and flora, compared to Svay Chrum and Srae Huy. The nearest protected area – Prey Lang National Forest (the biggest forest area in Cambodia), is located 24km away. Farther away from Kantout Reservoir, two wildlife sanctuaries were found: Phnum Prech Wildlife Sanctuary (located 41km away to the North-East) and Keo Seima Wildlife Sanctuary (situated 65km away to the South-East of Kantout Reservoir (For more details, see Annex 5 – Biological Baseline for Kantout).

Figure 4 – Protected Area and Key Biodiversity in Kantout Reservoir



During construction of Kantout reservoir, some aquatic plants may be destroyed such as *Nymphaeaceae*, *Elchhornia Crassipes*, *Elchhornia Crassipes*, *Ipomoea aquatic*, *Marsilia quadrifolia*, *Catharanthus Roseus*, *Ludwigia adscendens*, *Alisma plantago-aquatica L*, and *Neptunia oleracea*. However, these species are generally found in all ecological wetland in the country. They easy to regenerate after few months of impact and are not listed in IUCN’s red-list. For the aquatic animal, some speciefies such as *Channa Striata*, *Pseudomystus siamensis*, *Pristolepis Fasciata*, *Anabas testudineus*, *Macrognathus Siamensis*, *Hypsibarbus Malcolm*, *Channa Micropeltes*, and *Ophisternon bengalense*, may face a small impact due during construction stage when water in the reservoir goes down to allow construction. However, impact on these species is anticipated to be low as these species are highly tolerant to shallow water condition (during construction stage) and to harsh weather conditions. In addition, these are classified as Least Concern (LC) species in IUCN red-list.

During operation stage of the reservoir, inundation caused by increased water storage (from existing 0.25 to 3.00 million cubic meter) may affect seedlings/young forest located in the submerged area of the reservoir. These species include *Shorea Obtusa*, *Dipterocarpus Tuberculatus*, *Pterocarpus macrocarpus*, *Azalia xylocarpa*, *Dalbergia oliveri*, *Vatica philastreana*, *Cratoxylum cochinchinense*, *Mitragyna sp.*, *Irvingia malayana*, *Litsea glutinosa*, *Phyllanthus Emblica*, *Sindora siamensis*, *Irvingia malayana*, *Diospyros undulata*, and *Terminalia alata*. These species are classified as Endangered (EN), Near Threaten (NT), and Least Concern (LC). According to the inventory, these tree species are young species and they were classified as important species (precious wood) that are listed in IUCN red list. Submergence map for Kantout reservoir show large submerged areas which suggests that the impact of water on young forest and other natural habitat, including food of the wildlife in the submerged area, is relatively high. The level of impact on submerged area may vary depending on the level of water that may increase during rainy season when water is stored towards its maximum capacity.

Based on the estimation of tree abundance for the potential submerged area of 95.69 ha (see also Method Note in Annex 5), 11,385 trees are potentially adversely affected due to future inundation. However, it should be noted that all of the seedling estimated would not necessarily become trees in the future because some will be dead because of natural competition, forest fire, damaged by animal, and climate condition (See list of these 88 forest timber species in Annex 5, of which there are 15 species included in IUCN list).

Figure 5 – Tree density in the impacted area

| Type | Density/H | Total for 95.69 ha |
|----------|-----------|--------------------|
| Tree | 115 | 11,385 |
| Sapling | 600 | 59,400 |
| Seedling | 8000 | 72,000,000 |

Number of species classified as either Endangered (EN) or Critically Endangered (CR) as confirmed by local stakeholders as potentially present in the subproject's area of influence

| Number of species that are classified by IUNC as either Endangered (EN) or Critically Endangered (CR) | | | | | | |
|---|----------------|----------------|-------|---------------|----------|-------|
| | Aquatic Plants | Aquatic Animal | Birds | Forest Timber | Wildlife | TOTAL |
| IBAT (50km radius) | 0 | 19 | 13 | 4 | 17 | 53 |
| Subproject's Area of In | 0 | 0 | 1 | 4 | 1 | 6 |

Additional works in Year 1 of project implementation. Additional baseline survey will be conducted to complement baseline provided in Annex 5. Completed baseline survey will be used for conducting a Critical Habit Assessment (CHA) exercise. Based on CHA results, Biodiversity Management Plan (BMP) will be developed. It is noted that additional baseline survey, CHA, and BMP shall be completed prior to construction. The TOR for these works, and its reports, will be reviewed and cleared by the Bank. Once these works are completed, the subproject ESMP will be updated to incorporate the assessment results and proposed mitigation actions.

3.4 SOCIOECONOMIC CONDITIONS

Population and Demographic characteristics:

Kantuot commune has a population of 8,202 people (4,083 Females) and is home to 463 households (2,246 people) who are from Bunong ethnic minority group. In Kantuot village where the reservoir and command area are located, there is no IP found in the subproject's area of influence,.

Land use:

Kantuot commune has a total land area of 12,119 ha. Of the total 1,640 households in the commune, 382 households own less than 1 ha of paddy land, 229 owned less than 1ha of farmland, and 407 households are landless. In Kantuot village alone, most have paddy land of more than 1 ha. Only 42 households have less than 1ha of Riceland. Only 3 households do not have riceland. There are 7 households who live in the protected area (two of them are from Kantuot village).

Traffic system:

In the Kantuot commune, there are 44,500m of the total road length (9.3% of total commune land areas), Kantuot village has average 4km length of the access road to the district hall, and 24km to provincial hall.

Education:

The Kantuot commune has 7 public primary schools, 1 secondary school and 1 high school, with an enrollment rate of 6 year olds' children for primary school in the Kantuot village is 100%, and adult literacy rate in ages 15 – 17 year olds was 84.6%.

Economic Condition:

The population of 18 year olds to 60 year olds who have a major occupation in the commune is 3,619 people (88.3%), with 68.7% female of a total commune population, in these major occupations involvement, agriculture 7,276 people (90.5%), services 328 people (9.1%), and handicraft 15 people (0.4%). Total rice cultivated land is 920ha (20ha of dry rice cultivated land), total rice cultivated land access to irrigation system is 75ha (7.7%) within 82 households (4.5%). Total annual rice yield are 920tons, average yield per ha are 1.5tons (1ton in Kantuot village), with average price is 1.060 KH Riel per kilogram, average income per capita from rice production is USD30.2, horticulture and livestock, and aquaculture is USD171.4. Poverty index in the Kantuot commune is 59.18%, in the 3rd rank of among total ten communes of the Chetr Borey district. Total poor people in the Kantuot commune are 103 people (12.6 people in 1,000 people). Kantuot village has the lowest poverty rate in among the five villages. Regarding labor migration, 6.6% of Kantuot villager migrate for works, of which 6.3% migrated in country whereas the other 0.3% migrated oversea.

Health and Sanitation:

39% of households in Kantout commune have access to latrines and 93.5% (1,702 households) have access to water source (150m away from the house).

4. POTENTIAL ENVIRONMENTAL & SOCIAL RISKS AND IMPACTS

The screening for environmental and social risks and impacts for Kantout subproject was conducted in October 2022, March and April 2023 through consultation with local people and local authorities, and through site visit (See Annex 1.1 for screening related to land impact and screening for IP presence in the Kantout subproject). E&S screening was done in accordance with project's ESMF to identify environmental and social risks and impacts that may arise due to the rehabilitation of the Kantout subproject due to:

- Implementation of construction activities described in Section 1.3 (Key Construction Activities).
- Capacity of MOWRAM (in the role of oversight and building capacity for PDWRAM for PDWRAM's day-to-day subproject implementation management).
- Capacity of PDWRAM of Kratie province in terms of subproject management, operation, and maintenance of the Kantout subproject.
- Capacity of GDR with regards to preparation and implementation of Resettlement Plan (as per project's Resettlement Policy Framework).
- Anticipation of main Contractor's capacity in management of identified E&S risks and impacts.
- Farming practices of local people who potentially benefit from a) increased and reliable water access from reservoir (investment under Component 2) and b) increased agricultural production (investment under Component 3).

Risk assessment & risk rating. Risk assessment will take into account the likelihood of the risk materializing and the severity of its impact on the achievement of project's intended results. Given this, in table below, each risk is determined based on a combination of project's intervention design, characteristics of project activities, and exogenous factors that, in aggregate, may affect adversely project's ability to achieve its objectives. Risk assessment also assist in defining the nature, scale and significance of direct and indirect environmental and social impacts.

In this project, four ratings are used: **High (H)**, **Moderate (M)**, **Significant (S)**, and **Low (S)**. Clarification and examples are below.

- **High.** There is a high likelihood that exogenous environmental or social risks could adversely affect project's achievement. Project is likely to have adverse environmental impacts that are sensitive, diverse, and/or unprecedented.
- **Substantial.** There is a substantial likelihood that exogenous environmental or social risks could adversely affect project's achievement and project may have potential adverse environmental impacts, but these are less severe. Impacts could be on environmentally or socially sensitive areas, but project is less likely to have a large footprint and impacts will be site-specific, less divers and complex and will have less potential for strong synergistic or cumulative impacts.
- **Moderate.** There is a moderate likelihood that exogenous environmental or social risks could adversely affect project's achievement and project may have some adverse environmental and social impacts, and such impacts would tend to be away from environmentally or socially sensitive areas
- **Low.** There is a low likelihood that exogenous environmental or social risks could adversely affect project's achievement and there are few or no risks of adverse impacts, e.g. the project footprint is small and activities present little or no direct impacts.

Given the above, a risk with a Low rating, for instance, means there is a Low likelihood that the identified environment or social factors could adversely affect the achievement of the project’s objectives or sustainability of project results, and there is a Low social, or environmental impacts.

In table below, key E&S risks and impacts (associated with subproject activities) are identified and summarized. The social risks and impacts are assessed, in aggregate, as “moderate” whereas the environmental risks and impacts are assessed as “substantial”.

Table 2 – Description of E&S risks and impacts (by key investment activity and project component)

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|---------------------------|---|---|---------------|---------------|--------------------------------|---|---|
| ESS1 | Assessment and Management of Environmental and Social Risks and Impacts⁵ | | | | | | |
| Gender inequality | Gender norms has been considered one of the key deep-rooted socio-cultural causes of gender inequalities in farming in Cambodia, including Kantout area. Women also have limited to credit for agricultural production. Women also faced limited access to updated information and technology, farm equipment, market access... for enhanced economic engagement (from existing focus on domestic roles) ⁶ . Under CWSIP, gender risks and impacts associated with gender are relevant to ESS1, 2, 4, 5, 5, and 10. | Contextual risk, farm wide, during activity implementation | Moderate | Low | Farmers in target command area | Scaling up of crop production that target command areas | Sub-Component 3.3 (for enhanced capacity for scaling up of labor, water, and crop productivity improvement techniques) |
| Elite capture | Some better-off people may take their own advantage (voice, local business...) to influence subproject design/investment (e.g., location, existing infrastructure access...) to bring more project benefit to them – vis-à-vis the poor and vulnerable in the same geographical area. This risk is anticipated in Project Component 2 (Sustainable Water Service Delivery) which may affect design of water distribution canal, and Project Component 3 (Increased Water Productivity at the farm level) which may bring investment to the better-off group (e.g., storage house, food processing facilities, and design of access road). | Contextual risk, site-specific, during activity initiation | Low | Low | Farmers in target command area | Establishment of contract farming between farmers, agricultural cooperatives (AC)/producer groups (PG) and the private sector | Sub-Component 3.3 & 3.4 (Increased Private Sector Engagement for Agricultural Service and Sectoral Improvement) |
| Reduced net income | Crop intensification (in existing and new irrigated area) to increase crop yield combined with a) promoted contract farming model and b) increased transaction with middlemen is likely to cause reduced selling prices of farm produce, which in turn put | Induced risk, when technology adoption succeeds to a considerable | Low | Low | Farmers in target command area | Value chain development for rice (and other cash crops) | Sub-Component 3.4 (for increased private sector engagement for |

⁵ The risks identified and described under ESS1 are not covered under other ESSs. These risks are identified as a way to address issues that are mentioned in WB's Good Practice Notes

⁶ Phuong G Leapheng, 2018, The Important Role of Cambodian women in the Agriculture Sector. Parliamentary Institute of Cambodia.

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|---|---|---|---------------|---------------|---|---|--|
| | farmers at risk of getting lower pay due to increased competition among farmers. | extent of command area. Later stage of project life and beyond | | | | | agricultural service and sectoral improvement) |
| ESS2 | Labor and Working Conditions | | | | | | |
| Child Labor | The risk of child involvement in project's labor force (e.g., contractors' labor) is foreseen because subproject activities will take place in rural areas where use of child labor is common. There is a possibility that local people under 18 years is engaged by construction contractors and sub-contractors to perform unskilled works, and these workers may be from ethnic minority groups. | Induced risk, small-scaled, short duration | Low | Low | Unskilled workers (mostly local people) | Contractors' engagement of local people as short-term, unskilled workers | Sub-Component 2.1 and 1.2 (for rehabilitation and upgrading of reservoirs and canals for improved irrigation and flood control) |
| Forced Labor | Forced labor refers to any work or service that are not voluntarily performed by an individual under threat of force or penalty. Forced labor could happen for both children under 18 and adults, particularly for households who are in high need to cash for specific family purpose (e.g., cover a medical bill, paying debt...). The risk of engaging of forced labor might be associated with workers that are considered as "primary supply workers" as identified under the project's Labor Management Procedures. | Induced risk, small-scaled, short duration | Low | Low | Unskilled workers (mostly local people) | Local people to send their children to work for contractors for extra income | Sub-Component 2.1 and 1.2 |
| Occupational health and safety (OHS) | OHS risks identified under the project include physical hazards, chemical hazards, as follows: Physical Hazards. Physical hazards represent potential for accident or injury or illness due to repetitive exposure to mechanical action or physical activities. Physical hazards may result in a wide range of injuries, from minor that needs medical aid only, to disabling, catastrophic, and/or fatal. - Accidents due to falls: falling from ladders, scaffoldings, and vehicles, etc. | Direct risk, project workers, particularly contractor's workers, mostly while on-site | Significant | Low | All project workers, but mostly with contractor's workers due to work condition | Engagement of workers to support: 1) construction activities by Contractors, 2) consulting/ technical support by PMUs | Mostly associated with Sub-Component 2.1 and 2.2 but are related to any project activities of all five components that involve travel, and are related to |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|-----|---|-------------------------|---------------|---------------|---------------------|---|-------------------------------------|
| | <ul style="list-style-type: none"> - Drowning and water injury accidents: at construction sites, workers may have to walk on structure above the water, or beams across the river or stream. - Accident due to falling objects: Tools, machinery, equipment, and materials used during construction may fall from the height, causing injuries or death. - Fall into open holes: holes, manhole, and areas of deep excavation may be commonly found at works. Fall into these holes may cause injuries of various degrees. - Physical injury related to the operations of heavy equipment: Injury or death may result during operations of heavy equipment, such as crane, excavator, cuts, and bruises on sharp objects etc. <p>Chemical hazards. Chemical hazards represent potential for illnesses or injuries, both short and long term, and fatalities due to single acute exposure or chronic repetitive exposure to toxic, corrosive, sensitizing or oxidative substances. Common chemicals used in construction include Portland cement clinker (mineral binders), formaldehyde (wood-based materials), polyurethane, vinyl, cadmium, or lead (paints and resins), and solvents. They also represent a risk of uncontrolled reactions, including the risk of fire and explosion, if incompatible chemicals are inadvertently mixed.</p> <ul style="list-style-type: none"> - Fire and Explosions. Fires and or explosions resulting from ignition of flammable materials or gases can lead to loss of property as well as injury or fatalities to project workers. - Corrosive, oxidizing, and reactive chemicals. Corrosive, oxidizing, and reactive chemicals present similar hazards and require similar control measures as flammable materials. | | | | | | work environment of project workers |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|--|---|---|---------------|---------------|---|--|----------------------------------|
| | Communicable diseases and outbreak. Project workers are prone to any diseases that are easy to spread under certain conditions if effective control measures are not in place. Common diseases include pandemic diseases (COVID-19, HIV/AIDS...), vector-borne diseases (malaria, dengue fever, and Chikungunya...), water-borne diseases (primarily diarrheal disease such as viral and bacterial gastroenteritis, dysentery, cholera, and other manifestations of gastrointestinal infections), typhoid, schistosomiasis, and so forth. | | | | | | |
| | Risk of UXO. This risk is identified with operation that involve dredging (if any), earthwork, excavation, soil compaction, and so on to build the new dykes and possible construction of new roads that go alongside new canals. | Site-specific, small-scaled, before construction | Moderate | Low | | Local dredging, earthwork for demolishing old embankment and building new, extended embankment | Sub-Component 2.1 |
| Underpaid pay and unequal treatment | Local and IP people recruited as unskilled workers by project contractors may not be offered a written working contract. As a result, there is a possibility that they may be underpaid compared to the nature, scope, and quantity of work that they are expected to perform. They may also be asked to work under conditions that are hazardous to them, such as working without Personal Protective Equipment (as may be required for such work). Underpayment may also take place on the basis of gender, temporary work status – at the discretion of contractors. The risks of late wage payment or failing to pay workers should be assessed and included as part of the contract. | Induced risk, vulnerable workers, during working period | Low | Low | Unskilled workers (mostly local people) | Engagement of workers, particularly local, unskilled workers by Contractors | Sub-Component 2.1 and 1.2 |
| ESS3 | Resource Efficiency and Pollution Prevention and Management | | | | | | |
| Noise | Earthmoving activities and operation of machineries at construction sites will generate dusts and exhaust fumes. Construction activities, operation of heavy equipment and | Direct impact (mostly at construction sites, | Moderate | Low | People and animal near | Construction operations carried out by be | Sub-Component 2.1 and 2.2 |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|-----|--|---|---------------|---------------|---------------------------|--|---------------------------------|
| | <p>material blasting will generate noise and vibration and will be a nuisance to workers and residents near the site. Noise will be produced by vehicular movement, excavation machineries, concrete mixing, and other construction activities. Noise may be generated from workers' camp, particularly during living activities at nighttime, or due to certain maintenance/repair of equipment, machinery, vehicles.</p> | <p>transportation routes, and sites of source material and disposal, during construction (daytime).</p> | | | <p>construction sites</p> | <p>contractors for upgrading a) reservoir/ dam/ barrage/ regulator, and b) irrigation, b) extension of irrigation canal Sub.1.1, 1.2).</p> <p>Constructing/upgrading farmlands, including the construction and rehabilitation of irrigation and drainage systems, land levelling, improvement of soil quality and fertility (Sub. 2.2).</p> <p>Construction may involve a) demolition of existing dam structure/old irrigation canal, b) transportation (vehicles), b) operation of machineries, c) excavation, soil compaction.</p> | <p>Sub-Component 2.2</p> |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|------------------------|--|--|---------------|---------------|---|---|----------------------------------|
| | | | | | | Increased use of heavy machinery such as combine harvesters, laser-assisted land levelling. | |
| Air pollution | <p>Dust will be generated by transportation of material, clearing, grading, excavation, levelling, truck hauling, stockpiling, waste disposal, access road rehabilitation. In addition, the emission is also expected from machineries and vehicles, especially during dry season</p> <p>Smoke may be generated due to use of harvest fires from burning of straw and stub for incorporation into soil may cause air pollution, particularly in area where synchronized cultivation could be practiced thanks to more liable water access for irrigation</p> | Direct impact (mostly at construction site, road), localized, daytime | Moderate | Low | People and animal near construction sites | Construction operation at reservoir and irrigation site | Sub-Component 2.1 and 1.2 |
| Water pollution | <p>During construction, excavation may be carried out to allow upgrading of the existing dam structures. Earthwork and excavation may cause soil disturbance which result in water pollution, particularly when rehabilitation/construction of reservoir and irrigation canal are completed, and water is released which would bring disturbed soils and probably debris left over to the downstream through the released water.</p> | Direct risk (mostly local, around polluted source and main canals), duration depend of source of pollution | Moderate | Low | People and environment inside water distribution canals | Construction debris, leaked oil and chemicals, water disturbance may cause temporary/local water pollution | Sub-Component 2.1 and 1.2 |
| | <p>Increased use of chemical for intensified crop production may affect the overall water quality and affect people who rely on such water for domestic use. Impacts may include two levels: impact on surface water as immediate effect and underground water as long-term impact.</p> | Induced risk (mostly at command area), scale depending on waterway, contamination intensity during | Moderate | Low | <p>Farmers directly involved in cultivation and crop care</p> <p>Those who use ground/surface</p> | Crop intensification from increased irrigation access (e.g., increased irrigated area and number of crops per year) | Sub-Component 3.1 and 3.2 |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|---|--|--|---------------|---------------|--|--|--|
| | | cropping season (reduced towards harvesting) | | | water with connection from polluted source | | |
| Soil pollution | Solar panels used for drip irrigation may contain hazardous chemicals (used to make photovoltaic (PV) cells), and/or hazardous fluids (to transfer heat) and leaks of these materials could be harmful to the environment. | Direct risk (local, small-scaled) | Low | Low | Location where solar panel is used, and disposed of | Installation of solar panel for supplementary irrigation (dry season) | Sub-Component 3.1 (Increased water and labor productivity through integrated crop water management) |
| | Leakage of oil, chemicals used for machinery and construction process at construction sites | Direct risk (local, small-scaled) | Low | Low | Construction site and camp site | During machinery operation and maintenance | Sub-Component 3.1 |
| | Overuse of agri-chemicals, e.g., chemical pesticides, fertilizers, due to crop intensification | Direct risk (farm wide, during project life and beyond) | Moderate | Low | Soil (including surface water) | During crop care | Sub-Component 3.1 |
| Solid, hazardous, domestic waste | During construction process, waste of various kinds (e.g., oil, lubricant, chemicals) will be generated including solid wastes, hazardous wastes, and domestic solid waste (at workers' camp site). Solid waste may include surplus excavated materials, used lumber for trenching works, waste generated from demolition of existing camp, structures, construction debris, and so forth. Hazardous waste may include oil and chemical that are used during construction operations. Leakage of hazardous waste such as soil and chemical may cause soil contamination. Domestic waste will be generated by construction workers at construction site, workers' camp, and other facilities. | Direct risk (mostly local at construction site, camp sites, may extend if not managed appropriately (e.g., leaked oil going to reservoir and goes into water channels) | Moderate | Low | Soil, water sources, people, animal near discharge sources | Operation activities at construction site and worker's camp, warehouse, material transportation (e.g., at borrow pits, supply points, construction site & camp Overuse of agri-chemicals for crop | Sub-Component 3.1 and 3.2 Sub-Component 3.1 |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|--|--|---|---------------|---------------|--|---|---|
| | | | | | | diversification and intensification | |
| ESS4 | Community Health and Safety | | | | | | |
| Sexual Exploitation and Abuse, Sexual Harassment, and Violence against Children due to labor influx | The risk of Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH SEA/SH) is anticipated due to 1) concentration of labor engaged for Kantout upgrade and construction of irrigation channel, 2) frequent visits of project workers, and 3) increased level of this risk due to pre-existing SEA/SH issues in the subproject's area of influence. It is noted that labor influx includes not only workers but also people who are local and non-local that gravitate to construction sites temporarily to provide logistics services for contractor's workers during construction stage. Given the high number of workers and most skill workers are migrants. This risk of Violence Against Children (VAC) is also anticipated due to increased level of SEA/SH and pre-existing risk of local domestic violence that might be present before the project. | Induced risk (mostly associated with labor influx (at construction site, camp site, nearby residential areas), case by case | Low | Low | Project workers and local peoples, primarily with vulnerable individuals including female and children | Construction activities, but not excluding any other project activities | Sub-Component 2.1 and 2.2 |
| Dam Safety | There is a risk of reservoir break that may cause flooding to the downstream, resulting in loss of crop, houses, other assets, or even casualties for the downstream population. | Direct risk (dam is designed to make this risk unlikely), downstream, at dam failure and may last till drain | Moderate | Low | People, animal, and assets downstream the water flow | Upgrading of reservoirs/ dams | Sub-Component 2.1 and during operation stage |
| Road and Traffic safety | Increased risk of road accidents, particularly for people living in the vicinity of the civil works and those traveling near the construction areas – during construction phase, particularly when road condition is not good and safety measures are not effectively carried out by contractors. Risk of road accident may be due to people' failure in attending their children which put children at risks of accidents. | Direct risk, case by case, mostly during day-time construction | Moderate | Low | Associated with project workers and local people traveling near construction sites and on transportation routes. Risk is mostly with | | Component 1,2, 3, 4 and 5 |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|-----------------------------|---|--|---------------|---------------|--|--|----------------------------------|
| | Given increased traffic flow between construction sites and other destination such as borrow pit, quarry, material supply warehouses, there is a risk of road traffic accident on the part of contractors' workers, and local inhabitants such as pedestrians, motorcyclists, cyclists, and those on animals or animal drawn carts. Reasons may also include violation of speed limits, lack of awareness of pedestrian, drivers' behavior/drunken driving, or unexpected certain traffic circumstances. All project workers and local people near construction sites and routes connecting construction sites and material supply sites, quarry, borrow pits are exposed to traffic and road safety risks. | | | | those making frequent road travel | | |
| Disease transmission | Communicable diseases that are air-borne and water-borne may be spread due to concentration of the labor influx and their interaction with local inhabitants during the construction stage. Labor influx may include workers that are engaged by construction contractors from other localities, and including those who come to provide logistics services which include both local and non-local people. Recent common communicable disease may include COVID-19, STD (e.g. HIV/AIDS) and vector borne disease such as malaria, dengue fever that may arise in remote, mountainous area where dams and reservoirs are located. These risks are likely increased if areas with IP people who may not be aware of these risks and know/ take appropriate measures to avoid/reduce such risks. | Direct risk, depends on factors such as season, endemic level, scale and duration depending on control measure taken | Low | Low | Mostly workers at construction sites and local people who interact with these workers. | Interaction between people carrying the disease and healthy people, particularly between immigrant workers with others | Sub-Component 2.1 and 2.2 |
| Unexploded Ordinance | Although effort has been made to demine across the country, mortar shells, aerial bombs, and other unexploded ordnance may be found within the subproject area because some previous demining operations have been carried out at shallow depths for generation of UXO maps. Given this, it is not known if there is UXO located in the proximity of the construction sites where physical activities such as excavation, earthworks, etc. are carried out. Of particular concern is the hazard posed by | Direct risk (Small scale and local), before construction | Moderate | Low | Workers at construction sites and local people passing by | Construction activities that involves excavation, earthworks. | Sub-Component 2.1 and 2.2 |

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|---------------|--|--|---------------|---------------|---|---|--|
| | <p>unexploded ordinance that were left during the war, particularly in area where deep excavation is required for construction of structure of the reservoir such as at spillway, inside the reservoir where partial dredging may be required for only certain area near dyke structures, or where new irrigation canals and road along new canals are built.</p> <p>UXO risk may be at location where workers' camp is set up and were heavy equipment, machinery, and vehicles are parked.</p> | | | | | | |
| Health | <p>Overall health Farmers and involved labor may be affected in terms of health (long-term) due to potential a) increased use of chemical inputs (e.g., pesticide) which affects them directly through inhalation, and through secondary sources such as polluted surface/ underground water and produced crop⁷. It may also affect consumer (in the long run) due to pesticide residue</p> | Induced risk (small scale and long-term, especially after crop intensification during project life and beyond) | Moderate | Low | Farmers, hired labor for crop care | Crop intensification | Sub-Component 3.1 (Increased water and labor productivity through integrated crop water management) |
| | <p>Risk of water pollution Increased use of chemical for intensified crop production may affect the overall water quality and affect people who rely on such water for domestic use in the nearby area (some kilometer) downstream of the farming area. Impacts may include two levels: impact on surface water as immediate effect and underground water as long-term impact.</p> | Induced risk (small scale and long-term, especially after crop intensification during project life and beyond) | Moderate | Low | Farmers and people living in immediate vicinity | Crop intensification | Sub-Component 2.1 |
| | <p>Risk of increased vector-borne disease due to propagation of aquatic invertebrates. Increased command area and number of crops per year may provide favorable habitat for mosquitoes and snails, particularly vector-borne diseases such as malaria, dengue fever.</p> | Induced risk (small scale, seasonal, during project life and beyond) | Moderate | Low | Farmers and people living in immediate vicinity | Crop intensification | Sub-Component 2.1 |

⁷ It is estimated that 61% of rice farmers in Cambodia consume the rice they produce (Cambodia Inter-Censal Agriculture Survey 2019).

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|--|--|---|---------------|---------------|--|---|--|
| ESS5 | Land acquisition, Restrictions and Land Use and Involuntary Resettlement | | | | | | |
| Land acquisition | <p>At reservoir location, the new dyke (embankment) was built within the boundary of the existing reservoir which is under government's land management. No land acquisition from local households is foreseen.</p> <p>In command areas, minor land acquisition (1.5ha of public and private land) would be required to allow construction of 2 roads (total length: 2.5 km).</p> | Direct impact (small scale, localized at dam site and linear for canal building), before construction | Low | Low | People living near existing reservoir and farmers in command area | Upgrading of reservoir and expansion/upgrade irrigation canals | Sub-Components 1.1 and 1.2 |
| | Possible small-scaled land acquisition required for construction of post-harvest facilities | Direct, localized, before construction | Low | Low | Local people/public land | Construction of collection center, storage houses, market sheds | Sub-Components 3.3 |
| Reduced Downstream Water Access | Retention of water for upstream use would cause indirect impacts ⁸ , to the downstream population – to varying degree. For instance, downstream population who currently use water for farming and/or domestic purpose, or for income generation activities, may be affected due to restricted water access during the dry seasons when water is stored in the reservoir (upstream) for the planned irrigation and water supply purpose. Downstream impacts, once happen, may result in temporary economic displacement, particularly when gates are closed to retain a pooled water body for later use during dry season. Downstream impacts may cause loss of food producing opportunities and income which may affect their daily livelihoods activities (e.g., fishing, farming, recreational | Indirect impact ¹⁰ , with the command area and downstream, during dry season | Low | Low | Population living downstream the upgraded reservoirs (beyond the target command area of Kantout) | Upgrading of reservoirs for increased storage | Sub-Component 3.1 (Increased Water and labor Productivity through Integrated Crop Water Management) |

⁸ A direct impact is defined under ESS1 as an impact which is caused by the project and occurs contemporaneously in the location of the project.

¹⁰ An indirect impact is an impact which is caused by the project and is later in time or farther removed in distance than a direct impact, but is still reasonably foreseeable, and will not include induced impacts.

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|--|--|--|------------------------------------|----------------------------|---------------------|--|----------------------------------|
| | activities), and may cause cumulative impacts beyond the sub-basin area ⁹ (e.g., transboundary impacts). | | | | | | |
| ESS6 | Biodiversity | | | | | | |
| Fauna and Flora | <p>For aquatic animal, some, especially those in IUCN red list, may face small impact from project construction activity. However, the level of impact is low as these species are highly tolerant to shallow water condition (during construction stage), and to harsh weather conditions.</p> <p>During operation stage, inundation caused by increased water storage (from 0.25 to 1.5 million cubic meter) may increase submergence area (from existing 19ha to 114.69 ha) which may affect seedlings/young forest located in the submerged area of the reservoir. These young species are important species (precious wood) that are listed in IUCN red list. The level of impact depends on the extent to which the area is submerged during rainy season. Inundation map shows large submergence areas which suggests that the impact of water on young forest and natural habitat, including food of the wildlife in the submerged area, is relatively high.</p> | <p>Direct impact (small scale, localized at dam site)</p> <p>Direct impact, within submerged area, seasonal inundation</p> | <p>Moderate</p> <p>Substantial</p> | <p>Low</p> <p>Moderate</p> | | <p>Construction of the new dyke of the reservoir and during operational stage of the reservoir</p> | Sub-Component 2.1 |
| Farming ecosystem | Increased use of agricultural chemicals may cause adverse impacts on non-target fauna and flora off-field due to runoff from rice field. Also, increased density of crops may crowd out the habitat that typically exist in less intensively used farmland. | Induced risk, command area and beyond, after successful crop intensification during project life and beyond) | Moderate | Low | Farming ecosystem | | Sub-Component 3.1 |
| Hunting, trading, and consumption | The presence of the project implementation workforce may lead to hunting or trapping of local wildlife at or nearby the subproject locations. This may be done for relaxation or in order | Induced risk, case by case (among contractor's | Low | Low | | Labor influx (1-1.5 years) and local workers who may | Sub-Component 2.1 and 2.2 |

⁹ It is estimated that water storage for Kantout would be increased by 1,200 % (from existing .25 CM to 3 CM).

| ESS | Description of E&S risks and impacts | Nature, Scale, Duration | Inherent Risk | Residual Risk | Potential Receptors | Key activities that cause risks and impacts | Project Component |
|--|--|---|---------------|---------------|---|---|--|
| of animal from the wild | to supplement protein in their diet. The risks can be quite severe where there is a large workforce or where the local wildlife is rare and endangered. There is also a risk to the aquatic species such as fish and frogs. | workers), during construction phase | | | | be interested in consumption of wild animal | |
| ESS7 | Indigenous Peoples | | | | | | |
| Exclusion of Vulnerable/ Disadvantaged Groups | People from vulnerable/ disadvantaged may be excluded from the consultation process because of various reasons. Common reasons include a) they live far away from the village centers, b) they don't speak the national language, c) they are typically silent in community meetings, d) women voices are not considered important because they don't know about water and irrigation which is mostly led by men, e) social norms prevent them from attending meetings outside their family. They may also be excluded/have limited access to temporary employment opportunities, e.g., jobs that are offered by construction contractors. | Risk of exclusion due to language barrier, acquisition of new technology, remote group, trial of new technology, assumption that IPs, vulnerable will adopt a new technology the same pace like other young, innovative peoples | Low | Low | IP, particularly those less active in community activities, female, elderlies | All planning and development activities under Comp 2 and 3 that fail to identify these groups within the community and engage them as per Stakeholder Engagement Plan | Sub-Component 2.1 Sub-Component 3.1 |
| ESS8 | Cultural Heritage | | | | | | |
| | There is no adverse impact on cultural heritage anticipated for Kantout based on two rounds of consultation with local people and village authority. | | Low | Low | | | |

5. MITIGATION MEASURES

5.1 Mitigation Measures for E&S Risks and Impacts

In this section, E&S risks and impacts associated with the construction and operation of Kantout subproject (Component 2 – Sustainable Water Service Delivery), and crop production (Component 3 – Increased Agricultural Productivity at Farm Level) are organized separately (by component) to facilitate effective management of component owners – MOWRAM and PDWRAM for Component 2, and MAFF and PDAFF for Component 3).

Table 3 – E&S risks, impacts, and proposed mitigation measures under MOWRAM and PDWRAM responsibility

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|--|------------------------|---|--------------|--|
| 1. CONSTRUCTION, including <ul style="list-style-type: none"> ▪ Rehabilitation of Dams/ Reservoirs/ Weirs (Sub-Comp 1.1) ▪ Construction of extended/new irrigation system (Sub-Comp 1.2 & 2.2) | Environment | | | |
| | Air Pollution | <ul style="list-style-type: none"> - Spray or sprinkle water on work surfaces regularly in windy and dry weather, when necessary. - Avoid open burning of debris, cut vegetation (trees, undergrowth) or construction waste materials. - Reduce the operation hours of generators, machines, equipment, and vehicles as much as possible and control vehicle speed. - Ensure regular maintenance of generators, machines, equipment, and vehicles used at project site. - To protect against dust and fumes, spray water onto the ground. - Construction equipment maintained to a good standard. Immediate repairs of any malfunctioning construction vehicles and equipment. - Equipment and vehicles not in use should be switched off. - Machinery and vehicles causing excessive pollution (e.g., visible smoke) will be banned from construction sites. - All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission standards. - Siting of concrete mixing plants, crushing plants, quarries and other facilities that cause high dust and/or gaseous emissions should be at least 500 m from settlements and other sensitive receptors (schools, hospitals, etc.). - Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid spills and dust emission. | ESS1 ESS3 | During pre-construction stage (e.g. setting up camp site, warehouse, UXO clearance), Construction stage/ Contractors |
| | Water Pollution | <ul style="list-style-type: none"> - Camp wastewater shall be fully treated first before being discharged to adjacent or nearby waterbodies. - Spoils, construction wastes and construction materials stockpile area shall be located away from water bodies and under no circumstances will these materials be dumped into watercourses. - Where required, sediment traps are installed to prevent intense sediment transport that may occur during floods which may endanger downstream areas. Sediment trap may need to be designed with a guiding channel to avoid the risk of unwanted sediment flushing (massive self-cleaning). | ESS1 ESS3 | During construction/ Contractors |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|------------------------------|---|--------------|-------------------------------------|
| | | <ul style="list-style-type: none"> - Do not fill up canals and creeks at the construction site. In case filling of local drainage system is necessary, consultation with local authorities shall be undertaken and their permission obtained beforehand. An alternative drainage shall be established before the existing canal is filled-up. - Prohibit placement of construction materials, waste storage areas or equipment in or near drainage channels and water courses. - Discharge of oily wastewater, fuel, hazardous substances and wastes, and untreated sewage to watercourses/canals and on the ground/soil shall be prohibited. - Provide adequate drainage at the construction sites and other project areas to avoid flooding of surrounding areas and minimize flow obstruction of existing watercourses. - Include in engineering drawing the construction of retaining structures such as gabion baskets, riprap, etc. for riverbank protection. - Obtain required permits indicating water sources and permissible volumes - Maintain communication with local communities during construction stage to ensure that local water users provide timely feedback on water quality, if any, during construction process. - Water will be sampled from upstream and downstream of the reservoir for quality test, before and after construction, with baseline established for monitoring purpose (See Section 9.1 for more information). Water test aims to check if construction activities will have impact on water currently used by people downstream the reservoir. Testing parameters will be selected based on potential receptors (e.g., fish species, community who use the water released from the reservoir etc.). National water standards will be used for water quality test. - Water quality will be tested before and after construction using 10 parameters: pH, DO, BOD5, CODmn, TSS, Salinity, NO3-1, T-N, T-P, Oil & Grease. - , and before scaling up adoption of farming and after that – for command area | | |
| | Noise & Vibration | <ul style="list-style-type: none"> - Avoid night-time construction in populated/village areas. - Minimize project transportation through community areas where possible. - Ensure proper maintenance and proper operation of construction machinery to minimize noise generation. | ESS1 ESS3 | During construction/ Contractors |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|----------------------|--|-----|----------------------------------|
| | | <ul style="list-style-type: none"> - Where possible, maintain existing trees, bushes, vegetated areas, to prevent part of sound (that may be generated from construction site, vehicle, operating heavy equipment) from reaching nearby residential areas. - No noisy construction-related activities will be carried out from 21:00 hours to 06:00 hours along residential areas, hospitals, schools and other sensitive receptors. - Noisy construction activities will be avoided during religious or cultural events in close proximity to the subproject such as Friday prayers attended by Muslim Cham (if relevant), when ethnic Khmer are attending temple festivals or holding weddings, or similar applicable to IP if relevant, etc. - All construction equipment and vehicles shall be well maintained, regularly inspected for noise emissions, and shall be fitted with effective muffler and other appropriate noise suppression equipment consistent with applicable national and local regulations. - Use only vehicles and equipment that are registered and have necessary permits. Truck drivers and equipment operators should avoid, as much as possible, the use of horns in densely populated areas and where there are other sensitive receptors found such as schools, temples, hospital, etc. - Impose speed limits on construction vehicles to minimize noise emission along areas where sensitive receptors are located (houses, schools, temples, hospitals, etc. - Provide temporary noise barriers (3–5-meter-high barrier can reduce 5–10 dB(A)), as necessary, if site works will generate high noise levels that could disturb nearby households, hospital, school and other sensitive receptors. - Restrict use of vibrating rollers and operation of heavy equipment near sensitive structures. | | |
| | Workers' Camp | <p>Operation of workers' camps will generate solid wastes. Poor waste management could cause odour and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact neighboring landscape.</p> <ul style="list-style-type: none"> - Segregate and regularly collect wastes at worker camps and offices. - Construction/workers' camps shall be provided with garbage bins with covers. - Prohibit disposal of solid wastes into canals, rivers, other watercourses, agricultural fields and public areas. | | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-----------------------|--|--------------|-------------------------------------|
| | | <ul style="list-style-type: none"> - There will be no site-specific landfills established by the contractors. All solid waste will be regularly collected and removed from the work camps and disposed to areas approved by local authorities. - Contractor to reuse materials whenever feasible to reduce waste. - Prohibit burning of construction and domestic wastes. - Recyclables shall be recovered and sold to recyclers. - Residual and hazardous wastes shall be disposed of in disposal sites approved by local authorities. - Ensure that wastes are not haphazardly dumped within the project site and adjacent areas. - Workers camp location and facilities shall be located at least 500 m from residential area and agreed with local communities and local officials. - Drainage shall be provided to facilitate the rapid removal of surface water from all areas and prevent flooding and accumulation of stagnant water. - Wastewater effluents from contractors' workshops and equipment washing-yards will be passed through gravel/sand beds and all oil/grease contaminants will be removed before wastewater is discharged. Oil and grease residues shall be stored in tightly covered drums. Such wastes shall be disposed consistent with national and local regulations. - Construction/workers camps shall be cleaned up after use to the satisfaction of MRD and local community. All waste materials shall be removed and disposed to disposal sites approved by local authorities. - Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees/shrubs as soon as practicable after it is vacated and cleaned. | | |
| | Soil pollution | <p>In construction</p> <ul style="list-style-type: none"> - Schedule construction activities during the dry season as much as possible. - Store fuels, oils, and chemicals safely in areas on an impermeable surface with proper containment berms. Spillage of oil and chemical must be handled immediately to prevent infiltration. - Cover all restored areas with topsoil and re-vegetate (plant grass, fast-growing plants/trees) construction areas quickly once work is completed. <p>Solar panel (used in irrigation)</p> | ESS1 ESS3 | During construction/ Contractors |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|--|--|----------------|--|
| | | <ul style="list-style-type: none"> - Solar panels are made up of glass, metal, and plastic which can be used again once the panel has reached its life end. Recycling solar panels could be started by separating and isolating all the constituent components, including the special photovoltaic panel glass, aluminum frame, connection box, and connection cables. A local professional recycling unit should be identified to proceed with recycling. - Avoid throwing, burying unused batteries and panel in the field or at home which may cause soil pollution | | |
| | Impacts on Flora and Fauna | <ul style="list-style-type: none"> - No cutting of trees or destruction of vegetation will be allowed other than on the construction site. - No hunting, fishing or collection of animal and plant materials will be permitted. - Choose siting of construction works to avoid the cutting and clearing of mature shady vegetation. - Inspection to ensure replanting and restoration work completed. - River biota and fisheries will be assessed as part of site-specific ESMP preparation. During project implementation, and before subproject implementation, analysis and assessment of risks and impacts on flora and fauna including fisheries, will be conducted. River biota and fisheries assessment should also be based on seasons for water structure work where construction takes place across seasons. Mitigation measures will be in place and will be implemented as part of Contractor's ESMP and is subject to PMU periodic monitoring and PMU's independent monitoring. - Ensure for migratory fish passage/ladder. - Chance Find Procedure include requirements that that if such above species are found, they must be kept intact, protected, and immediately reported to relevant site managers for appropriate handling. Wild animals spotted on the construction sites must not be caught for sale and/or consumption in any way. | ESS 1 ESS 3 | Pre- and during construction/ Contractors |
| | Hazardous and Non-hazardous Waste | <p>Segregate waste (e.g. hazardous and non-hazardous), collect, store and transport waste to designated waste disposal sites.</p> <p>For hazardous waste in construction</p> <ul style="list-style-type: none"> - Setting up a systematic waste management and chain of custody system considering waste reduction at source, recycling, temporary storage, transport, and final disposal. | ESS 1 ESS 3 | During construction/ Contractors |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-----------------|---|-----|----------------------------------|
| | | <ul style="list-style-type: none"> - Develop procedures for the safe collection, storage, transport, and disposal of project hazardous waste at licensing/permitting site. - Never dispose spent oil on the ground and in water courses as it can contaminate soil and groundwater (including drinking water supplies). - Have a diluted wash wastewater disposal ground tank with internal water proofing layer to protect leakage. - Store fuel and hazardous substances and wastes on bunded paved area with roof and interceptor traps so that accidental spills do not contaminate the environment. If spills or leaks do occur, undertake immediate clean up. - Train relevant construction personnel in handling of fuels and other hazardous substances as well as spill control and clean-up procedures. - Ensure availability of spill clean-up materials (i.e. absorbent pads, etc.) specifically designed for petroleum products and other hazardous substances where such materials are being stored. - Segregate hazardous wastes (oily wastes, used batteries, fuel drums) and ensure that storage, transport and disposal shall not cause pollution and shall be undertaken consistent with national and local regulations. - Store waste oil, lubricant and other hazardous materials and wastes in tightly sealed containers to avoid contamination of soil and water resources. - Ensure all storage containers of hazardous substances and wastes are in good condition with proper labelling. - Regularly check containers for leakage and undertake necessary repair or replacement. - Store hazardous materials above flood level. - Storage areas for fuel, oil, lubricant, bitumen and other hazardous substance will be located at least 100 m away from any watercourses. - Storage, transport and disposal of hazardous wastes, including spill wastes, shall be consistent with national and local regulations. - Wherever possible, refueling will be carried out at a fuel storage area. - Refueling shall not be permitted within or adjacent to watercourses. - Where significant amount of oily wastewater or spill/leakage of oil and grease may occur (i.e. equipment maintenance areas), drainage leading to an oil- water separator shall be provided for treatment of wastewater. The oil-water separator shall be regularly skimmed of oil and maintained to ensure efficiency. | | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-----------------|--|-----|----------------------------------|
| | | <ul style="list-style-type: none"> - Vehicle maintenance and refueling will be confined to designated areas in construction sites designed to contain spilled lubricants and fuel. - Adequate precaution will be taken to prevent oil/lubricant/hydrocarbon contamination of channel beds. Spillage if any will be immediately cleared with utmost caution to leave no traces. - All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities (i.e. firefighting equipment, sorbent pads, etc.) to combat emergency situations complying with all the applicable statutory stipulation. - For canal rehabilitation works, the project will have proper sludge handling and management procedures under ECoPs to manage the excavated sludge materials and to prevent harmful exposure to workers and surrounding communities. <p>For hazardous waste in agricultural production</p> <ul style="list-style-type: none"> - Crop residue: straw and stub should be collected for use as animal feed or for other purpose such as for mushroom growing, or for sale, or reuse for other farming purpose (e.g. incorporating into soil to improve soil fertility) - Empty pesticide containers: collected and kept appropriately as per recommendation in IPM good practices. Never through and leave empty pesticide contain in the field which may contaminate soil and surface water which may affect aquatic animal and even human. <p>For non-hazardous waste</p> <ul style="list-style-type: none"> - Reduce, recycle, and reuse waste [e.g. plastic wastes, electronic waste, agricultural waste (natural, animal faeces for later use as manure, plant waste)] wherever and whenever possible. - Latrines must be built at construction site and camp site for appropriate domestic waste management. <p>For dredging materials</p> <ul style="list-style-type: none"> - Use or reuse the dredge material on properties with a residential or recreational use - Prepare short-term placement of dredge material during off-loading or re-handling activities. The quantity of dredge material to be stored at the site must not exceed the quantity of material that can reasonably be managed at the site during the construction periods - Dewatering the dredge material prior to reuse of the materials | | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|--------------------------------|---|----------------|-----------------------------------|
| | | <ul style="list-style-type: none"> - Manage dredge material in a manner so as to minimize the amount of material returned by spillage, erosion or other discharge to waters during transportation activities | | |
| | UXO | <ul style="list-style-type: none"> - In case of finding the suspected objects during any work, UXOs must be followed as stated in section 5.5.2 - An UXO clearance plan will be developed as part of site-specific ESMP, and is implemented before commencing project activity. - Conduct assessment of UXO risks before site clearance. UXO screening/assessment will be carried out by certified UXO experts before any physical/construction activities, including mobilization of contractors to construction site, are allowed. - In case UXOs are found by certified experts during on-site screening, removal of UXO will be carried out by certified experts. - A UXO clearance certificate shall be obtained from related authority for each subproject prior to commencing any subproject activities - As part of site-specific ESMP, conduct training and awareness activities for local community with regards to UXO risks and chance finds. | ESS 1 ESS 3 | Pre-construction / Contractors |
| | Quarry and Borrow Sites | <ul style="list-style-type: none"> - Sourcing of quarry and borrow materials from existing licensed sites shall be preferred over establishment of new sites, as much as possible. - Quarries and borrow pits shall not be established in national, provincial, district and village conservation forests and other ecologically sensitive and protected areas. The required materials are to be sourced from the qualified and licensed quarries. You may put the quarries and burrow pits in the separate phrase. - Borrow/quarry sites shall not be located in productive land, avoid land acquisition and following the RPF. - In case the Project will involve new quarry/borrow sites/spoil disposal sites, environmental assessment and approvals will be needed. Such sites shall be located over 500 m away from residential, school, hospital and other sensitive receptors. - Prior to extraction, topsoil (about 15 cm) shall be stockpiled, preserved and then refilled after completion of quarry/borrow pit operation for rehabilitation purposes after excavation is over. | | Construction / Contractors |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-----------------|---|-----|----------------------------------|
| | | <ul style="list-style-type: none"> - Dust control during excavation and transport (i.e. water spraying on access roads and provision of truck cover) shall be undertaken in areas where there are sensitive receptors such as residential areas, school, hospital, etc. - Long-term material stockpiles shall be covered to prevent wind erosion. - During quarry and borrow site operation, provide adequate drainage to avoid accumulation of stagnant water. - The use of riverbed sources shall be avoided, as much as possible. However, if this is unavoidable, the contractor shall minimize use and avoid small rivers and streams. Alluvial terraces or alluvial deposits which lie on the riverbeds but not covered by water in normal hydrological conditions shall be preferred. Extraction of these materials, if necessary, shall have prior approval from MOWRAM, MOE and provincial authorities. - Confine quarrying of riverbed materials to less than 20% of river width in any location and keep away from riverbanks. Extraction of materials shall have prior approval from MOWRAM, MOE and relevant provincial authorities. - In case riverbed material is extracted, protect and reinstate riverbanks in case unexpected erosion occurs. - Quarry and borrow sites must be selected amongst those offering the highest ratio between extractive capacity (both in terms of quality and quantity) and loss of natural state. - Upon completion of extraction activities, re-contour borrow/quarry pit wall or fill-up when there are available and suitable materials such as excavation spoils, replace topsoil, and re-vegetate with native species such as grasses and fast-growing shrubs and trees. - Upon completion of extraction activities, borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. - Borrow pits will be left in a tidy state with stable side slopes and proper drainage in order to minimize soil erosion, siltation of nearby bodies of water and to avoid creation of water bodies favorable for mosquito breeding. - To avoid or prevent people from drowning when pits become water-filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented. - It is possible that villagers may request borrow pits to be excavated so that they may be used as water reservoirs or fishponds. If this were to be agreed between | | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|---------------------|--|-------------------------|---|
| | | the contractors and the villagers, all the full safety measures detailed above must be observed. Such agreements would be formalized in writing between the contractors and the villagers after full discussion with all concerned parties. | | |
| | Biodiversity | <ul style="list-style-type: none"> - Workers will be trained to identify and release aquatic species if found during construction period - Construction methods will be selected to minimize disturbance on aquatic animal, birds in both reservoir and command area. Specific measures will be proposed in updated ESMP to minimize disturbance on aquatic animal and birds in reservoir and command areas. These mitigations will be incorporated into Contractors' ESMP to facilitate implementation on the part of Contractors. <p>Additional work for Year 1 of project implementation:</p> <ul style="list-style-type: none"> - A stocktaking of existing baseline (provided in Annex 5) will be undertaken early in Year 1 of project implementation. Based on this, scope of additional baseline survey will be proposed and baseline survey conducted to facilitate a Critical Habit Assessment (CHA) exercise. The CHA results will serve the basis for updating mitigation measures, including development of a Biodiversity Management Plan. Additional survey, CHA, and update of mitigation measure will be completed prior to commencing construction. The TOR for these works, and its reports, will be reviewed and cleared by the Bank. Once these works are completed, the subproject ESMP will be updated to incorporate the assessment results and proposed mitigation actions. | ESS 1 ESS 3 ESS 6 | During construction / Contractors |
| | | <p>Reservoir area</p> <ul style="list-style-type: none"> - The flooded/submerged area will be increased from 19ha (existing) to 118ha (designed). An assessment of potential impact will be carried out for the additional 95.69 ha subject to submergence area. Based on such assessment, a Biodiversity Management Plan would be prepared (See initial plan at Section 5.2 of this document). - Based on the potential loss of biodiversity, particularly young precious trees, a tree replanting plan may be prepared to offset the loss of tree due to inundation during reservoir operation. The location where plants would be replanted, including type of plants, and implementation costs, would be determined based on consultation with local community and authorities. <p>Command area</p> | | During operation stage/ PMU of MAFF PMU of MOWRAM |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility | |
|---------------------|---|--|---|--------------------------------------|--|
| | | <ul style="list-style-type: none"> - Good agricultural practices including Integrated Pest Management (IPM), integrated crop management, alternative wet and dry (AWD), drip irrigation, will be introduced for promoting adoption by farmers in the command area. - These practices help promote appropriate/reduced use of chemical inputs (e.g. pesticide, fertilizers) which reduce potential water and soil pollution, and reduce potential adverse impact on the farming biodiversity. | | | |
| | Damage to community facilities/ Disruption to access | <ul style="list-style-type: none"> - Every effort and care will be exercised by contractors and subcontractor not to damage existing public facilities such as irrigation channel, cable, electricity lines, roads, paths, etc. - If damaged, contractors will repair damaged facilities at Contractor's costs and restore the functionality of the damaged facilities shortly – to the satisfaction of the community, so as not to affect community's living and production activities. - Contractors and subcontractors will take necessary measures to avoid disruption of access by local people to their home, road, path leading to the field, or irrigation channels, etc., which affect their daily living and production activities. | | During construction / Contractors | |
| | Social | | | | |
| | Land Acquisition & Economic Displacement | <ul style="list-style-type: none"> - In the command area, there is a possibility that some land may be required to allow construction of 4 road with a total length of 2.5 km. An abbreviated Resettlement Plan would be prepared in accordance with the project's Resettlement Policy Framework to compensate for the affected households (e.g. loss of land, loss of economic opportunities). | ESS 1 ESS 5 ESS 7 | Pre- construction / PMU | |
| Labor Influx | <ul style="list-style-type: none"> - Recruit a portion of the workers required for the project locally. Bidding and contract documents will encourage contractors to hire local workers. - Train local workers within a reasonable time frame to meet project requirements. Costs for training will be borne by contractors. - Manage workers' accommodation (commute or reside on site) effectively depending on project's need. - Avoid and when avoidance is not possible, minimize and manage labor influx. - Prepare Code of Conduct (CoC), inform and train workers in the CoC and ensure it is signed by all workers. - Implement SEA/SH training. - Ensure equal pay for equal work for women. - Hiring of people under 18 years of age is not permitted. | ESS 1 ESS 2 ESS 7 | During construction / Contractors, PMU | | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-------------------------|--|----------------|---|
| | SEA/SH | <ul style="list-style-type: none"> - Explicitly state zero tolerance for sexual harassment, exploitation, and abuse within the workplace. - Require CoC to be signed by all construction workers. - For victims coming forward: referral to qualified SEA/SH service provider. The GRM will include a confidential channel for reporting SEA/SH. - Strict Code of Conduct for workers with no tolerance for physical or verbal abuse of women or children - Training to workers on maintaining good community relations, with emphasis on proper conduct around women and children. - Training on SEA/SH and VAC for community members, in particular women and girls (may be done separately for men and women). - Ensuring workers sites are situated (at least 500m – safety distance from schools and/or other areas where children congregate). - Children prohibited from construction site and worker’s camp. - Ensure access to grievance redress mechanisms. - Support (in the form of training, awareness raising, etc.) to local law enforcement to act on community complaints regarding SEA/SH and VAC. - Provision of information to local communities about the contractor’s policies and responsibilities, including the Contractor’s Code of Conduct and minimum working age (see Annexes 5.2 & 5.3). - Provide counselling services for male and female workers, wives and other female partners of contractors workers. - Build partnerships with local health providers and SEA/SH service providers to conduct community awareness activities, and referrals. - Implement public awareness campaigns to address sexual harassment in transport services and hubs, and training of police on women’s security needs when using transport. - Ensure good lighting is maintained in and around worker camps, and there is separate facilities (e.g. bathroom and toilet) for men and women in work camp | ESS 1 ESS 2 | Pre- and during construction / Contractors, PMU |
| | Social Conflicts | <ul style="list-style-type: none"> - Regularly inform in advance the local officials and affected residents of the location and schedule of construction activities which may cause impacts on the environment and life of people. - Locate construction camps away from communities (at least 500 m away) in order to avoid social conflict in using resources and basic amenities such as water supply | | Pre- and during construction / Contractors |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|--|---|-----------------------------------|--|
| | | <p>and to avoid close contact between workers and the community (in particular children).</p> <ul style="list-style-type: none"> - Maximize number of local people employed in construction and non-construction jobs and provide on the job skills training for local people employed. - Maximize goods and services sourced from local commercial enterprises. - Ongoing consultations and awareness raising of local communities and raising awareness in each community on GRM. | | |
| | <p>Water Use Conflict between Upstream and Downstream</p> | <ul style="list-style-type: none"> - During subproject design, water availability, storage capacity, and water needs of upstream and downstream population is calculated to inform design, and water use coordination during project operation. - Water user groups should be established for upstream and downstream population and should be coordinated by a higher level committee/group to negotiate and optimize water coordination - Guidelines/Manual should be developed (under Subcomp 3.2) to provide guideline for upstream and downstream communities at subprojects to meet, discuss, and achieve consensus on how water is distributed for equal use between upstream and downstream population | <p>ESS 1 ESS 7 ESS 10</p> | <p>Design, Operation/ PMU/Local governments/ Farmers Water Users Group</p> |
| | <p>Downstream water access and Return flow</p> | <ul style="list-style-type: none"> - Water harvested for Kantout reservoir will be collected from the watershed. Increased storage in the reservoir decrease water discharge downstream the reservoir. <p>With regards to return flow, the small (<5ha) canal supply areas will generate negligible return flows. Key reasons include: a) irrigation system is designed (with culvert and gates) to enable farmers to get only the amount of water essential to their crop during the cropping season, b) water saving techniques including alternative wet dry and drip irrigation will be promoted for rice and cash crops, respectively, across the project This allows farmer to reduce overuse of irrigation water and reduce the amount of surface (and subface) water that leaves their field following application of irrigation water; c) water will be coordinated by Farmer User Water Community (FUWC) at command area level to increase water use efficiency. This minimizes water overuse (wasting) and maximize the use of available water. These measures, in aggregate, minimize the return flow. Thus, it is anticipated the impact on downstream water uses in the river is negligible.</p> | <p>ESS 1 ESS 10</p> | <p>Design, Operation/ PMU/Local governments/ Farmers Water Users Group</p> |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-----------------|---|-----|----------------------------------|
| | | <p>In term of downstream impact, under natural conditions, the Kantout Stream is ephemeral and ceases to flow early in the dry season. The 7.1 km² catchment upstream of the storage contributes a minor share of the wet season flows and so whilst the dam does reduce flows there are significant side-catchments that allow the wet season flow pattern to continue. So, minimized return flow combined with increased flow (downstream the reservoir) would not cause adverse impact on domestic water use and aquatic life in downstream waterway.</p> <p>To further reduce potential impact, the following arrangements are proposed:</p> <ul style="list-style-type: none"> - Cascading Cross Regulators (CRs) will be established within the Ou Kchoung stream section located downstream the reservoir (and apply similarly for Kantout reservoir). To minimize reduction of water flow downstream the reservoir, these CRs will be open fully during wet season. During dry season, however, when water become scarce, these CRs will be opened intermittently to create a pool of water that will be fed into irrigation canals located close to these CRs. It is also noted that during dry season, the cascading CRs will be operated in turn (e.g., approximately one for each CR rotation for a duration of about 6 days). During dry season, for CR which gets its turn, flow is allowed to overtopped gates for environmental flow and for domestic water supply downstream reach of the stream. It is anticipated there would be no impact on the aquatic lives and the need for water supply downstream Kantout reservoir. There is environmental flow in the stream reach throughout the year. In a word, the design aims to establish an equilibrium between the irrigation needs and water supply need, particularly during dry season when water become scarce (meaning the design balance the needs of water for two purpose: 1) irrigation and 2) water supply, particularly during dry season. - Return flow from agriculture will be strictly monitored by the Provincial Department of Industry, Science, Technology & Innovation (PDISTI) with oversight from Ministry of Industry, Science, Technology & Innovation (MISTI). This monitoring is coupled with project's promotion and adoption of agricultural technologies (e.g IPM, alternative wet dry to save irrigation water, laser land leveling, SRI...) which, in aggregate, aim to minimize chemical use, and residue, and minimize overuse of irrigation water. In | | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|---|---|-----------------------------------|---|
| | | <p>addition, SCADA will be also piloted to provide a real-time water use monitoring to assist water coordination decision making.</p> <ul style="list-style-type: none"> - It is also noted that water samples are required to be taken by the owner of water works and by PDI. Water samples are sent to Phnom Penh for testing at MISTI's laboratory. During post-project rehabilitation, the testing activities will be maintained – as per national regulation, to ensure water downstream the command area meet the national quality for use for domestic water purpose. - | | |
| | <p>Exclusion of Disadvantaged/ Vulnerable Groups</p> | <ul style="list-style-type: none"> - Vulnerable/Disadvantaged group will be identified for each subproject (based on guidance from SEP) - Consultation is conducted with identified groups using the consultation methods (based on guidance from SEP) - Needs and expectation of vulnerable group is assessed in relation to the overall intended benefit of the subprojects which include both irrigation access (Comp 2) and access to improved farming technologies that are appropriate to the groups (e.g. culturally appropriate for IP peoples) | <p>ESS 1 ESS 7 ESS 10</p> | <p>Design, during construction / Contractors, PMU</p> |
| | <p>Elite capture</p> | <ul style="list-style-type: none"> - Consultation will be conducted farmers in potential command area, focusing on vulnerable/disadvantaged groups - Alternative livelihoods for vulnerable group are identified based on their needs vis-à-vis project's investment eligibility - Conduct consultation at community level (in the command area) to achieve a consensus on how water needs is balanced between different groups in one command area. | <p>ESS 1 ESS 7 ESS 10</p> | <p>Design, Operation / PMU</p> |
| | <p>Health and Safety Impacts</p> | <ul style="list-style-type: none"> - Display safety warning signs in all workplaces where safety hazards are present. - Provide all necessary protective equipment for workers exposed to hazardous and danger activities. - Maintain first aid kits on site for construction workers. - Provide clean potable water on site. - Deliver training on ECoPs to all construction workers. - Provide occupational health and regular safety training and toolbox briefings. - Make sure all construction workers are aware of the GRM and that they can access it. | <p>ESS 1 ESS 2 ESS 4</p> | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|------------------------------------|---|-------------------------|--|
| | Community Health and Safety | <ul style="list-style-type: none"> - Fence off all work sites adjacent to communities to avoid unauthorized access to the project sites and to prevent potential injuries. - Display warning signs including at unsafe locations. - If school children are in the vicinity, traffic safety personnel direct traffic during school hours. - Control driving speeds of project vehicles particularly when passing through communities or nearby schools, health centers or other sensitive areas. - Make sure the community is aware of the GRM and that they can access it. - Appoint an Environmental Health and Safety Officer (EHSO) who shall be responsible for training, monitoring and reporting on ESHS concerns and implementing health and safety related-programs. - Conduct orientation for construction workers regarding emergency response procedures and equipment in case of accidents (i.e. head injury from falling, burns from hot bitumen, spills of hazardous substances, etc.), fire, etc.; health and safety measures, such as on the use of hot bitumen products for paving of project roads, etc.; prevention of HIV/AIDS, malaria, diarrhea, and other related diseases, as well as Code of Conduct (including discussion of SEA/SH/VAC). - Regularly train/remind drivers of strictly observing speed limits and exercise good driving practices when driving construction supported vehicles through residential areas as well as other sensitive areas such as schools, pagodas, hospitals, markets, and other populated areas, including parking. - Educate drivers on safe driving practices to minimize accidents and to prevent spill of hazardous substances and other construction materials by providing covers over transporting dump trucks. - Barriers (i.e., temporary fence) shall be installed at construction areas to deter pedestrian access to these areas except at designated crossing points. - Sufficient lighting at night as well as warning signs shall be provided in the periphery of the construction site. - The general public/ local residents, and in particular children, shall not be allowed in high-risk areas, i.e., excavation sites and areas where heavy equipment is in operation. - Provide fencing on all areas of excavation greater than 2m deep. - Ensure reversing signals are installed on all construction vehicles. | ESS 1 ESS 2 ESS 4 | Pre- and during construction / Contractors |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-------------------|---|-----------------------------------|--|
| | | <ul style="list-style-type: none"> - Measures to prevent malaria if in areas where malaria is an issue, shall be implemented (i.e. provision of insecticide treated mosquito nets to workers, spraying of insecticides, installation of proper drainage to avoid formation of stagnant water, etc.). - Discharge of untreated sewage shall be prohibited. - Conduct road safety trainings for workers and roadside community. - Provide trainings on HIV/AIDS and STDs to workers and the community (separately) - Provide trainings on SEA/SH and VAC to workers and the community (separately) - Ensure particular attention is provided to the needs of women and other vulnerable persons. For instance, specific trainings for them should be facilitated by appropriate trainers (i.e. women-only training on HIV/AIDS and/or SEA/SH should be led by a female trainer). - Ensure access to grievance redress mechanism. - Ongoing consultations and awareness raising of local communities. | | |
| | Dam Safety | <ul style="list-style-type: none"> - Adopt recommendations from dam safety reports, including recommendation from dam safety due diligence, proposed emergency preparedness and response plan - The consequence Category must be reviewed following completion of a dam break study - Install a lake level measurement gauge upstream of the spillway - Investigate the nature of the foundation material beneath the dam from the downstream toe - Clear the vegetation from the upstream and downstream slopes and for a margin of 10m from the downstream toe - Construct a toe drain from both abutments, graded to fall toward the dam maximum section, 3m from the toe of the embankment - Develop a surveillance plan incorporating the basic activities described in the inspection report - Develop an operation and maintenance plan incorporating the basic activities described in the inspection report - Develop an emergency preparedness plan for the dam and provide training to staff in its operation | ESS 1 ESS 2 ESS 7 ESS 10 | Design, Construction, Operation / PMU, Contractors, PoWRAM |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|--|--|-----|----------------------------------|
| | | <ul style="list-style-type: none"> - The project will also develop the Emergency Preparedness and Response Plan for each dam and will adopt recommendations from all relevant dam safety reports/plans. | | |
| | Child Labor | <ul style="list-style-type: none"> - Apply LMP for age check prior to engagement of labor | | |
| | Underpaid pay and unequal treatment | <ul style="list-style-type: none"> - Encourage Contractors to provide equal pay for men and women doing the same type and amount of works, particularly when works are offered to unskilled, local workers (including ethnic minority) | | |
| | Road and Traffic safety | <ul style="list-style-type: none"> - Conduct public awareness raising activities (IEC) to ensure local people and road user are aware of road safety regulations and risks and take action accordingly while using road; - Monitor and observe speed limit; | | |
| | Disease contraction/transmission | <ul style="list-style-type: none"> - Conduct public awareness raising activities (IEC) to ensure local people and contractors know about the risks of contracting and spreading communicable diseases such as COVID-19, HIV/AIDS, and water-borne diseases (e.g., amoebiasis, giardiasis, and toxoplasmosis. etc. - In the event of disease outbreak (e.g. COVID-19), provide immediate training/awareness raising to the risk groups. - Contractor’s workers will be trained on communicable diseases prior to mobilization to construction sites. - For water-borne diseases that arise due to polluted or contaminated water, mitigations measures may include: <ul style="list-style-type: none"> o Ensure the water is visibly clean and free from sand and silt. Filter the water to get rid of visible dirt. o Drink only clean and safe water – either portable water or water filtered through water purifiers. o Get water purifying devices like filters, RO unit, etc., regularly serviced and maintained. o Ensure stored water is germ-free. o Add antiseptic liquid, such as Dettol in dubious-looking bathing water. o Hand hygiene – regularly wash hands with soap after returning home, after using the toilet, before and after preparing food, before eating or drinking anything. | | |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|--|--|--|--------------------------------------|
| | | <ul style="list-style-type: none"> ○ Teach hand hygiene to children. Children should make it a habit to always wash hands when returning home after playing games. ○ Ensure food is washed and thoroughly cooked. ○ Use disposable glass and plates whenever possible when eating outside food, particularly street food. ○ Avoid eating stale cooked food, unrefrigerated food kept exposed outside for long hours. ○ Take vaccinations for immunization against preventable diseases like Typhoid, Hepatitis A, Polio, etc. | | |
| | Hunting, trading, and consumption of animal from the wild | <ul style="list-style-type: none"> - Conduct public awareness raising activities (IEC) to ensure local people and contractors - Contractor's workers are trained not to consume and ask for food made from animal from the wild, and are not involved in trading of wild animals | | |
| | Environmental and Health and Safety Impacts | <ul style="list-style-type: none"> - Avoid obstructing or deviating from the flow of natural water (e.g. fence off water bodies from grazing animals). - Prepare an integrated pest and disease management plan. - Apply appropriate farming techniques, systems, and methods. - Apply Good Agricultural Practices wherever possible. - Avoid permanent seed production zone in one certain place. - Do crop rotation system with other cereal crops. - Use mulch, grasses, or compacted soil to stabilize exposed areas. - Regularly collect and store manure for composting to limit spread of pathogens. - Animal breeds or strains chosen should be adapted to the local climate, diseases, parasites, and nutrition. - Animals should be periodically checked for the presence of parasites, and any corrective treatment deemed necessary to prevent distress and suffering should be administered as soon as possible. - Any sick or injured animals should be treated or cared for to alleviate pain and distress as soon as practically possible, including being isolated or humanely destroyed if necessary. - Animals should be confirmed dead before disposal, and any if still alive should be euthanized immediately. Dead animals should be removed promptly and buried in an approved location. | ESS 1 ESS 4 ESS 7 ESS 6 ESS 10 | Design, Implementation/ MAFF, DAF |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|-----------------|--|-----|----------------------------------|
| | | <ul style="list-style-type: none"> - Identify and contain sick animals and develop containment and culling procedures for adequate removal and disposal of dead animals. - Regularly clean the operational area (e.g. livestock sheds and feeding pens at breeding farms). - Regularly collect and store animal feces to reduce noxious odor (which can be later use as manure). - Ensure proper storage and disposal of all spent/expired vaccines and needles. | | |

Table 4 – E&S risks, impacts, and proposed mitigation measures under MAFF and PD AFF responsibility

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---|--------------------------|--|--------------|--------------------------------------|
| 2. TRANSFER OF AGRICULTURAL TECHNOLOGIES Crop intensification and value chain development (Sub 2.1, 2.2, and 2.3) | Farming ecosystem | PD AFF will prepare an Overall Agriculture Extension Plan that target farmers in the command areas of Kantout. The OAEP will cover the following key areas: <ul style="list-style-type: none"> → Integrated Pest Management to train, and assist farmers (after training) to apply training knowledge. This is done through a series of field demonstration (at community level) and trials (at household level) to promote and scale up adoption of IPM. Key training topics under IPM includes: <ul style="list-style-type: none"> ○ Appropriate use of pesticides, including use of non-chemical pest control methods ○ Recognize and avoid use of prohibited pesticides ○ Good management of pesticide containers ○ Pesticide safety ○ Pesticide residue management, and so forth. → Integrated Crop Management to train farmers – in an integrated manner with IPM. Key training topics under ICM may include: <ul style="list-style-type: none"> ○ Use of select varieties (e.g. certified seeds, selection of local varieties through seed rehabilitation and restoration) ○ Fertilizer use/management ○ Water saving techniques (e.g. Alternative Wet Dry for rice cultivation, and Drip Irrigation for horticulture (e.g. cash crops) | ESS1 ESS3 | Design, Implementation/ MAFF, DAF |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|---|--|-----------------|--------------------------------------|
| | | <ul style="list-style-type: none"> ○ Water use coordination (e.g. through existing or establishment of new Farmers Water User Group) ○ Post-harvest management (e.g. use of straw and stub for other farming purpose, good storage of grain to avoid reduced selling prices ...) → Integrated Water Use to train farmers (in command area) how to coordinate water use among themselves – in a manner that <ul style="list-style-type: none"> ○ Respond to the changing crop patterns within the command area (See Also Annex 2.2) ○ Optimize water use to save water for release to minimize the water restricted access to the population downstream → Contract farming to train farmers to work together as a group (e.g. through joining Farmers’ Cooperative for synchronized rice/ crop production for increased quality and premium prices through contract with private sector → Branding to train farmers on how to select outstanding rice variety and/or cash crop to develop a brand (through contract farming) to upscale sustainable crop production and increase income for member farmers who join contract farming | | |
| | Risk of increased health problem | <ul style="list-style-type: none"> - Regular monitoring of surface and underground water quality and make recommendation to use of surface and underground water for domestic water use, particularly in area where water is collected for domestic use - Water quality will be tested before and after commencing intensification of crop production in the target command area | ESS 1 ESS 4 | Design, Implementation/ MAFF, DAF |
| | Risk of loss of net income | <ul style="list-style-type: none"> - A business plan should be developed as part of contract farming (mentioned above) to explore how selling prices are not affected as a result of increased yield and productivity as a result of project’s outcome. This plan needs to be linked to overall production plan at provincial, regional, and national levels - Contract farming should be considered by established Farmers’ Cooperative (Village/commune level) to enhance bargain capacity of Farmers’ Cooperative - Establish partnership with private sector (through Public Private Partnership) to promote long-term development of the select value chain such as for rice, bean, banana, and other select crops. | ESS 1 ESS 10 | Design, Implementation/ MAFF, DAF |
| | Gender inequality | <ul style="list-style-type: none"> - As an entry point, female of beneficiary households will be invited to consultation to learn about their need from project (e.g. area of knowledge, improved cultivation techniques, loan needs, households’ labor division). - Use of project’s SEP to conduct consultation with women as vulnerable group | ESS1 | Design, Implementation/ MAFF, DAF |

| Types of Investment | Risks & Impacts | Proposed Mitigation Measures | ESS | Project Stage/ Responsibility |
|---------------------|--|---|-----------------|-----------------------------------|
| | | <ul style="list-style-type: none"> - As part of Overall Agricultural Extension Plan, develop plan to promote participation of female members in extension trainings, particularly in crops stage where women participate (e.g. seed preparation, soil preparation, crop care, and harvesting) - In addition, female farmers will be encouraged to participate in the process of training, adoption of new techniques, including participation in selling/marketing produce and in the value chain (e.g. through contract farming) | | |
| | Greenhouse gas emissions | <ul style="list-style-type: none"> - Promote use of Alternative Wet Dry (AWD) and Laser Land Leveling for rice, and drip irrigation for cash crops to save irrigation water. - Pilot monitoring of GHG emission | | |
| | Exclusion and Potential Impacts on Vulnerable/ Disadvantaged Groups | <ul style="list-style-type: none"> - Apply SEP to identify vulnerable groups and apply appropriate consultation methods in SEP to solicit feedback from vulnerable groups and promote their participation during the technology transfer process (e.g. training, trial, adoption) | ESS 1 ESS 10 | Design, Implementation/ MOWRAM |

5.2 Biodiversity Assessment & Management Plan (BMP)

The impact on community forestry is not avoidable during the operation stage. Therefore, the following activities will be carried out:

- Conduct additional biodiversity assessment, including 1) collecting additional baseline to complement baseline information in Annex 5, 2) conducting critical habit assessment (CHA) based on updated baseline, and 3) prepare BMP based on CHA results.
- It is noted that compensation/replanting will be carried in a manner that results in a biodiversity net gain (BNG) that is measurable. The net gain will be informed from the CHA results. BMP will also include a comprehensive offset plan for species of residual impact.
- The above work should be completed early in Year 1 of project implementation and prior to commencing construction. A consulting firm will be engaged by PIU to undertake the about work. Budget for this work has been factored Budget Plan in Table 7 (Chapter 10).
- It is noted when conducting CHA, the following activities are carried out:

What are the likely impacts?

- Update the biodiversity impact assessment initiated as part of this ESMP/ESIA. This aims to understand the magnitude and likelihood of impacts upon the biodiversity values identified and prioritized through the additional baseline reports and critical habitat assessment, and other studies.
- Investigate avoidance, minimization and restoration options to mitigate impacts caused by the project on the biodiversity values for which critical habitat has been defined.

What mitigation measures are possible?

- Investigate avoidance, minimization and restoration options to mitigate impacts caused by the project on the biodiversity values for which critical habitat has been defined.

Significant residual impacts after the mitigation hierarchy has been applied?

- Calculate the total residual impact by measuring the area and the quality or condition of habitat of biodiversity value likely to be lost after the mitigation hierarchy has been applied.
- Monitor actual residual impacts and amend management strategies as required.

Which sites in the region are possible biodiversity offsets?

- Screen possible offset sites for their potential by assessing their biodiversity assets (e.g. species and habitat in terms of area, abundance and quality) and the potential to conserve or improve them
 - Assess each offset site for social, economic and political factors such as land cost and tenure, local community requirements and the political implications of different offsets
 - Investigate the conservation interventions required to conserve biodiversity at the different offset sites, such as prevention of habitat loss or eradication of invasive species
 - Ensure additionality of conservation gains is possible
 - Incorporate these assessments into a Biodiversity Management Plan (BMP).
- Where possible, subproject design would be adjusted accordingly to avoid significant impact on species in IUCN red list.
 - Assessment will be ex-ante and will include the number of species and the area potentially affected in the first or second year of operation stage. The result can be compared with the baseline result. This helps minimize the cost of forest replanting.
 - Manage to have the seedling species as listed in table below in order to prepare for replanting the same species for compensate the forest loss from the project activity. This activity can be done during the construction stage or recently after the construction, if there is an approval from all stakeholders for the impact on these species.

- Identify suitable location for replanting the forest. The selected location should be similar condition to the damage area that allow all damage species could grow well as it was. During the assessment stage, some area of the community forestry in Kantout were already degraded due to land encroachment; therefore, encroachment planting would be a suitable approach for forest restoration to compensate the forest loss.
- Development replanting plan and consult with all stakeholders, especially forest administration and community forestry in order to confirm the location and species.
- Organize planting event with all stakeholders
- Follow up the survival rate and maintenance after replating event.

| No | Khmer Name | Scientific Name | Confirmed by Local People | IUCN Category |
|----|------------|-----------------------------------|---------------------------|---------------|
| 1 | ឃ្នែក | <i>Shorea Obtusa</i> | √ | NT |
| 2 | ឃ្នើង | <i>Dipterocarpus Tuberculatus</i> | √ | NT |
| 3 | ឃ្នង់ | <i>Pterocarpus macrocarpus</i> | √ | EN |
| 4 | ល្ងៀង | <i>Cratoxylum cochinchinense</i> | √ | LC |
| 5 | បេង | <i>Azelia xylocarpa</i> | √ | EN |
| 6 | នាងនួន | <i>Dalbergia oliveri</i> | √ | CR |
| 7 | ឃ្នី | <i>Mitragyna sp.</i> | √ | LC |
| 8 | ចំបក់ | <i>Irvingia malayana</i> | √ | LC |
| 9 | ក្រឡាក់ | <i>Vatica philastreana</i> | √ | EN |
| 10 | ពពួល បាយ | <i>Litsea glutinosa</i> | √ | LC |
| 11 | កន្លឹកព្រៃ | <i>Phyllanthus Emblica</i> | √ | LC |
| 12 | កកោះ | <i>Sindora siamensis</i> | √ | LC |
| 13 | ចំបក់ | <i>Irvingia malayana</i> | √ | LC |
| 14 | ឈើភ្លើង | <i>Diospyros undulata</i> | √ | LC |
| 15 | ឃ្នឹក | <i>Terminalia alata</i> | √ | LC |

Next steps.

| No. | Activities | Through | | Stakeholders involved | Completion |
|-----|---|---|---|---|----------------------|
| 1 | Validating presence of species | Face-to-face consultation | Field observation | Government (incl. Forest Administration, Department of Agriculture, Forestry & Fisheries, local people) | By November 30, 2023 |
| 2 | Collect additional baseline data (focusing on species present in the subproject's area of influence) | Field Survey (field observation, drone, samplings, participatory mapping) | Supported by secondary data from most recent scientific reports | Government (incl. Forest Administration, Department of Agriculture, Forestry & Fisheries, local people) | By November 30, 2023 |
| 3 | Conduct Critical Habitat Assessment (CHA) | Desktop assessment | | International and national biodiversity specialist | By December 15, 2023 |
| 4 | Develop Biodiversity Management Plan, including Biodiversity Offset Management Plan | Desktop work | | | By December 30, 2023 |

| | | | | | |
|---|---|------------|--------------|---|---|
| 5 | Conduct additional survey (if needed, based on Step 4) and finalize CHA to facilitate Bank's due diligence of subproject eligibility (vis-à-vis Negative List in ESMF) | Field work | Desktop work | Government (incl. Forest Administration, Department of Agriculture, Forestry & Fisheries, local people) International and national biodiversity specialist | Within Year 1 of project Implementation |
|---|---|------------|--------------|---|---|

5.3 Mitigation of Climate Change Impacts through Engineering Design

It is noted that the annual rainfall appears to be increasing but are distributed unevenly over hot and wet seasons. This results in increased extreme weather conditions such as more floods during rainy season and prolonged drought during dry season. According to the Department of Climate Change (Ministry of Environment), extreme events such as floods and droughts are projected to increase in terms of frequency and intensity across Cambodia. Flooding and soil moisture content is of major concern SINCE these may affect not only public infrastructure but also agricultural production and other non-agricultural income generation activities such as services (tourism, transportation...) which in turn affect the livelihoods and income of local people.

Under this subproject, the potential impact of climate change (e.g. increased temperature, changing precipitation, natural disasters, and other weather uncertainties) are taken into account to estimate the submerged areas in the reservoir and water availability for the command area. The subproject is also designed to take into account the safety of dam, particularly the safety of the community under the dam failure scenario. For agricultural development in the target command area under component 3, under the uncertainty of weather conditions such as uncertain rain, prolonged drought, climate-resilient farming technologies are recommended. Water saving technologies such Alternative Wet Dry for rice cultivation, and drip irrigation for cash crops, are recommended to enable farmers to address uncertainty in weather condition. Meanwhile, rotation of crops (e.g. rice and other cash crops in one field) is promoted to allow soil fertility improvement thanks to crop change and sufficient fallow between crops.

5.4 Emergency Preparedness Plan and Dam Safety Assessment

This section covers two parts. The first part is the Dam Safety Assessment (DAS) for the existing Kantout Reservoir and the second part is the Emergency Preparedness Plan (EPP) prepared for the existing Kantout Reservoir (Please see stand-alone EPP and DSA for Kantout).

5.4.1 Summary of Dam Safety Assessment for the existing Kantout

Kantout Dam, constructed in 1970s across Kantout creek, is located about 15km South-West of the Svay Chrum dam. No design, construction or meaningful geotechnical information is available for Kantout Dam. It is reported that dam rehabilitation works were undertaken at Kantout Dam in 2005; no information regarding this work is available. Topographical survey has recently been undertaken at Kantout Dam. Reservoir and control area maps, longitudinal profiles, cross sections and storage rating curves are available. Minimal maintenance or operational testing of the outlet gates has been undertaken. No vegetation and trees removal from the dam slopes has occurred since 2005.

A preliminary Consequence Category assessment suggests the dam to have a LOW Consequence Category for both sunny day and flood failure; this should be reviewed following the completion of a dam break study. The uncontrolled broad crested weir spillway appears to be in satisfactory condition. The spillway can pass the peak design discharge flow of 20.0 m³/sec with 2m dry freeboard – this is acceptable for a LOW Consequence Category dam. Evidence of water ponded downstream of the dam suggests that seepage and/or leakage from the dam, likely beneath the embankment through a permeable layer at or within the foundation, is occurring. There is no current evidence that embankment or foundation material is being eroded by this flow; this should be investigated and monitored. Changes to the dam, including raising the stored water level, could change this situation. A number of recommendations regarding the management of Kantout Dam have been made in this report (See Annex 6.1 for details).

5.4.2 Emergency Preparedness Plan (EPP)

To be copied to Annex 6.2 for details in the next version.

5.5 Chance Finds Procedure

Purpose, Objectives and Scope

Construction of small infrastructure and facilities as well as livelihood supports related activities under the CWSIP project has the potential to alter tangible or intangible cultural heritages, unknown or unrecorded cultural and archaeological sites as well as the UXOs. The project will develop Chance Finds Procedure to define the steps on how Chance Finds will be managed once they have been discovered. EA and IA will ensure contractors and livelihood experts to be familiar with the possibility that they may discover unknown finds and know how to manage them.

The objectives of the Chance Finds Procedure are to:

- Define the steps which must be followed to manage the discovery of previously unknown sites, including the preservation and appropriate treatment of these finds, while minimizing any disruption to the construction schedule
- Enable compliance with all relevant national laws and regulations and other requirements.

EA and IA will make sure that the Chance Finds Procedure will be applied by all CWSIP contractors/subcontractors at subproject sites.

5.5.1 Chance Finds Procedure for Cultural Heritage

- **Procedure and Implementation**

Consultation. EA and IA will consult with all relevant parties, including relevant ministries at national level, provincial line technical departments, and district authority, in order to agree to the Chance Finds Procedure.

Laboratory and Other Support. EA and IA, with technical support from the Ministry of Culture and Fine Art and its provincial departments, will make arrangements for suitable laboratory test and other necessary facilities at provincial level or national level for identifying the find objects.

Training and Awareness. Where necessary, EA and IA, with support from cultural expert, will develop and implement a Cultural Heritage Training and Awareness. The training and awareness will include basic training in the identification of sites and objects relevant to the subproject sites, including the cultural significance of IC communities. The training and awareness shall be delivered to all relevant project implementation agencies at sub-national level, contractor, and subcontractor prior to their participation in subproject activities.

- **Implementation & Monitoring**

Monitoring shall require the appropriately trained personnel to determine the significance of a chance find in accordance with the definitions provided in the CWSIP project's Cultural Heritage Management Framework and follow the Chance Find Flowchart provided in Attachment 1.

Attachment 1 - Chance Find Flowchart

- Bound copy of Chance Finds Report Forms presented to EA/IA and provincial representative
- Verification of each Chance Find Report Forms to Chance Finds items completed
- Chance finds appropriately packed and labelled
- Inventory of Chance Finds Items placed inside packed boxes
- Outstanding issues relating to any or all of the above have been resolved

- EA/IA or provincial representative accepts transfer of Chance Finds items from contractor to relevant provincial department of Culture and Fine Art.

| Contractor Representative | EA/IA Representative | Provincial Representative |
|---------------------------|----------------------|---------------------------|
| Name | Name | Name |
| Signature | Signature | Signature |
| Date | Date | Date |

- Stop Work**

- Once cultural heritage objects sites are identified, contractor or sub-contractor shall immediately stop work within an approximate distance of the site.
- Contractor/sub-contractor shall call EA/IA and provincial level to the location to make a rapid determination of the significance of the find.
- Contractor/sub-contractor shall, in the event that a site of potentially high significance is discovered, demarcate, and secure the area.
- EA/IA, provincial Department of Culture and Fine Arts and contractor shall evaluate sites or objects in accordance with the procedure required by the Ministry of Culture and Fine Arts.
- If threatened species such as animal and trees are found, these species must be kept intact, protected, and immediately reported to relevant site managers for appropriate handling. Wild animals spotted on the construction sites must not be caught for sale and/or consumption in any way.

- Management of Chance Finds**

In case the chance find site is a highly significant cultural sites, contractor and EA/IA shall work together to determine any requirements for community engagement accordance to ESS10. The team will seek out and consult with the affected stakeholders and establish the appropriate action.

Management Options. The following management options will be considered:

- Avoidance** to minimizes the impact to the site through partial or complete project redesign or relocation, should be the preferred option for cultural resource management perspective.
- In-situ Management** This option includes the application of site protection measures. Appropriate protection measures will be identified and agreed between EA/IA, contractor, provincial department of culture and fine arts, and the local authority on a site-specific basis.
- Destruction** If a site is assessed as having limited cultural significance, it may be destroyed once a complete photographic record has been made and the Chance Finds Report Form has been completed.

- Reporting**

All cultural heritage sites will be reported to EA/IA and provincial level and national level as part of contractor's monthly report, and will include a summary of:

- An update of the Key Performance Indicators
- Incidents of disturbance to known cultural heritage sites
- All cultural heritage sites identified, distinguishing between known and chance finds
- All Chance Finds, etc.

5.5.2 Chance Finds Procedure for UXOs

This chance finds procedure should be applied to all subprojects under the CWSIP. In case of finding the suspected objects during any work:

- Immediately stop all work and move out using the same path use;

- Immediately restrict the entry of all persons including the workers, in any case;
- Immediately inform the about the existence of landmines/UXO in a specific area to the community nearby and have to make sure no one enters those areas until the mining authorities arrive and the landmines are cleared;
- Set the signs and markings with the use of yellow, red, and blue ropes in the landmine/UXO existing area to warn the public;
- Simultaneously, the information about the landmine/UXO occurrence must be immediately informed to the staff of the contractor and DDSIC, the nearby community local authorities, and PMU.
- Then PMU will contact UXO agency (CMAC), to have support for taking immediate actions as well as the immediately available agency to conduct the UXO survey and disposal if any.
- Then, clear the suspected objects with the support of the agency;

The chance find should be ultimately reported to the PMU who will then report to the World Bank immediately.

6. STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE

6.1 PUBLIC CONSULTATION PROCESS

- **Consultations during Preparation of EMSP**

Consultations were conducted with local people and authorities during the preparation of ESMP for Kantout reservoir. The consultation meetings were conducted on 2 February 2023, 26 March 2023, and 27 April 2023. The participants included a) project preparation team (Environmental and Social Focal Points of MOWRAM and MAFF, b) provincial authorities (Deputy Director of the PDRD in Kratie, Deputy Director of the PDAFF in Kratie, c) MWS Consultant, d) intended local beneficiaries (e.g. farmers), Commune Chief, Village Chief (See Annex 1.2 for the Minutes of Consultation Meetings).

The main purpose of the consultation in March 2023 is present the subproject design ideas, potential E&S social and environmental impacts associated with such design ideas, and obtain feedback and suggestions from intended subproject beneficiaries and local authorities at provincial and district level. The consultation in April 2023 aims is to present updated project ideas, including proposed specific investment (e.g. increased water storage, extended dyke structures, extended/new irrigation canal..) and solicit feedback and suggestions from both beneficiaries and adversely affected households for continued design adjustment. The consultation in February 2023 aim to understand current water use among farmers and potential water use conflicts (See Annex 1.2 for a summary of consultation results).

- **Consultations during the rehabilitation of the Kantout reservoir**

During subproject implementation, particularly prior to construction, when locations of contractor's office, workers' camp, disposal sites for construction debris and construction waste, and labor management plan, etc. are identified based on Contractor's ESMP, environmental and social risks and impacts associated with Contractor's specific construction methods and measures will be updated in C-ESMP and disclosed for continued consultation with local people and local authorities to avoid/minimize E&S risks and impacts.

6.2 RESULTS OF PUBLIC CONSULTATION

Please see Annex 1.2.

6.3 INFORMATION DISCLOSURE

The ESMP for Kantout was disclosed on 6 October 2023 on the website of Central PMU (<https://mowram.gov.kh/regulations#>) for public consultation. Version disclosed include full text in English and Executive Summary in Khmer. At project level, the Executive Summary in Khmer are in the process of being disclosed in hard copies at the offices of Provincial Departments of Water Resources and

Meteorology and the Provincial Department of Agriculture, Forestry and Fisheries in Kratie province. At subproject site, the Executive Summary (Khmer) of the ESMP will be posted at Communes' Hall where the subprojects is located. The ESMP will be finalized following project appraisal and will be re-disclosed through the same channels. The final English version of the ESMP will also be disclosed on the WB's website.

7. GRIEVANCE REDRESS PROCEDURES

7.1 STEPS IN GRIEVANCE REDRESS

The project has four complaint handling procedures for four types of risks and impacts: 1) land acquisition, 2) labor and working conditions, and 3) sexual exploitation and abuse and sexual harassment (SEA/SH), and 4) General Complaints. These procedures are established based on principles set forth in project's SEP (See Annex 8 – Grievance Redress Procedures for details).

7.2 RECORDING GRIEVANCES IN LOGBOOK

The GRM Focal Point, Project Manager and Project Director within the MOWRAM are responsible for establishment and effective functioning of a Project Grievance database. The MOWRAM's SEO will register all concerns/grievances that are submitted by project stakeholders into the PGL during project implementation. Data information received will be kept and maintained carefully to ensure privacy and confidentiality, particularly for grievances related to SEA/SH (See Sample Project' Grievance Logbook in Annex 3). In case there is serious complaint, such as road accidents, SEA/SH cases, the World Bank shall be notified within 48 hours of complaint receipt and/or report on the incidence (See also Annex 3 for Reportable Incidents and sample Project Grievance Logbook).

All grievances and concerns submitted to any project implementation agencies, either in written or verbal forms, are documented diligently in writing by the agency that receive and reported to the PMU at provincial level who will consolidate and reported montly to PMU (through the SEO in charge of grievances) for record and follow-up for grievance resolution.

8. ROLES AND RESPONSIBILITIES FOR ESMP IMPLEMENTATION

8.1 MOWRAM'S PMU

The MOWRAM's PMU will work closely with PDWRAM in planning and implementing subproject located within their province. The PDWRAMs will also supervise project officers at the district-level Department of Water Resource and Meteorology, and are responsible for:

- Coordinating effectively with all project stakeholders, including MOWRAM's SEO, consultants, contractors, local authorities, provincial departments, and project communities;
- Supporting provincial and district-level project officers in monitoring and evaluating progress and performance of consultants and contractors;
- Supporting MOWRAM'S SEO to conduct trainings on COVID-19, labor, gender, SEA, SH, VAC, and HIV/AIDS;
- Supporting MOWRAM'S SEO to disseminate project information and conduct consultation activities, as well as ensuring effective grievance redress resolution within their province;
- Supporting MOWRAM'S SEO to conduct screening and scoping of the subprojects, and identifying environment, social, land acquisition impacts and screening for presence of IPs in the subproject area;
- Liaising with village authorities in subproject area to encourage vulnerable group to apply for jobs that may be offered by project's contractors;

- Collaborating with relevant departments involved in land acquisition and/or other environment or social mitigation measures.

8.2 MAFF'S PMU

MAFF's PMU will work closely with PDAFF in planning and implementing subproject located within their province. PMU of MAFF will be responsible for day-to-day project implementation, monitoring and evaluation of Project Component 3 (Increased Water Productivity at Farm Level). PMU will work under the oversight and guidance of MAFF and will be responsible for all aspects of environmental and social performance, including E&S monitoring and evaluation, reporting of E&S performance, and relevant incidence during project implementation.

8.3 PROVINCIAL DEPARTMENT OF WATER RESOURCES AND METEROLOGY

PDWRAM's main responsibility include:

During subproject preparation:

- Support design parties in their surveys and consultation to prepare Feasibility Study and Detailed Design for Svay Chrum reservoir.

During construction:

- Oversee construction activities under Component 2, particularly construction of the reservoir, new irrigation canal in the command area

During operation:

- Collaborate with other relevant technical departments, including PDAFF and PDISTI at provincial level, farmer water user groups (FWUG) to ensure the reservoir and its regulators (located within the water distribution network) are operated effectively, and in a manner that minimizes water use conflicts among target water user community in the command area.
- Conduct regular maintenance of the reservoir and irrigation canals during subproject operation and maintenance stage.

8.4 PROVINCIAL DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES

PDAFF is responsible for implementing activities under Component 3 (Increased Agricultural Productivity at Farm Level). Under this subproject, PDAFF is responsible for developing and implementing agricultural techniques that makes full use of improved water access (under Component 3) to enable farmers in the command area to produce more food in a sustainable manner which improves farmers' income and livelihoods. In particular, PDAFF will focus on the followings:

- **Promoting crop diversification** for farmers in the command area (e.g. crop rotation for rice and horticulture production improve soil conditions whereas enhancing vegetation production for household's better nutrition and income.
- **Introducing to farmers new agricultural engineering techniques** to promote **a) mechanization** to increase productivity in crop production (e.g. mechanization in soil preparation using laser land leveling, use of combine harvester to save labor and reduce production costs, **b) save water** by applying alternate wet and dry (AWD) and drip irrigation for horticultural activities, **c) reduce GHG**.
- **Scaling up Crop Production and engaging Private Sector** in value chain development for specific farm product (e.g. rice, bean, and other cash crops such as vegetables...) and relevant agricultural services through agricultural cooperatives, producer groups, etc.

8.5 CONTRACTOR'S ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (C-ESMP)

The civil works Contractor is responsible for implementing E&S mitigation measures set forth in this ESMP for Component 2 which is related to construction of the dam, irrigation canal, and auxiliaries such as gates, regulators. Based on this ESMP and project's LMP, the contractor will:

- Prepare and submit a contractor's Environmental and Social Management Plan (C-ESMP) for each contract package and submit it to the PMU and PMU's Supervision Consultant for review and approval prior to implementation.
- The C-ESMP provides details of how the contractor will mitigate E&S risks and impacts that are associated with the construction activities, including their workers, workers camp, machinery,

vehicles, etc. Contractors ESMP should include a BMP. The contractor needs to also include in their C-ESMP a labor management plan (C-LMP). The C-ESMP must be site-specific and has details related to how identified E&S risks and impacts are managed based on site condition and contractor's capacity and workforce.

- In case the contractor engages a subcontractor to undertake part of the work (as specified in the Contractor's Work Contract, the subcontract must prepare their own subcontractor's plan to indicate how they manage identified E&S risks and impacts – in a manner that is consistent with this ESMP and project's LMP. The subcontractor must indicate in their E&S plan the reporting arrangements between subcontractor and the main contractor and consolidate into their E&S performance report and report to PMU on a monthly basis. Depending on the agreement between the main contractors and PMU in terms of main contractor's reporting responsibility and C-ESMP, quarterly reporting may be required.
- If the proposed works and activities described in the C-ESMP are changed during the contract liability period, the C-ESMP shall be updated by the main contractor to reflect such changes, including subcontractor's E&S management plan, where relevant. The C-ESMP of the main contractor should include the followings:
 - i. A statement of policy, providing a definition of the contractor's environmental policy and an indication of commitment to the execution of its site-specific ESMP.
 - ii. A brief document description, including date of issue; revision status; distribution list; and preparation personnel details and signatures;
 - iii. Applicable laws and regulations associated with the requirements in the site-specific ESMP. Provision of contractor licenses, permits and approval associated with the C-ESMP.
 - iv. Details on how environmental and social risks and impacts identified in site-specific -ESMP will be managed, including: 1) site-specific measures to mitigate identified risks and impacts during construction; 2) Workers' Code of Conduct; 3) Contractor's LMP (based on project's LMP);
 - v. List of detailed environmental and social trainings that all contractor's personnel (including subcontractors) are required to undertake. As a minimum, all contractor's staff and workers mobilized to the subproject site should be: i) familiar and understand the requirements and mitigation measures proposed in the C-ESMP; ii) aware of the legal obligations of the contractors under the contracts, and their relevant responsibilities; and iii) provide the following training to all staff on site, including: occupational health and safety, risks related to SEA/SH/VAC, community health and safety (CHS), and emergency response;
 - vi. Capabilities, support mechanisms, and financial resources to be allocated to ensure full and satisfactory implementation of the proposed C-ESMP. Detailed environmental and social responsibilities of contractor's personnel including subcontractors working on site, specific trainings to be provided to contractors and subcontractor's staff, including local peoples to be engaged as contracted workers, and training schedule;
 - vii. The contractor shall be responsible for preparing monthly environmental reports (as required in Word Contract), including reporting accident and incident, if any, to MOWRAM within 48 hours. The contents of these reports include the followings:
 - viii. Implementation of the Contractor's C-ESMP complying with the agreed program;
 - Activities that have been carried by the contractor during the reporting period to ensure their compliance with the C-ESMP;
 - Difficulties encountered during C-ESMP implementation, including proposed remedial actions for improvement;
 - Highlight the number and the type of non-compliances and proposed corrective actions;
 - Reports activities/actions that have been carried out by Subcontractors involved that contribute to achieving the objective of the C- ESMP, including minutes of meetings and discussions held by the main contractor;
 - Minutes of meeting from discussions held with MOWRAM regarding-ESMP implementation;

- Implementation of the Worker’s and Manager’s Code of Conduct, Occupational Health, and Safety Management Plan, including Community Health and Safety;
- Ensure sufficient funding and human resources are timely in place for effective implementation of the C-ESMP including Contractor’s LMP (to be prepared as part of C-ESMP).
- Ensure appropriate and timely implementation of required pre-construction and construction mitigation measures as described in the C-ESMP;
- Implement additional environmental and social mitigation measures as necessary.

8.6 CONTRACTOR’S SAFETY, SOCIAL AND ENVIRONMENT OFFICER

The contractor shall appoint competent staff(s) as the contractor’s on-site safety, social and environment officer (SSEO). The SSEO must be appropriately trained in environmental management and must possess skills necessary to effectively and efficiently all contractor’s and subcontractors’ personnel engaged under the subproject. The SSEO will be responsible for monitoring and reporting on the contractor's compliance with the C-ESMP requirements. The SSEO’s responsibility include, but not be limited to, the followings:

- Supervise subcontractors’ construction works, including their implementation of the Contractor’s LMP and C-ESMP;
- Submit Contractors’ LMP and C-ESMP to PMU/DDIS for review and approval prior to commencing staff mobilization to the project site for the awarded assignments;
- Carry out environmental and social site inspections to assess and audit the contractors' site practices, equipment, and work methods with respect to pollution control and adequacy of environmental mitigation measures being implemented;
- Monitor E&S compliance with approved C-ESMP and contractual requirements;
- Monitor implementation of environmental and social mitigation measures;
- Prepare audit reports for the site environmental and social conditions;
- Investigate complaints and recommend corrective measures;
- Advise the contractor on environmental and social management improvement;
- Recommend mitigation measures in the case of non-compliance;
- Carry out additional monitoring of noncompliance as instructed by PMU and DDIS;
- Inform the contractor, PMU and DDIS of any environmental and social issues/problems, submit contractor’s ESMP Implementation Plan to PMU and DDIS, including relevant authorities, if required by PMU;
- Maintain detailed recording of all site activities related to environment and social issues;
- Appoint qualified staff to undertake necessary actions and measures to ensure labor related issues;
- Work closely with the appointed staff in charge of labor issues to prepare a Labor Management Procedures (Contractor’s LMP) and a C-ESMP (Contractor’s ESMP) including OHS regulations) which will apply to their contracted workers who work on the projects;
- Maintain recruitment and employment records for contracted workers (including subcontractors), including documentation that verifies minimum working age as set forth in the Contractor’s LMP as well as copies of signed Workers’ CoC;
- Provide regular training to contracted workers on issues, but not limited to, such as occupational safety and health, and other social risks such as SEA/SH/VAC, code of conduct to maintain good relationship with local community, etc.;
- Require primary supplier to identify and address risks of SEA/SH/VAC, child labor, forced labor, and occupational safety and health for primary supply workers;
- Develop and implement the contractor grievance mechanism based on the GRM set forth in the project’s LMP for contracted workers, including ensuring that grievances received from contracted workers are resolved promptly, and reporting the status of grievances and resolutions to PMU/SEO. This grievance mechanism will be part of the Contractor’s LMP.
- Ensure that all contractor and subcontractor workers understand and sign the Code of Conduct prior to commencement of the works; maintain them as a record and report on it

- Implement all necessary measures to address the risks of sexual exploitation and abuse (SEA)/sexual harassment (SH) as specified in the contractor’s LMP, C-ESMP and ensure full implementation of these measures;
- Develop plans and take actions for prevention and mitigation of COVID-19 outbreaks.

Incident reporting

The contractors are required to inform DDIS and PMU any incidents listed below within agreed timeframe (See Incident Report template provided at Annex 3 in this document). The contractor’ ESMP must include Incident Report template for convenient use):

- Any violations to national laws, regulations, or international agreements;
- Any serious accidents or fatalities;
- Significant impacts that cause losses to personal property such as traffic accidents, damages to local houses/roads and other incidents;
- Serious surface/ground water pollution;
- Failures of embankments at disposal sites that cause serious pollutions to the surroundings;
- Fire related to worker’s behaviors;
- Any claims related to SEA/SH/VAC, or any other incidents related to children;
- Receive a complaint about pollution or damages.

8.7 CONTRACTOR’S OBLIGATION AS TO CONTRACTUAL REQUIREMENTS

The contractor and its subcontractors, if any, shall comply with the ESMP. In particular, the Contractor has to prepare a Contractor’s ESMP (C-ESMP) to elaborate this ESMP based on a) site condition, b) capacity of the Contractors and their subcontractors (if any), c) national regulations that are active by the time of subproject implementation.

To ensure that necessary action has been undertaken and that steps to avoid adverse impacts and/or reoccurrence have been implemented, the Project Manager, the Safeguard Focal Persons, and/or contractor must report to PMU within 48 hours of any serious incidents of non-compliance that may have serious consequence. In the event of working practices being deemed dangerous either by the subproject, the local authorities, or the other concerned agencies, immediate remedial action must be taken by the contractors. The contractor must keep records of any incidents and any corrective action taken. The records of non-compliance that could be practically addressed (not cause serious impacts) will be reported to the DDIS with a copy to PMU on a monthly basis.

The contractor will be responsible for dealing with any reports/grievance forwarded by the local communities, authorities, police or other agencies as soon as practicable, preferably within one hour but always within 48 hours. The Project Manager/Safeguard Focal Persons will monitor and ensure that the contractor has taken appropriate action. Where appropriate, approval remedial actions may require an agreement from the local authorities and/or other government agencies. Procedures should be put in place to ensure, as far as is reasonably practical, that necessary actions can be undertaken to avoid recurrence and/or serious damage.

9. ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

The implementation of this ESMP will be subject to external monitoring arrangement – as described in the project’s ESMF (Chapter 10 – Monitoring and Reporting).

9.1 ENVIRONMENTAL MONITORING PROGRAM

To ensure the effectiveness of environmental management, the environmental monitoring program is prepared to monitor the environmental quality. Contractor and/or sub-contractor is responsible for monitoring using appropriate method, equipment and system. Details on monitoring parameters are shown in the table below:

Table 5 – Environmental monitoring plan during construction phase

| Monitoring Parameters | Monitoring Activities | Location | Measurements | Frequency | Responsibility |
|------------------------------|---|--|---|------------------|--|
| Soil quality | <ul style="list-style-type: none"> Avoid construction activities in rainy season and/or day of heavy rains. Management activities of fuel, oils, and chemical substance. Cover all restored areas with topsoil and re-vegetate | Construction site | Site inspection Visual observation | Daily | SEO E&S specialist consultants PMU |
| Air quality | <ul style="list-style-type: none"> Spray or sprinkle water on the work surfaces and other piled materials to minimize dust at least 3-6 times per day in windy and dry weather and/or based on the weather condition Solid waste or construction waste activities Construction machinery operation and maintenance Distance of sitting concrete mixing plants, crushing plants, quarries and other facilities to settlement and other sensitive receptors Transportation of construction materials | Construction site | Site inspection Visual observation Monitoring equipment and/or appropriate monitoring methods | Daily | SEO E&S specialist consultants PMU |
| | <ul style="list-style-type: none"> Testing air quality (NO₂, SO₂, CO, TSP, PM₁₀, PM_{2.5}) | Construction site | Air quality monitoring equipment | Every 06 months | |
| Noise and vibration | <ul style="list-style-type: none"> Avoid working during night-time from 21:00 hours to 06:00 hours Provide ear set to workers to prevent noise if the noise level exceeds the standard Check and maintains construction machinery regularly to avoid noisy and high vibration Restrict use of vibrating rollers and operation of heavy equipment near sensitive structures | Construction site Nearby sensitive structures | Site inspection Visual observation | Daily | SEO E&S specialist consultants PMU |
| | <ul style="list-style-type: none"> Measuring noise and vibration level | Construction site | Measuring equipment and/or appropriate monitoring methods | Every 06 months | |

| Monitoring Parameters | Monitoring Activities | Location | Measurements | Frequency | Responsibility |
|--|---|---|---------------------------------------|-----------------|--|
| Water Quality | <ul style="list-style-type: none"> Wastewater management Design and capacity of septic tank Digging of side drain at campsite Construction of retaining structures | Construction site | Site inspection Visual observation | Daily | SEO E&S specialist consultants PMU |
| | <ul style="list-style-type: none"> Testing wastewater quality | Final outlet from Septic Tank | Water quality monitoring equipment | Every 06 months | SEO E&S specialist consultants PMU |
| Flora and Fauna | <ul style="list-style-type: none"> Avoid cutting of trees or destruction of vegetation No hunting, fishing, or collection of animal and plant materials Construction of fish ladder passage Revegetation success will be monitored. | Construction site | Site inspection Visual observation | Daily | SEO E&S specialist consultants PMU |
| Hazardous and Non-hazardous waste | <ul style="list-style-type: none"> Hazardous and Non-hazardous waste management strategies Sludge management | Construction site | Site inspection Visual observation | Daily | SEO E&S specialist consultants PMU |
| Quarry and borrow sites | <ul style="list-style-type: none"> Permits or license for quarry and borrow sites Confine quarrying of riverbed materials to less than 20% of river width in any location and keep away from riverbanks. Fencing surrounding the pits Installation of safety signages at the pits | Location of quarry and borrow sites Riverbed Pits | Site inspection Visual observation | Daily | SEO E&S specialist consultants PMU |
| Landscape and biodiversity | <ul style="list-style-type: none"> Adopting good housekeeping and good construction practices. Ensuring proper lining of canals and adequate assembling of pipes Avoid extraction of gravel from watercourses. Adopting of slop stabilization techniques. Detailed biodiversity monitoring will be carried out for any CHA qualifying species during construction phase and in the 1st few years of operations. This aims to ensure mitigation and/or offsets measures are adequate to address the impacts | Construction sites | Site inspection Visual observation | Daily | SEO E&S specialist consultants PMU |

| Monitoring Parameters | Monitoring Activities | Location | Measurements | Frequency | Responsibility |
|---|---|--------------------|---|-----------|--|
| Protected Areas, wetlands, biodiversity zones | <ul style="list-style-type: none"> Exclude subproject located in the Zone 3, Zone 2, and Zone 1 of the protected area. | Construction sites | Site inspection | Daily | SEO E&S specialist consultants PMU |
| Damage to community facilities/disruption to access | <ul style="list-style-type: none"> Avoid damaging community facilities and disruption of transport access during construction Repair or compensate all the damages, if any (based on preconstruction survey). | Construction site | Site inspection Visual observation Consultation | Daily | SEO E&S specialist consultants PMU |

9.2 SOCIAL MONITORING PROGRAM

To ensure the effectiveness of social management, the social monitoring program is prepared to monitor the social issues. Contractor and/or sub-contractor is responsible for monitoring using appropriate method, equipment and system. Details on monitoring parameters are shown in the table below:

Table 6 – Social monitoring plan during construction and operation phase

| Monitoring Parameters | Activities Subject to Monitoring | Locations | Measurements/ Indicators | Frequency | Responsibility |
|----------------------------------|--|---|---|---|--|
| <i>During construction phase</i> | | | | | |
| Labor Influx | <ul style="list-style-type: none"> Prepare Contractors' Labor Management plan | <ul style="list-style-type: none"> Contractors' office Construction sites | <ul style="list-style-type: none"> Labor management plan prepared and submitted to PMU for approval (as part of Contractor's ESMP) Total workers planned to be mobilized on-site monthly for entire subproject cycle (including managers, skilled workers and unskilled workers) Total workers planned to mobilize and actually mobilized monthly (by gender, local vis-à-vis migrant) | <ul style="list-style-type: none"> Before construction is proceeded Updated as needed (subject to PMU's prior review) | <ul style="list-style-type: none"> Contractors (including main contractors and subcontractors) PMU |

| Monitoring Parameters | Activities Subject to Monitoring | Locations | Measurements/ Indicators | Frequency | Responsibility |
|-------------------------|--|--|--|--|--|
| | <ul style="list-style-type: none"> Recruitment of local labor | <ul style="list-style-type: none"> Construction sites | <ul style="list-style-type: none"> Number of local people engaged monthly (sex disaggregated), and included in Contractors' monthly progress report (to PMU) | <ul style="list-style-type: none"> Monthly and during subproject cycle | <ul style="list-style-type: none"> Contractors PMU |
| | <ul style="list-style-type: none"> Ensure equity and gender-based job opportunities | <ul style="list-style-type: none"> Construction sites | <ul style="list-style-type: none"> Total female workers mobilized on-site per month Number of local female workers mobilized on-site per month Number of IP workers mobilized if month (if IPs are present in subproject area) | <ul style="list-style-type: none"> Monthly and during subproject cycle | <ul style="list-style-type: none"> Contractors PMU |
| SEA/SH | <ul style="list-style-type: none"> Before mobilizing workers to construction site, conduct orientation/training on SEA/SH (using sample Code of Conduct as a minimum) for all Contractors' managers and workers mobilized to construction site As part of above training/orientation, ensure all workers understand SEA/SH risks, disciplines and penalty, and understand project's grievance procedures related to SEA/SH As part of workers and manager's work contract, require all workers engaged for project (both workers mobilized to site or work in contractors' office) to peruse and sign Workers' CoC Ensure Contractors appoint a focal point in charge of ESHS and grievance reception, processing and resolution Apply all measures related to management of work camps | <ul style="list-style-type: none"> Construction sites Relevant local communities | <ul style="list-style-type: none"> Number and percentage of workers trained on SEA/SH prior to mobilization to subproject site Number and percentage of workers signing Code of Conduct as part of Work Contract Percentage of workers perpetrating SEA/SH and percentage of cases reported to PMU and resolved Name and contact of ESHS and grievance focal report reported in Contractor's ESMP. | <ul style="list-style-type: none"> Monthly and during subproject cycle Reported to PMU within 48 hours if occurred | <ul style="list-style-type: none"> Contractors PMU |
| Social Conflicts | <ul style="list-style-type: none"> Any actions on the part of Contractors' workers or community member that cause social conflicts (e.g. SEA/SH, the | <ul style="list-style-type: none"> Construction sites | <ul style="list-style-type: none"> Number of social conflicts arising and nature and scope of conflict | <ul style="list-style-type: none"> Daily Monthly | <ul style="list-style-type: none"> Contractors PMU |

| Monitoring Parameters | Activities Subject to Monitoring | Locations | Measurements/ Indicators | Frequency | Responsibility |
|------------------------------------|--|---|--|---|--|
| | way construction activities are carried out [pollution, restricted access, loss of local income/livelihoods, accidents...) | <ul style="list-style-type: none"> Relevant local communities | <ul style="list-style-type: none"> Number of social conflicts resolved by contractors within 7 days Number of social conflicts resolved by local authorities Number of serious cases that have happened and reported to PMU within 48 hours | | |
| Community Health and Safety | <ul style="list-style-type: none"> General disease prevalence within the subproject area and neighboring areas General health of workers Communicable diseases among workers and subproject community Construction activities that give rise to risks related to traffic accident and other construction related accidents Fatality Disease outbreaks Environmental pollution incident Dam failure (during construction) | <ul style="list-style-type: none"> Construction sites Camp site and Worker camps Community and neighboring community | <ul style="list-style-type: none"> Site inspection Observation Consultation with workers Consultation with local authorities and commune health center | <ul style="list-style-type: none"> Daily Monthly Within 48 hours for | <ul style="list-style-type: none"> Contractors PMU |
| Child Labor/ Forced Labor | <ul style="list-style-type: none"> Involvement of child labor/ forced labor in main contractor and subcontractors' workforce Involvement of child labor/ forced labor among primarily supply workers | <ul style="list-style-type: none"> Construction sites Worksite of primary supplier | <ul style="list-style-type: none"> Site inspection Observation | <ul style="list-style-type: none"> Daily Screening prior to engaging services of primary supplier | <ul style="list-style-type: none"> Contractors Primary supplier PMU |
| Cultural heritage | <ul style="list-style-type: none"> Unexpected impacts on heritage resources | <ul style="list-style-type: none"> Construction sites | <ul style="list-style-type: none"> Site inspection Observation Report by local people/local authority | <ul style="list-style-type: none"> Daily Reported to PMU within 48 hours | <ul style="list-style-type: none"> |
| GRM | <ul style="list-style-type: none"> All grievances shall be recorded (including verbal grievance). Grievance resolution process and resolution result and status will be updated/monitored regularly to ensure grievances are processed/resolved within the | <ul style="list-style-type: none"> | <ul style="list-style-type: none"> | <ul style="list-style-type: none"> | <ul style="list-style-type: none"> |

| Monitoring Parameters | Activities Subject to Monitoring | Locations | Measurements/ Indicators | Frequency | Responsibility |
|---|--|--|---|--|---|
| | timeframe specified for each step in grievance redress procedure (See Annex 8). | | | | |
| <i>During operation phase</i> | | | | | |
| Dam Safety | <ul style="list-style-type: none"> Status of the dam just put into operation, its appurtenances, and its performance | <ul style="list-style-type: none"> Within target command area Downstream the target command area | <ul style="list-style-type: none"> Inspect and evaluate dam safety | <ul style="list-style-type: none"> Monthly | <ul style="list-style-type: none"> PMU (during project life) PDWRAM (after subproject completion) |
| | <ul style="list-style-type: none"> Operation and maintenance procedures for the subproject dam | | <ul style="list-style-type: none"> Prepare before construction completion and adopt during operation | <ul style="list-style-type: none"> As soon as rehabilitated dam is operated again | |
| | <ul style="list-style-type: none"> Adoption and implementation of Dam Safety Plans and Emergency Preparedness Plan with due consideration to their potential risks | | | <ul style="list-style-type: none"> As soon as rehabilitated dam is operated again | |
| Water Use Conflict between upstream and downstream | <ul style="list-style-type: none"> Establishment of water user groups for target command area Development of guidelines/manual for water use coordination within target command area (upstream and downstream) Policy actions related to water use coordination at sub-basin/basin level Ensure an effective monitoring mechanism (which is built on water user consensus) is in place, transparent, and information on water use and distribution is regularly recorded to facilitate equitable water use across the entire command area. | <ul style="list-style-type: none"> Within target command area Downstream the target command area | <ul style="list-style-type: none"> Number of water user groups to be established for the target command area Percentage of command area (ha) that are coordinated by established water user group Percentage of command area (ha) that benefit from water fee (contributed by water user) Number of water use conflicts that are reported, recorded, and resolved by affected water user group Number of water use conflicts that are reported to, recorded and resolved by provincial Department of Water Resources | <ul style="list-style-type: none"> Monthly | <ul style="list-style-type: none"> PMU Established water user groups PDWRAM |

10. ESTIMATED COSTS FOR ESMP IMPLEMENTATION

The costs of implementing the ESMP listed below are related to PMU costs in addition to the dedicated safeguards PMU personnel budget line item. The main costs of implementing this ESMP are related to institutional capacity and stakeholder capacity building, ongoing consultation facilitation costs, and the PMU on site monitoring and outreach safety programs. Cost of independent monitoring is not included in this subproject and is included in cost estimate under ESMF.

Table 7 – Estimated costs for ESMP implementation

| No. | Items | Cost (USD) |
|--------------|--|----------------|
| 1 | ESMP technical training to PMU, SEO, Contractor etc. | 10,000 |
| 2 | Additional survey for Critical Habitat Assessment and related biodiversity monitoring for construction/operation phase | 15,000 |
| 3 | Update ESIA and conduct CIA | 35,000 |
| 4 | Additional biodiversity assessment to estimate potential impact to finalize BMP and replanting program | 20,000 |
| 5 | Implement replanting program (in another area jointly identified by community and provincial forest administration) | 100,000 |
| 6 | ESMP awareness raising and sensitization with key stakeholders and communities | 10,000 |
| 7 | Community outreach at the project area | 10,000 |
| 8 | Consultation facilitation | 20,000 |
| 9 | Monitoring activities (e.g. water and soil sampling prior to commencing construction) | 20,000 |
| 10 | UXO clearance | 10,000 |
| Total | | 250,000 |

ANNEXES

Annex 1 – Screening checklist for E&S impacts of Kantout Reservoir construction and rehabilitation

Circle screening conclusion:

- If the answers to the checklist questions are “No”, there is no need for further action.
- If the answers to the questions are “Yes”, then consult the relevant procedures /guidelines for assistance in addressing issues of concerns.

| A | Environmental and Social Impacts | No | Yes | Notes |
|--|---|----|-----|---|
| Location | | | | |
| 1 | Are there environmentally sensitive areas (forests, pastures, rivers and wetlands) or threatened species that could be adversely affected by the sub-project? | | √ | Seasonal inundation of 95.69 ha of community forest land which affecting some 5 plant species that are in IUCN red list |
| 2 | Does the sub-project area (or components of the project) occur within or adjacent to any protected areas designated by government (national park, national reserve, world heritage site, etc.)? | √ | | |
| 3 | If the sub-projects are outside of, but close to, any protected area, is it likely to adversely affect the ecology within the protected areas (e.g., interference with the migration routes of mammals, fish or birds)? | √ | | |
| 4 | Will the sub-projects reduce people’s access to the pasture, water, public services or other resources that they depend on? | √ | | |
| 5 | Might the sub-projects alter any historical, archaeological or cultural heritage site or require excavation near such a site? | √ | | |
| Physical and biological environment | | | | |
| 6 | Will sub-projects require large volumes of construction materials (e.g. gravel, stones, water, timber, firewood)? | | √ | Construction material is need to build the new dam |
| 7 | Might the sub-projects lead to soil degradation or erosion in the area? | √ | | |
| 8 | Might the sub-projects affect soil salinity? | √ | | |
| 9 | Will the sub-projects create solid or liquid waste that could adversely affect local soils, vegetation, rivers, streams or groundwater? | √ | | |
| 10 | Might river or stream ecology be adversely affected due to the installation of structures such as weirs, etc.? | √ | | |
| 11 | Will the sub-projects have adverse impacts on natural habitats that will not have acceptable mitigation measures? | √ | | |
| 12 | Do the sub-projects have human health and safety risks, during construction or later? | | √ | OHS safety and Dam safety |
| 13 | Might the sub-projects lead to migration into the area? | √ | | |
| Alternatives | | | | |

| | | | | |
|----------|--|---|---|--|
| 14 | Is it possible to achieve the objectives above in a different way, with fewer environmental and social impacts? | | √ | |
| B | Land Acquisition and Social Issues | | | |
| 1 | Have all groups within the community been consulted about the proposed sub project? | | √ | |
| 2 | Which groups have not been consulted? | √ | | |
| 3 | Will the sub-projects require acquisition of land (public or private)and/or other assets for its development? | | √ | |
| 4 | Will anyone be prevented from using economic resources (e.g. pasture, community place, forests etc.) to which they have had regular access? | | √ | |
| 5 | Will the sub-projects result in the involuntary resettlement of individuals or families? | √ | | |
| 6 | Will the sub-projects result in temporary or permanent loss of crops, fruit trees and household infrastructure such as granaries, toilets, kitchens etc.? | | √ | |
| 7 | Will the sub-projects affect adversely the livelihoods of particular groups within the communities, especially vulnerable groups such as the landless? | √ | | |
| 8 | Will the sub-projects affect adversely the well-being and livelihoods of women, particularly female-headed households? | √ | | |
| 9. | Will the sub-projects benefit all groups within the community equally? | | √ | |
| 10. | Are there ongoing land or water disputes within the community/ with neighboring communities? | | √ | |
| C | Local Indigenous Peoples | | | |
| 1 | Might the project adversely affect local minority groups or vulnerable people living in the area? | √ | | |
| 2 | Are there members of these groups in the area who could benefit from this project? | | √ | |
| D | Pesticides and Waste Materials | | | |
| 1 | Will the project result in the introduction of pesticides or an increase of pesticide use if use of such products currently exists? | √ | | |
| 2 | Will the project result in the production of solid or liquid waste (e.g. water, domestic or construction waste), or result in an increase in waste production, during construction or operation? | | √ | |
| E | Is there probability of the presence of unexploded ordinance (UXO) at or near the proposed sub-project area? | | √ | |

1.1 Screening for IP present in the subproject area

IP screening has been conducted for Kantout subproject in according with the guidance in project's Indigenous Peoples Planning Framework. Based on secondary data, and consultation with village authorities (Kantout commune) in March 2022 and April 2023, the subproject area is home to Khmer people. It is anticipated that the subproject will bring out intended subproject benefits, which is increased reliable water access, to local people, including both Khmer mainstream group and Phnom ethnic minority groups. It is anticipated if new irrigation canal is built in the command area to bring local people with

irrigation access, some Khmer households may be affected by land acquisition. However, the land impact is small at household level because the linear impact will be minimized by aligning the small canal along the paddy bund/borders which minimize the need for land acquisition at households level. It is anticipated that people who are affected by land acquisition for new irrigation canal will also subproject beneficiaries.

1.2 Summary of Consultation with Subproject Stakeholders

This section provides a summary of three rounds of consultation that has been taken during project preparation.

1.2.1 – Consultation on water use

The consultations with farmers were conducted at 5 different locations on 2 February 2023 at Svay Chhrum (to represent Kantout), and Srae Huy with the total participation of 93 participants with 19 women including local authorities at commune and village level and farmers who have experience accessing available water for their crop irrigation.

Due to the available water is limited and the demand for water is high then there are a lot of issues/conflict happen in water sharing within the target subprojects. Following are the key points of current water conflict

- Insufficient water for irrigation compared to cropped area: In some area even though the water is less in dry season but it is still accessible by some farmers who have paddy fields closed by to the stream then they can access to water for their second crop. Seeing this, other farmers also want to do the same which causes water demand is higher than water availability to supply for irrigation which leads to water conflict. In some cases, farmers need to fight for water such as pump at nighttime before other come.
- Conflict between farmers at downstream and upstream: In water sharing coordination during scarcity of water for crop irrigation, farmers is divided to take turn in getting water between the upstream and downstream, but it is always problems in getting water especially for those who are at downstream as people at upstream always pump the water even it is downstream farmers' turn. This is because the water is not enough, and farmers upstream are afraid that they won't have enough water for their crops then they need to pump it to their fields all the time. In some cases, the turn of water sharing is too short due to limited amount of water and lack of irrigation infrastructures then farmers couldn't get enough water for their crop during their turn especially for woman led families.
- Conflict of interest between fish farmers, irrigation farmers and household users: Due to leaking embankment, non-functioning gates, the reservoir becomes shallow during dry season then just small amount of water left in the reservoir. As rule water must be kept in the reservoir for household use, environment conservative purpose. However, there are still some farmers want to do farming with the water left in the reservoir and some farmers who do fishing also want to drain the water out of the reservoir to catch the fishes. This causes a lot of issues and complaints to local authority in order to take intervention on this and solve it.

Even there are a lot of issues, farmers proposed that water conflict be solved through:

- Rehabilitating the schemes including infrastructure to ensure there will be enough water for irrigation and there are enough structures to deliver water to the fields.
- Having well organized body (functioning FWUC) to manage scheme operation especially in water distribution and scheme maintenance.
- Planning in advance between area to be cropped compared to available water to ensure water availability meets the demand for water for the cropped.

- Improving the participation of farmers and local authority in scheme operation and maintenance to ensure everyone have the equal access to water, no water conflict, and scheme can be used last long.
- Ensuring that a clear rule should be set and disseminated wisely in the communities for water resource during scarcity period so that everyone clearly understands what the priority for water use is during that time and they can follow the rule.

1.2.2 – Consultation on E&S risks and impacts (26 March 2022)

- Kantout weir is located within the Kantout Community Forestry (716 ha)
- Preliminary result from consultation and observation
 - 38 Flora found with 13 falling into IUCN red list (mostly Least Concern category)
 - 45 Fauna found with 27 falling into IUCN red list (mostly Least Concern category)
- No ethnic minority, graveyard or significant spiritual sites located inside or nearby the reservoir
- No households own land inside the existing reservoir
- 4 households farming inside the reservoir during dry season (these HHs have farming land outside)
- The conserved forest of the Kantout upstream is potentially flooded if water storage increases
- Construction should be avoided during June to December or wait until harvest completion
- If new irrigation is built – based on water availability (to be confirmed), some farmland may be affected due to new irrigation

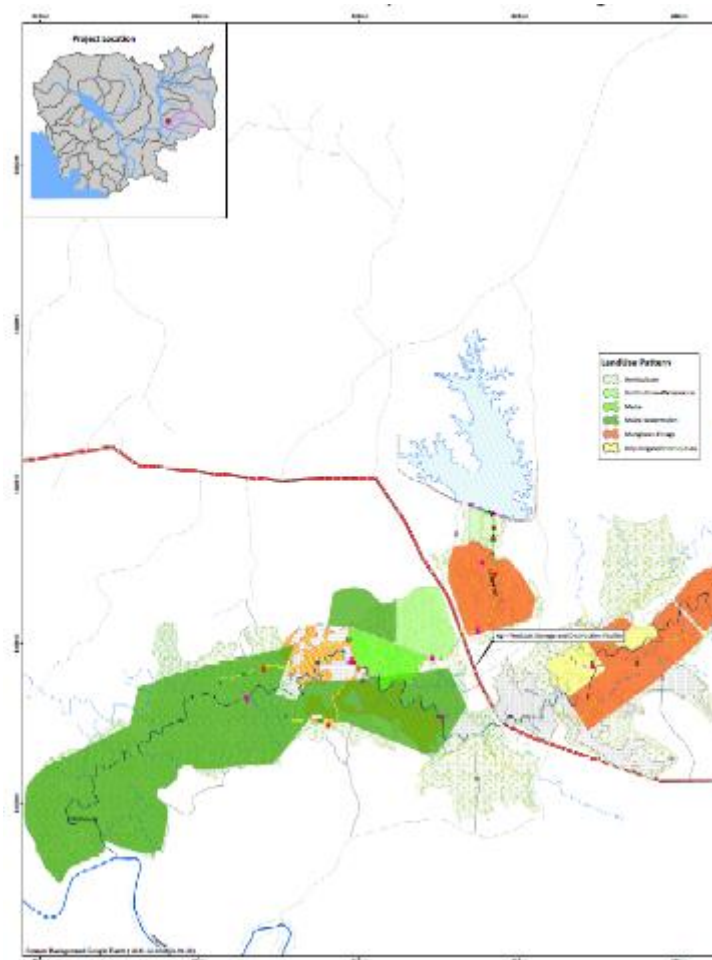
1.2.3 – Consultation on on E&S risks and impacts (27 April 2023)

- The engineering team originally propose the road width on the embankment 1 m (left) and 4 m (right) in order to avoid the impacts on the paddy fields. Though, local people suggested to expand the road width at Left from 1m to 4 m so that it is easy move the truck during the harvesting season.
- Since the rehabilitation of the irrigation channel will be done on the existing canal, the local people confirmed that there will be no impacts.
- The engineering team agree to design the road width on the embankment 4 m for both left and right.

Annex 2 – Layout of Kantout Subproject

Diagrams are presented from upstream (reservoir) to downstream (command area)

OVERALL SCOPE OF KANTOUT SUBPROJECT (Including Reservoir and Command Area)



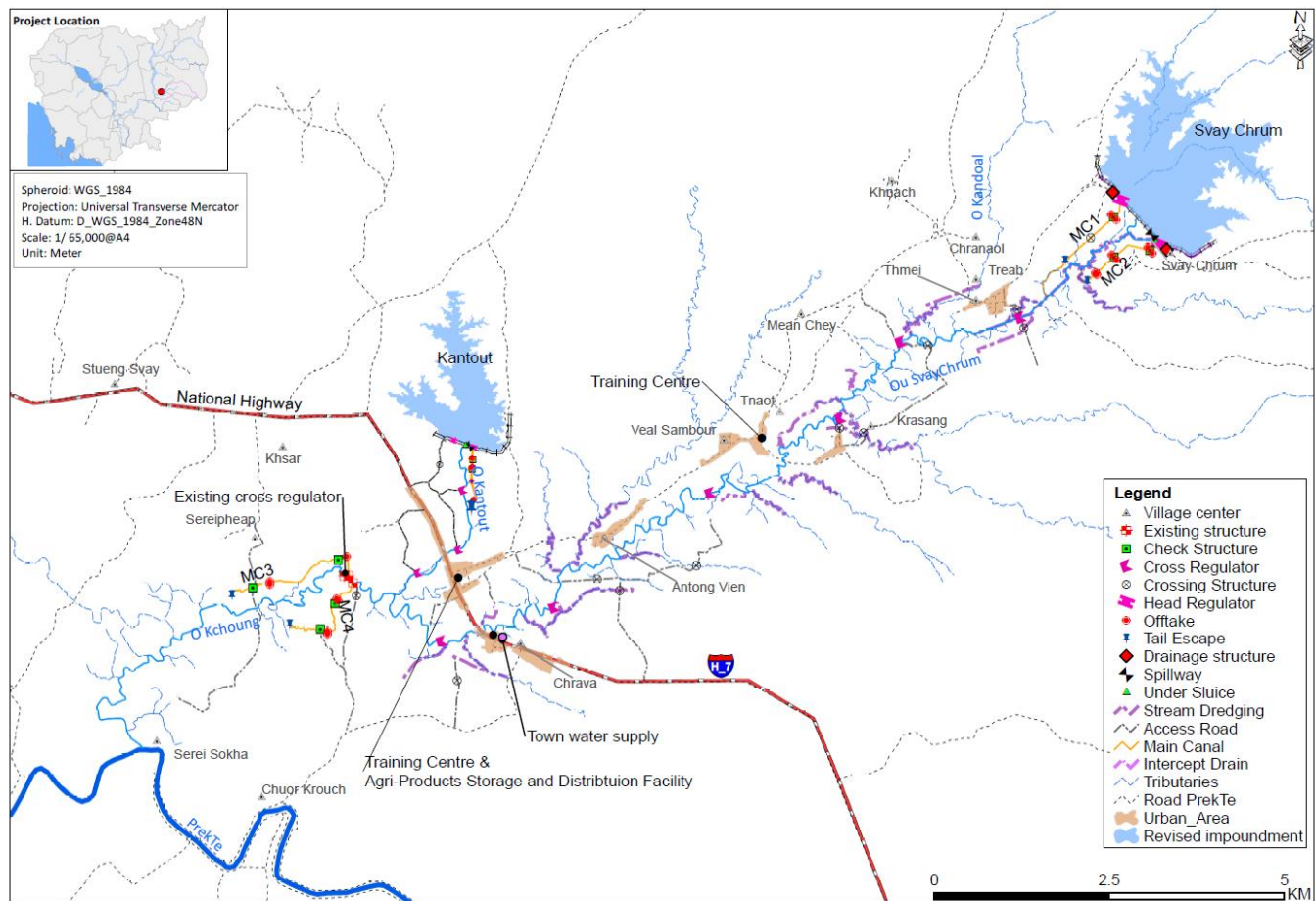
2.1 Reservoir Area

Submerged Areas in the Reservoir (blue line) and Proposed Dyke (red line)

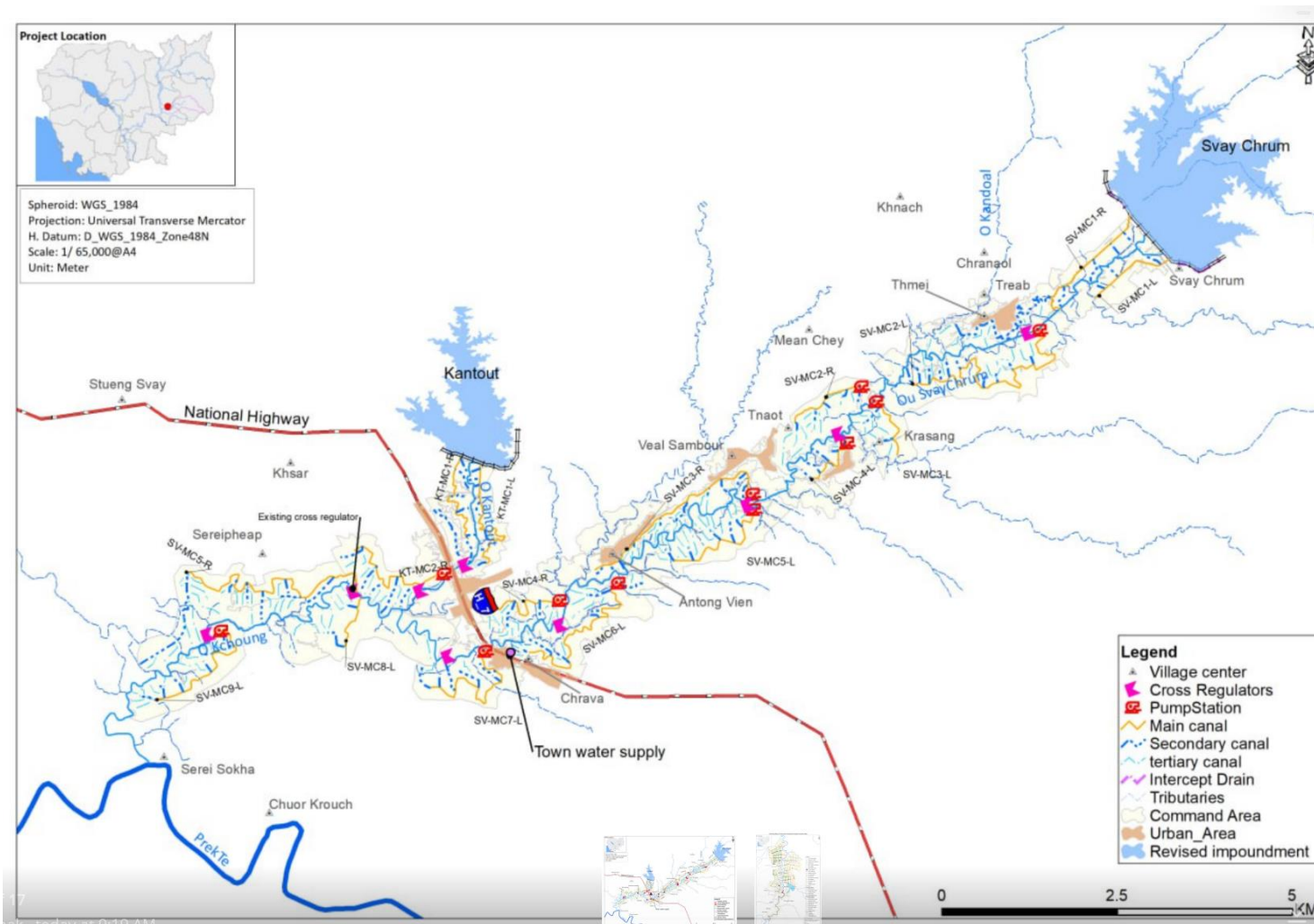


Layout of Combined Svay Chrum and Kantout for Options 1, 2, 3

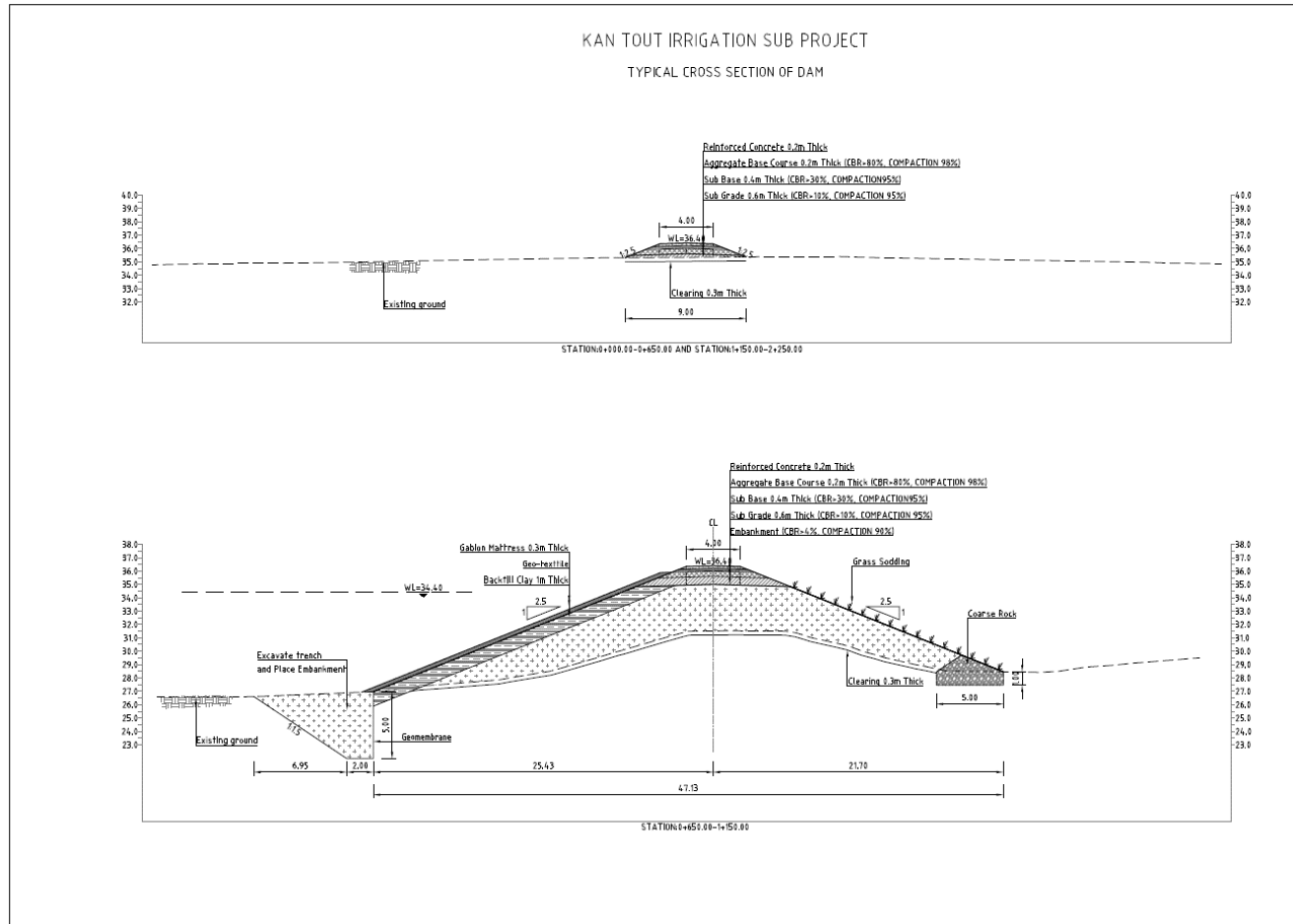
OPTION 1 (Recommended)



OPTION 2,3 (Not recommended)

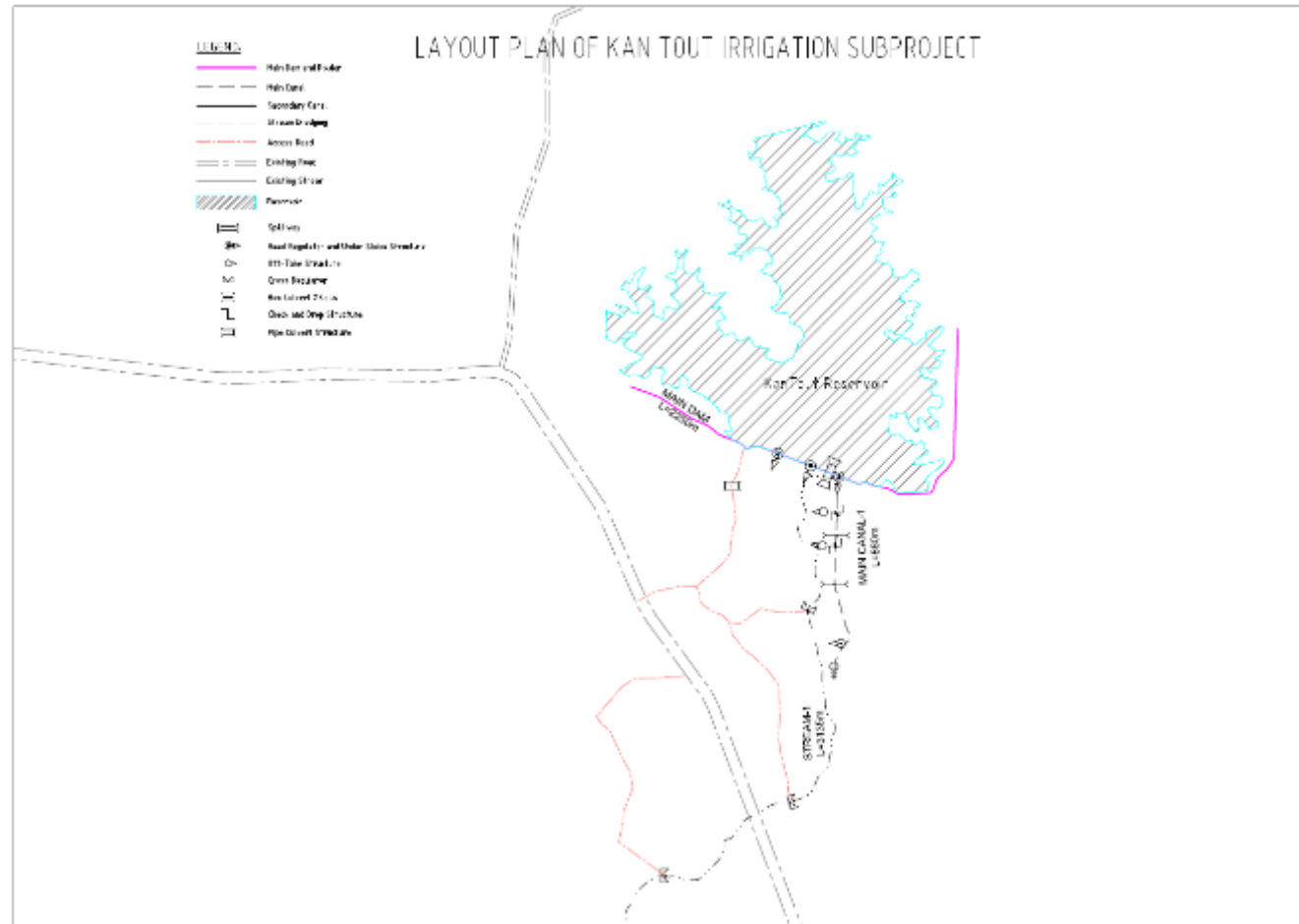


Typical Cross Section of Dam



2.2 Command Area

Proposed Irrigated Areas in Kantout Command Area)





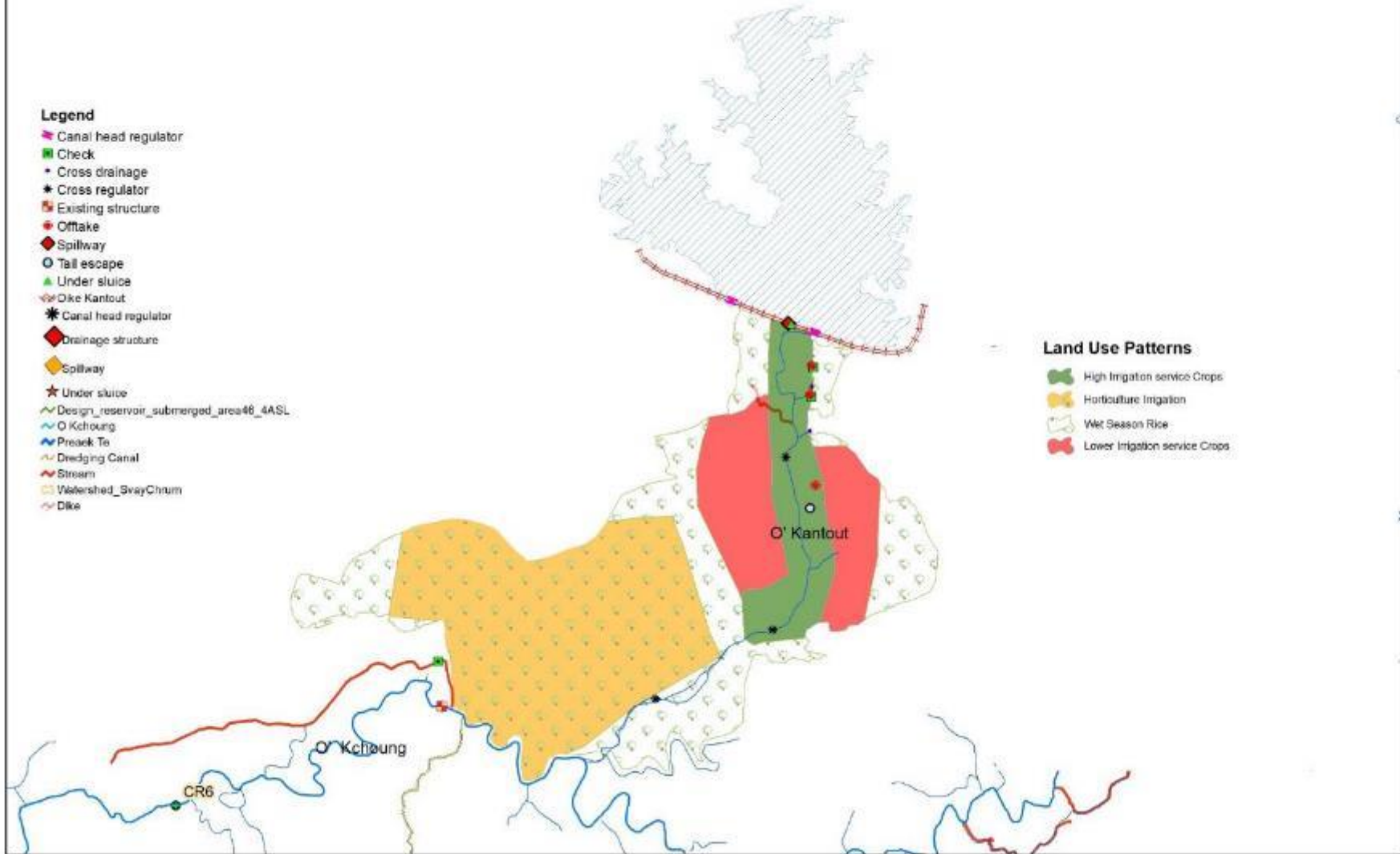
Potential Command Area in Kantout

Legend

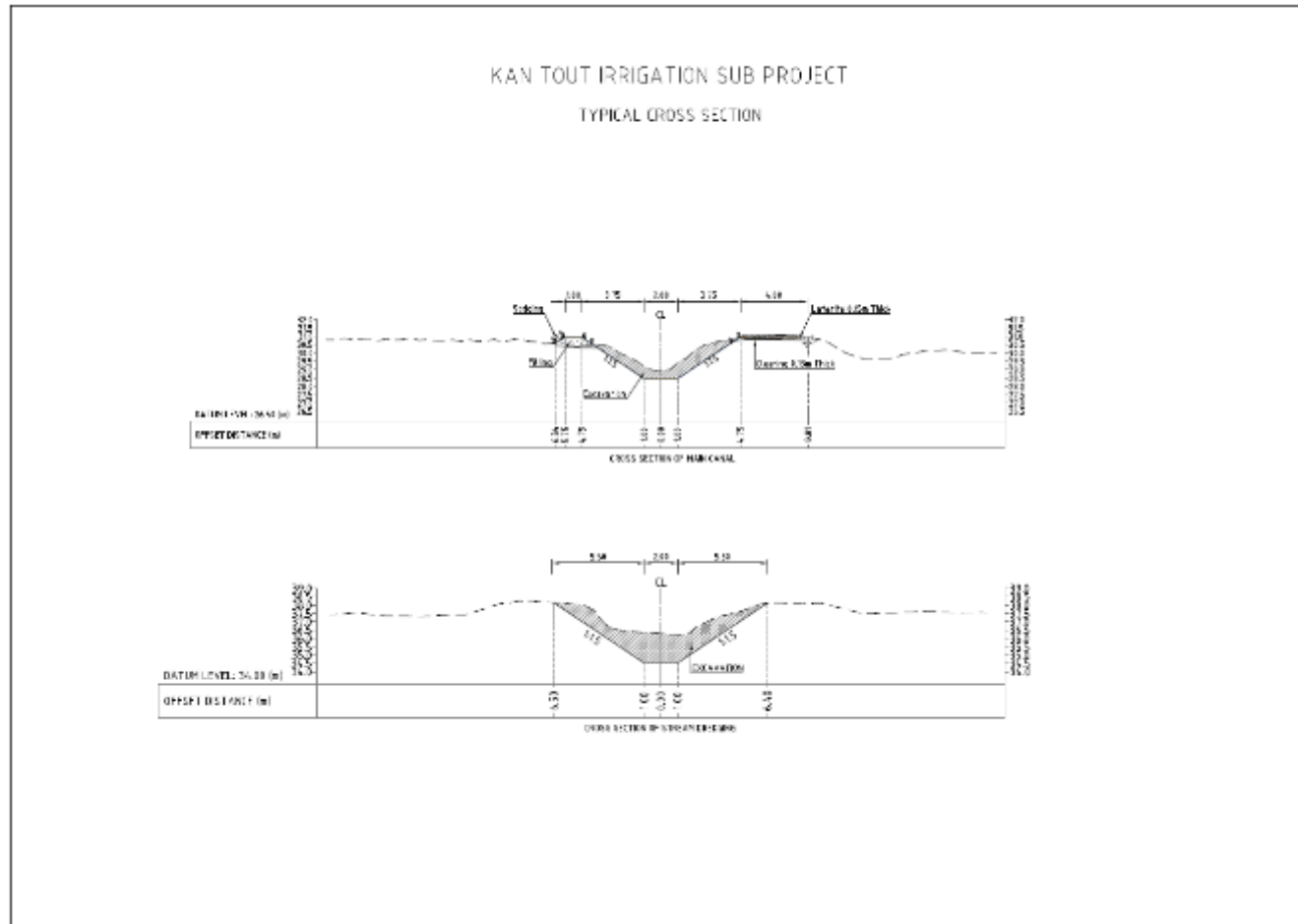
- Canal head regulator
- Check
- Cross drainage
- Cross regulator
- Existing structure
- Offtake
- Spillway
- Tail escape
- Under sluice
- Dike Kantout
- Canal head regulator
- Drainage structure
- Spillway
- Under sluice
- Design_reservoir_submerged_area46_4ASL
- O'Kchaung
- Preack To
- Dredging Canal
- Stream
- Watershed_SvayChrum
- Dike

Land Use Patterns

- High Irrigation service Crops
- Horticulture Irrigation
- Wet Season Rice
- Lower Irrigation service Crops



Typical Cross Section of Irrigation Canal (Command Area)

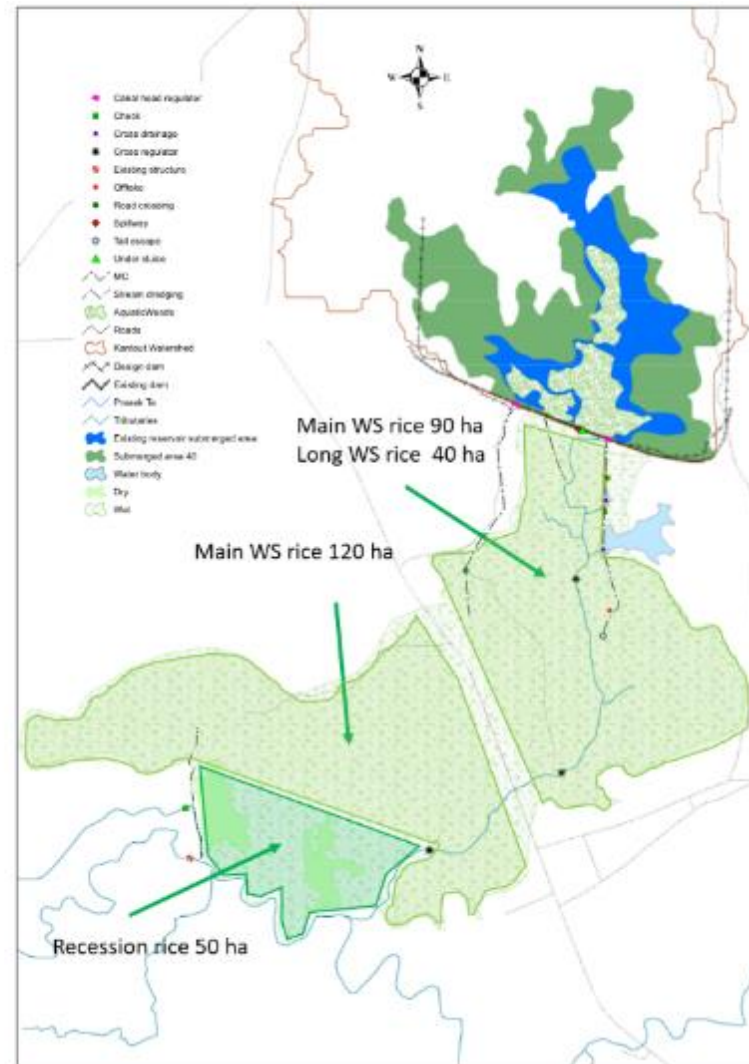


Layout for Proposed Cropping Patterns for Wet and Dry Seasons

Khantout WS

Long WS rice
Main WS rice
Recession rice

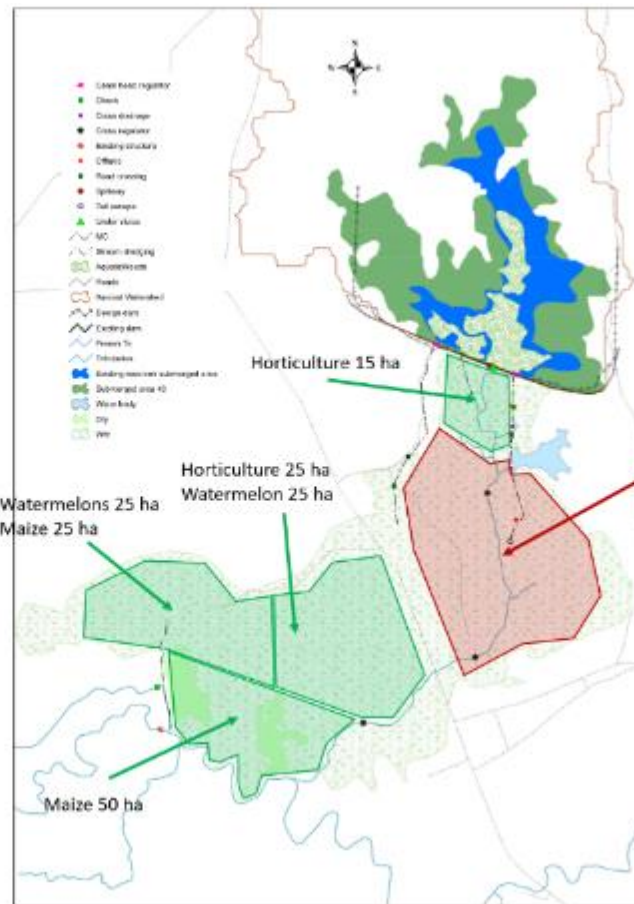
40 ha
210 ha
50 ha



Khantout DS

Horticulture (flood irrigation)
(eg vegetables)
Maize
Watermelon
Annual forage
Mungbean

40 ha
75 ha
50 ha
15 ha
50 ha



Annex 3 – Reportable Incidents & Grievance Reporting/Logbook

3.1 Reportable Incidents

The following incident types are to be reported using the environmental and social incident response process.

Fatality: Death of a person(s) that occurs within one year of an accident/incident, including from occupational disease/illness (e.g., from exposure to chemicals/toxins).

Lost Time Injury: Injury or occupational disease/illness (e.g., from exposure to chemicals/toxins) that results in a worker requiring 3 or more days off work, or an injury or release of substance (e.g., chemicals/toxins) that results in a member of the community needing medical treatment.

Acts of Violence/Protest: Any intentional use of physical force, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, deprivation to workers or project beneficiaries, or negatively affects the safe operation of a project worksite.

Disease Outbreaks: The occurrence of a disease in excess of normal expectancy of number of cases. Disease may be communicable or may be the result of unknown etiology.

Child Labor: An incident of child labor occurs: (i) when a child under the age of 14 (or a higher age for employment specified by national law) is employed or engaged in connection with a project, and/or (ii) when a child over the minimum age specified in (i) and under the age of 18 is employed or engaged in connection with a project in a manner that is likely to be hazardous or interfere with the child's education or be harmful to the child's health or physical, mental, spiritual, moral or social development.

Forced Labor: An incident of forced labor occurs when any work or service not voluntarily performed is exacted from an individual under threat of force or penalty in connection with a project, including any kind of involuntary or compulsory labor, such as indentured labor, bonded labor, or similar labor-contracting arrangements. This also includes incidents when trafficked persons are employed in connection with a project.

Environmental pollution incident: Exceedances of emission standards to land, water, or air (e.g., from chemicals/toxins) that have persisted for more than 24hrs or have resulted in harm to the environment.

Discrimination based on SOGI: Discrimination means creating a distinction, exclusion, or restriction which has the purpose or effect of impairing or excluding a person based on their real or perceived sexual orientation, gender identity, gender expression, or sex characteristics from being on an equal basis with others.

Sexual Exploitation: Any actual or attempted abuse of position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially, or politically from the sexual exploitation of another. In Bank financed operations/projects, sexual exploitation occurs when access to or benefit from a Bank financed Goods, Works, Non-consulting Services or Consulting Services is used to extract sexual gain.

Sexual Abuse: Actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions. In Bank financed operations/projects, sexual abuse occurs when a project related worker (contractor staff, subcontractor staff, supervising engineer) uses force or unequal power vis a vis a community member or colleague to perpetrate or threat to perpetrate an unwanted sexual act.

Sexual Harassment: Any unwelcome sexual advance, request for sexual favor, verbal or physical conduct or gesture of a sexual nature, or any other behavior of a sexual nature that might reasonably be expected or be perceived to cause offence or humiliation to another, when such conduct interferes with work, is made a condition of employment, or creates an intimidating, hostile or offensive work environment. In

Bank financed operations/projects, sexual harassment occurs within the context of a subcontractor or contractor and relates to employees of the company experiencing unwelcome sexual advances or requests for sexual favor or acts of a sexual nature that are offensive and humiliating among the same company's employees.

Other: Any other incident or accident that may have a significant adverse effect on the environment, the affected communities, the public, or the workers, irrespective of whether harm had occurred on that occasion. Any repeated non-compliance or recurrent minor incidents which suggest systematic failures that PMU deems needing the attention of the WB.

For environmental and social incidents

4.A. Form to be completed by PMU within 48 hours

| B1: Incident Details | | | |
|-------------------------------|--------------------|---|----------------------|
| Date of Incident: | Time: | Date Reported to PMU: | Date Reported to WB: |
| Reported to PMU by: | Reported to WB by: | Notification Type: Email/'phone call/media notice/other | |
| Full Name of Main Contractor: | | Full Name of Subcontractor: | |

| B2: Type of incident (please check all that apply) ¹ |
|--|
| Fatality <input type="checkbox"/> Lost Time Injury <input type="checkbox"/> Displacement Without Due Process <input type="checkbox"/> Child Labor <input type="checkbox"/> Acts of Violence/Protest <input type="checkbox"/> Disease Outbreaks <input type="checkbox"/> Forced Labor <input type="checkbox"/> Unexpected impacts on heritage resources <input type="checkbox"/> Unexpected impacts on biodiversity resources <input type="checkbox"/> Environmental pollution incident <input type="checkbox"/> Dam failure <input type="checkbox"/> Other <input type="checkbox"/> |

| B3: Description/Narrative of Incident |
|--|
| <i>For example:</i> <ol style="list-style-type: none"> I. What is the incident? II. What were the conditions or circumstances under which the incident occurred (if known)? III. Are the basic facts of the incident clear and uncontested, or are there conflicting versions? What are those versions? IV. Is the incident still ongoing or is it contained? V. Have any relevant authorities been informed? |

| B4: Actions taken to contain the incident | | | |
|---|-------------------|---------------|--------|
| Short Description of Action | Responsible Party | Expected Date | Status |
| | | | |
| | | | |
| | | | |

For incidents involving a contractor:
 Have the works been suspended under Contract GCC8.9? Yes ; No ;
 Name of Contractor: _____

| |
|--|
| B5: What support has been provided to affected people |
| |

4.B. Form to be completed by PMU (following investigation)

| C3a: Fatality/Lost time Injury information | | | | | | |
|--|-------------------|----------------------|-------------------|-------------|--------------------------|--------------------------|
| Cause of fatality/injury for worker or member of the public (please check all that apply): | | | | | | |
| 1. Caught in or between objects <input type="checkbox"/> 2. Struck by falling objects <input type="checkbox"/> 3. Stepping on, striking against, or struck by objects <input type="checkbox"/> | | | | | | |
| 4. Drowning <input type="checkbox"/> 5. Chemical, biochemical, material exposure <input type="checkbox"/> 6. Falls, trips, slips <input type="checkbox"/> 7. Fire & explosion <input type="checkbox"/> | | | | | | |
| 8. Electrocutation <input type="checkbox"/> 9. Homicide <input type="checkbox"/> 10. Medical Issue <input type="checkbox"/> 11. Suicide <input type="checkbox"/> 12. Others <input type="checkbox"/> | | | | | | |
| Vehicle Traffic: 13. Project Vehicle Work Travel <input type="checkbox"/> 14. Non-project Vehicle Work Travel <input type="checkbox"/> 15. Project Vehicle Commuting <input type="checkbox"/> | | | | | | |
| 16. Non-project Vehicle Commuting <input type="checkbox"/> 17. Vehicle Traffic Accident (Members of Public Only) <input type="checkbox"/> | | | | | | |
| Name | Age/DOB | Date of Death/Injury | Gender | Nationality | Cause of Fatality/Injury | Worker (Employer)/Public |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| C3b: Financial Support/Compensation Types (To be fully described in Corrective Action Plan template) | | | | | | |
| 1. Contractor Direct <input type="checkbox"/> 2. Contractor Insurance <input type="checkbox"/> 3. Workman’s Compensation/National Insurance <input type="checkbox"/> | | | | | | |
| 4. Court Determined Judicial Process <input type="checkbox"/> 5. Other <input type="checkbox"/> 6. No Compensation Required <input type="checkbox"/> | | | | | | |
| Name | Compensation Type | Amount (US\$) | Responsible Party | | | |
| | | | | | | |
| | | | | | | |
| C4: Supplementary Narrative | | | | | | |
| | | | | | | |

For SEA/SH Incident

4.C. Incident Form for SEA/SH (to be completed by PMU within 48 hours)

| B1: Incident Details | | |
|--|--|---|
| Date of incident intake by the project/GM: | Date Reported to PMU: | Date Reported to WBG: |
| Reported to project/GM by: <input type="checkbox"/> Survivor <input type="checkbox"/> Third party <input type="checkbox"/> Other: _____ Is a record of this incident in GM? Yes <input type="checkbox"/> No <input type="checkbox"/> | Reported to PMU by: <input type="checkbox"/> GM operator <input type="checkbox"/> Directly, by Survivor <input type="checkbox"/> Directly, by third party <input type="checkbox"/> Other: _____ | Reported to WBG by: <input type="checkbox"/> PMU <input type="checkbox"/> Directly, by Survivor <input type="checkbox"/> Directly, by third party <input type="checkbox"/> Other: _____ |

| B2: Incident type (please check all that apply) See Appendix 1 for definitions |
|---|
| Sexual exploitation <input type="checkbox"/> Sexual abuse <input type="checkbox"/> Sexual harassment <input type="checkbox"/> |

| B3: Provide the following details from the GM record | |
|---|---|
| Age of survivor (if recorded in GM): | Have the national legislation or mandatory reporting requirements been followed? Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Sex of survivor (if recorded in GM): Male <input type="checkbox"/> Female <input type="checkbox"/> Other <input type="checkbox"/> | Was the survivor referred to service provision? ²⁹ Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Is the survivor employed by the project (as indicated by the survivor or complainant and reported in the GM)? Yes <input type="checkbox"/> No <input type="checkbox"/> | Is the alleged perpetrator employed by the project (as indicated by the survivor or complainant and reported in the GM)? Yes <input type="checkbox"/> No <input type="checkbox"/> |

| B4: Basis for further action | |
|--|--|
| a. Has the complainant provided informed consent to lodge a formal complaint? Yes <input type="checkbox"/> No <input type="checkbox"/> | c. Has the survivor provided informed consent to be part of an investigation into misconduct? Yes <input type="checkbox"/> No <input type="checkbox"/> |
| b. Does the employer have a suitable administrative process and capacity in place to investigate misconduct relating to SEA/SH in a survivor-centered way? Yes <input type="checkbox"/> No <input type="checkbox"/> | d. Has the complaint been filed anonymously or through a third party? Yes <input type="checkbox"/> No <input type="checkbox"/> |
| If the answer to any of these questions is no, has the GM assessed the risks and benefits of carrying out an investigation into the alleged misconduct, taking into account the survivor's safety and wellbeing? Yes <input type="checkbox"/> No <input type="checkbox"/> | |
| Will an investigation into misconduct be undertaken in addition to an investigation into adequacy of project systems, processes or procedures? Yes <input type="checkbox"/> No <input type="checkbox"/> | |

4.D. Incident Form for SEA/SH (to be completed by PMU following SEA/SH investigation)

| C1: Findings of the investigation | | |
|--|---|---------------------------------------|
| Have sanctions against a perpetrator been recommended as part of an investigation into misconduct? Yes <input type="checkbox"/> No <input type="checkbox"/> | Has an investigation into adequacy of project systems, processes or procedures been undertaken? Yes <input type="checkbox"/> No <input type="checkbox"/> | |
| C2: Corrective actions to be implemented (To be fully described in Corrective Action Plan) | | |
| Short Description of Action (SEA/SH examples) | Responsible Party | Timeline for completion/Status |
| <i>Referral of Survivor to holistic care services</i> | | |
| <i>Undertake disciplinary investigation in accordance with GM timelines and confirmed process</i> | | |
| <i>Disciplinary actions, including sanctions, to be applied following misconduct investigation by Employer</i> | | |
| <i>Increased training on Codes of Conduct (CoC)</i> | | |
| <i>Audit of implementation of SEA/SH safety mitigation</i> | | |
| <i>Strengthened awareness training on project-related risks, CoC and how to report incidents for project-affected community</i> | | |
| <i>Training for project supervisors on the need to follow guidelines of behavior in CoC and their supervisory responsibilities</i> | | |
| <i>Plan to improve coverage/quality of service Provision</i> | | |
| <i>Any other system strengthening measures or corrections for system failures that are necessary</i> | | |

3.2 Project's Grievance Logbook

Project Grievance Logbook (Sample for Local Levels)

| No. | Name of Complainant (or anonymous) | Addresses | Sex (M/F) | Age | Contact information | Date Received | Details of nature of grievance (Environmental impacts, social impacts, labor, health, etc.) | Which of the three GRM that was used? (As described in Chapter 9 (GRM)) | Actions taken to resolve grievance, by whom | How many steps that have been used in the relevant GRM | Date grievance was finally resolved/closed? | Notes |
|-----|------------------------------------|-----------|-----------|-----|---------------------|---------------|---|---|---|--|---|-------|
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

(Sample for PMU Level – to be elaborated on Excel spreadsheet with filter function)

| Date Received | Name of Complainant (or anonymous) | Sex (M/F) | Age | Contact information (phone number/email, other channel(s)) | Location of Complainants (Province, District, commune, village...) | Form of grievance received (Writing or Verbal (face-to-face, telephone, online), SMS, MOWRAM and PDoWRAM comment box in designated Website/Facebook/WhatsApp, etc.) | Channel of Receipt (Direct to PMU GRM Focal Point, or Relayed from other channels (provide details)) | Key topics of Grievances a) Labor and Working Condition b) Resettlement (incl Voluntary Land Donation) c) SEA/SH d) Environmental impacts e) Community Health and Safety f) Accidents | Nature of complaints? a) Resolution required b) Clarification required c) Suggestion only (for project improvement) d) General Concerns | Step 1 of GRM Procedure | | | Step 2,3,4 (Replicated in Excel spreadsheet) | Closing of Case (At which Steps, date of case closing) | Notes |
|---------------|------------------------------------|-----------|-----|--|--|---|--|---|---|-------------------------|-------------------------|--------------------------|--|--|-------|
| | | | | | | | | | | Date received | Date solved/transferred | Duration spent (in days) | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

Annex 4 – Worker’s Code of Conducts

The Annex has two Code of Conduct (COC): one is for ESHS and SEA/SH/VAC, and the other is for working with local Ethnic Communities.

4.1 Code of Conduct related to ESHS and SEA/SH/VAC

Instructions:

This Code of Conduct shall be perused and signed by all individual workers who enter direct work contract with a) PMU, b) PMU’s consulting firms and service providers, c) contractors who renovate existing HCFs.

I, _____, acknowledge that adhering to environmental, social, health and safety (ESHS) standards, following the project’s occupational health and safety (OHS) requirements, and prevention of Sexual Exploitation & Abuse (SEA)/Sexual Harassment (SH), are important.

I understand that that failure to follow ESHS and OHS requirement, or to partake in activities constituting SEA/ SH -- be it at the project site, the surrounding area of the project site, workers’ camps, or the project communities, including community members and project workers, constitute acts of gross misconduct and are therefore grounds for sanctions, penalties, or potential termination of employment. Prosecution by the Police of those who commit SEA/SH may be proceeded as applicable under relevant Laws.

I agree that while working on the project, I will:

- Carry out my duties competently and diligently.
- Comply with this Worker’s Code of Conduct and all applicable laws, regulations, and other requirements, including requirements to protect the health, safety and well-being of other project workers, and any other person and community members.
- Maintain a safe working environment including by:
 - Ensure that workplaces, machinery, equipment, and processes under each person’s control are safe and without minimal risk to health and safety of those involved.
 - Use appropriate measures relating to chemical, physical and biological substances, and agents; and
 - Follow applicable emergency response procedures.
- Report works situations that I believe unsafe or unhealthy to either project workers and/or community and remove myself and inform those relevant to remove themselves from a work situation which I reasonably believe imminent and dangerous to safety, life, and health of those involved.
- Consent, if required, to a background check in any place I have worked for more than six months.
- Attend and actively partake in training courses related to ESHS, OHS, SEA/SH and VAC, as requested by my employer.
- Always wear my personal protective equipment (PPE), as required while at work or engaged in project related activities.
- Take all practical steps to implement the environmental and social management plan (ESMP), which may include OHS Management Plan.

- Abide by a zero-tolerance policy as to SEA/SH/VAC and alcohol consumption during work activities, and refrain from use of narcotics or other substances which can impair worker's expected working ability and judgement.
- Respect women, children (persons under 18 years of age), and the elderly regardless of their ethnic background, language, religion, personal opinions, disability, and/or other socioeconomic status.
- Shall not use language or behavior that are inappropriate to community members and project workers, particularly women, children, and the elderly,
- Shall not commit any sexual abuse and or exploit, and/or sexual harassment of any kinds to community members in the project area and any project workers.
- Shall not engage in sexual harassment of project personnel and staff — for instance, making unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature (looking somebody up and down; kissing, howling or smacking sounds; hanging around somebody; whistling and catcalls; in some instances, giving personal gifts.
- Shall not engage in offering any work-related favors such as making promises of favorable treatment (i.e., promotion), or make threats of unfavorable treatment (i.e., loss of job), or make payments in kind or in cash depending on sexual acts — or other forms of humiliating, degrading or exploitative behavior.
- Shall not engage in using prostitution service -- in any form and at any time during project implementation.
- Shall not participate in sexual contact or activity with children under 18 years of age —including grooming or contact through digital media. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not considered a defense or excuse.
- Consider reporting through the project's GRM, or to my manager, any suspected or actual SEA/SH deed by a fellow worker, whether employed by my company or not, or any breaches of this Code of Conduct.
- Complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual Exploitation & Abuse, Sexual Harassment, and Violence Against Children (VAC).
- Report violations of this Code of Conduct; and

With respect to children under the age of 18:

- Bring to the attention of my manager the presence of any children on the construction site or engaged in hazardous activities.
- Wherever possible, ensure that another adult is present when working in proximity to children.
- Shall not invite unaccompanied children unrelated to my family into my home unless they are at immediate risk of injury or in physical danger.
- Not use any computers, mobile phones, video, and digital cameras or any other medium to exploit or harass children or to access child pornography (see also "Use of children's images for work related purposes" below).
- Avoid, in all circumstances, any verbal and/or physical punishment or discipline of children.
- No hiring of children (under 18) in any project activity.
- Comply with all relevant local regulations, including labor law in relation to child labor and forced labor.

- Take appropriate caution when photographing or filming children (see also section below). Photos or films of children should not be taken under the project, except for instances showing the benefits or impacts of road works, such as impacts to schools or school safety trainings.

Use of children's images for work related purposes

When photographing or filming a child for work related purposes, I must:

- Before photographing or filming a child, assess and endeavor to comply with local traditions or restrictions for reproducing personal images.
- Before photographing or filming a child, obtain informed consent from the child and a parent or guardian of the child. As part of this, I must explain how the photograph or film will be used.
- Ensure photographs, films, videos present children in a dignified and respectful manner and not in a manner that is vulnerable or submissive. Children should be adequately dressed up and not in poses that could be seen as sexually suggestive.
- Ensure images are honest representations of the context and the facts.
- Ensure file labels do not reveal identifying information about a child when sending images electronically.

Raising Concerns

If any person observes behavior that I believe may represent a violation of this Code of Conduct, or that otherwise concerns me, I will raise the issue promptly. This can be done in either of the following ways:

1. Contact [enter name of the Employer's Social Focal Point] to handle these incidences.
2. Call Employer's telephone number (See contact detail at Section 5 of project's Stakeholder Engagement Plan).

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. PMU will take all reports of possible misconduct seriously and will investigate and take appropriate action. In case of SEA/SH, PMU will provide referral to local service provider who will provide support to SEA/SH victims (See also Section 6.4 of project's Stakeholder Engagement Plan).

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

Sanctions

I understand that if I breach this Workers' Code of Conduct, my employer will take disciplinary action which could include:

- Informal warning.
- Formal warning.
- Additional Training.
- Termination of employment.
- Report to the Police if warranted.

I understand that it is my responsibility to:

Ensure that the Environmental, Social, Health and Safety requirements are met.

Adhere to the Occupational Health and Safety Management Plan

Avoid actions or behaviors that could be construed as SEA/SH/VAC. Any such actions will be a breach of this Workers' Code of Conduct.

I hereby acknowledge that I have perused the foregoing part of this Workers' Code of Conduct, agree to comply fully with the requirements contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, SEA/SH/VAC issues. I understand that any actions that are inconsistent with this Workers' Code of Conduct, or failure to act as mandated by this Workers' Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: _____
Printed Name: _____
Title: _____
Date: _____

4.2 Code of Conduct for Working with Local Ethnic Communities

This Code of Conduct is grounded on the Objectives of the WB's ESS7, which are:

- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous Peoples.
- To avoid adverse impacts of projects on Indigenous Peoples, or when avoidance is not possible, to minimize, mitigate and/or compensate for such impacts.
- To promote sustainable development benefits and opportunities for Indigenous Peoples in a manner that is accessible, culturally appropriate and inclusive.
- To improve project design and promote local support by establishing and maintaining an ongoing relationship based on meaningful consultation with the Indigenous
- To recognize, respect and preserve the culture, knowledge, and practices of Indigenous Peoples, and to provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.

4.3 Guidelines for Worker's Camp

To ensure the compliance to the OHS and ESF requirement, these guidelines will help the contractor when setting up worker's camps.

GENERAL

The Workers Camp Management Plan will be compliant with the specific prescriptions of the ESMP.

WORKER RECRUITMENT

The Contractor is required to minimise the number of skilled workers that are recruited from overseas. No unskilled labor will be sourced from overseas. Local communities should be prioritized for unskilled labor, including a target of 15% female unskilled workers. The Contractor will maximise the number of skilled and unskilled workers that are recruited from the communities along the project site.

The Contractor will be required to provide justification for any skilled workers recruited from overseas and explain why this position cannot be filled locally/ in Cambodia.

WORKERS CAMP FACILITIES

All facilities in the Workers Camp must be complaint with the stipulations of the ESMP. The camp shall be provided with the following minimum facilities:

- Eating space and dormitories as required shall be constructed of suitable materials to provide a safe healthy environment for the workforce and which facilitate regular cleaning and the provision of ventilation and illumination.
- At least one water closet toilet, one urinal and one shower per 10 personnel engaged either permanently or temporarily on the project. Separate toilet and wash facilities shall be provided for male and female employees, including ensuring that toilets are available close to working sites/road sections where women are working.
- A sick bay and first aid station.
- Sewage collection facilities to allow for the treatment of black and grey wastewater discharge from toilets, washrooms, showers, kitchens, laundry and the like. The management of all camp wastewater water shall be as prescribed in the ESMP.
- All camp facilities shall be maintained in a safe clean and or appropriate condition throughout the construction period.
- Throughout the period of the contract the employer, the engineer, or their representatives shall have uninterrupted access to and from the camp for the purpose of carrying out routine inspections of all buildings, facilities or installations of whatever nature to ensure compliance with this specification.

WORKERS CAMP OPERATIONS

- The Contractor will be required to provide adequate provisions for the workers for the duration of the project so as not to be a burden on the food or water security of the surrounding communities. The Contractor will strive to hire local labor to provide cleaning and food services.
- All wastewater, solid waste, freshwater usage, noise levels, handling and storage of hazardous materials shall be as prescribed in the ESMP.

MANAGEMENT OF OFF DUTY WORKERS

- The Contractor will prepare ensure all staff sign and adhere to the Workers' Code of Conduct to describe the expected behaviours of their project worker in relation to the local communities and their social sensitivities.

- The Contractor is to ensure that all overseas project staff, not already living in Cambodia, undergo a cultural familiarisation session as part of their induction training. The purpose of this induction will be to introduce the project staff to the cultural sensitivities of the local communities and the expected behaviours of the staff in their interactions with these communities.
- The Contractor is to stipulate the conditions under which visitors may attend the workers camp. Strict visiting hours should be enforced, and all visitors will be required to sign in and out of the worker’s camp. No overnight visitors will be allowed.
- The Contractor shall ensure that basic social/collective rest spaces are provided equipped with seating within the Workers Camp to help minimise the impact that the workers would have on the leisure and recreational facilities of the nearby communities. Provisions should also be made to provide the workers with an active recreation space within the camp.

WORKERS CAMP MANAGEMENT PLAN

A Worker Camp Management Plan shall be submitted by the Contractor to MOWRAM. The Workers’ Camp Management Plan shall describe how this document and the ESMP shall be implemented in the following:

- Recruitment strategy
- Accommodation
- Canteen and dining areas
- Ablutions
- Water supply
- Wastewater management system
- Proposed power supply
- Code of Conduct for Workers
- Recreational/leisure facilities for workers
- Visitors to the Workers Camp
- Interactions with the local communities

Annex 5 – Biological Baseline for Kantout

Background. Kantout reservoir was constructed during Pol Pot regime (Khmer Rou) in 1975. It is located in Kantout village, Kantout commune, Chetr Borey District, Kratie province, north-eastern of Cambodia. The reservoirs located inside the community forestry called “Kantout Community Forestry” under the management of Ministry of Agriculture, Forestry, and Fishery. The community was officially established in 2011 cover the total area of 716 hectares with two hundred families are members. In addition to the community forestry, there is also a community fishery called “Kantout Community Fishery” located inside the watershed; however, currently this community is not working well because of the degradation of aquatic resource in the reservoir. As the geographic area cover by community forestry and community fishery, Kantout reservoir seem to have rich biodiversity including fauna and flora compared to Kantout and Srae Huy. Kantout is considered as a wetland where many kinds of fauna and flora species are found. This section has two key parts: Method note and findings of aquatic plans, aquatic animals, birds, forest timber and wildlife.

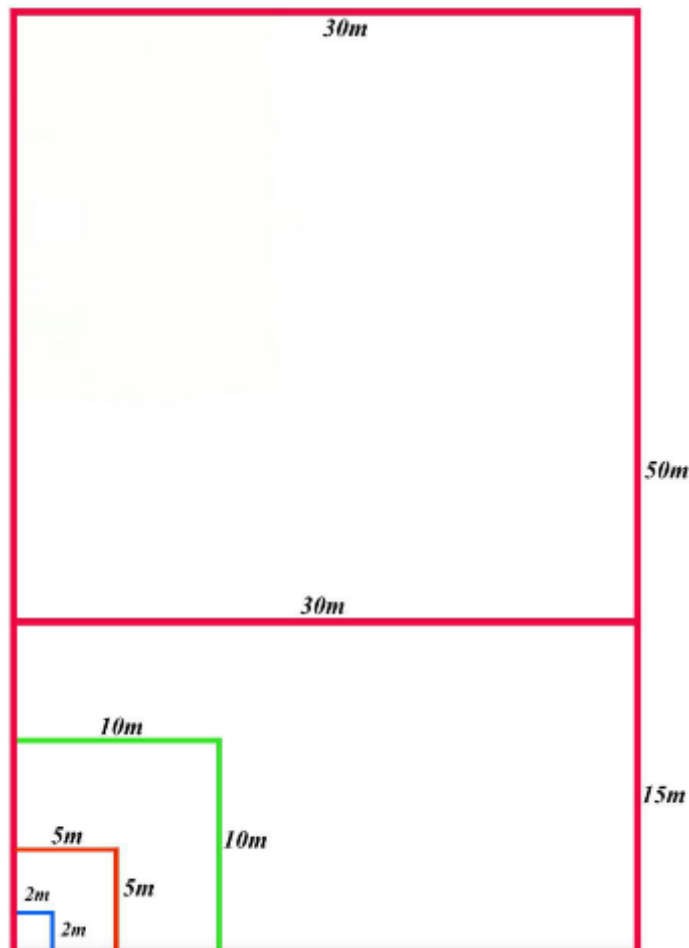
5.1 Method Note

The process involved in assessment of biodiversity for Kantout subproject include:

- 1) Review and discuss ToR on biodiversity assessment with Bank's team
- 2) Review of secondary data, including also IBAT screening results,
- 3) Prepare summary of key findings and guide questions for stakeholder discussions,
- 4) Conduct field study to: a) consult with local stakeholders on initial findings, b) validate initial findings, identify discrepancies (due to un-matched spatial scope between IBAT screening (50km radius) and subproject's area of influence (5-10km radius), c) conduct field observation using transect walk, drone imagery and representative samples (5 samples) evenly distributed in the potential submerged area (for the reservoir), and command area.
- 5) Report writing/ share initial results for consultation of report findings with local stakeholders including local people, local fisheries communities, forestry administration, commune and village chiefs, local people.

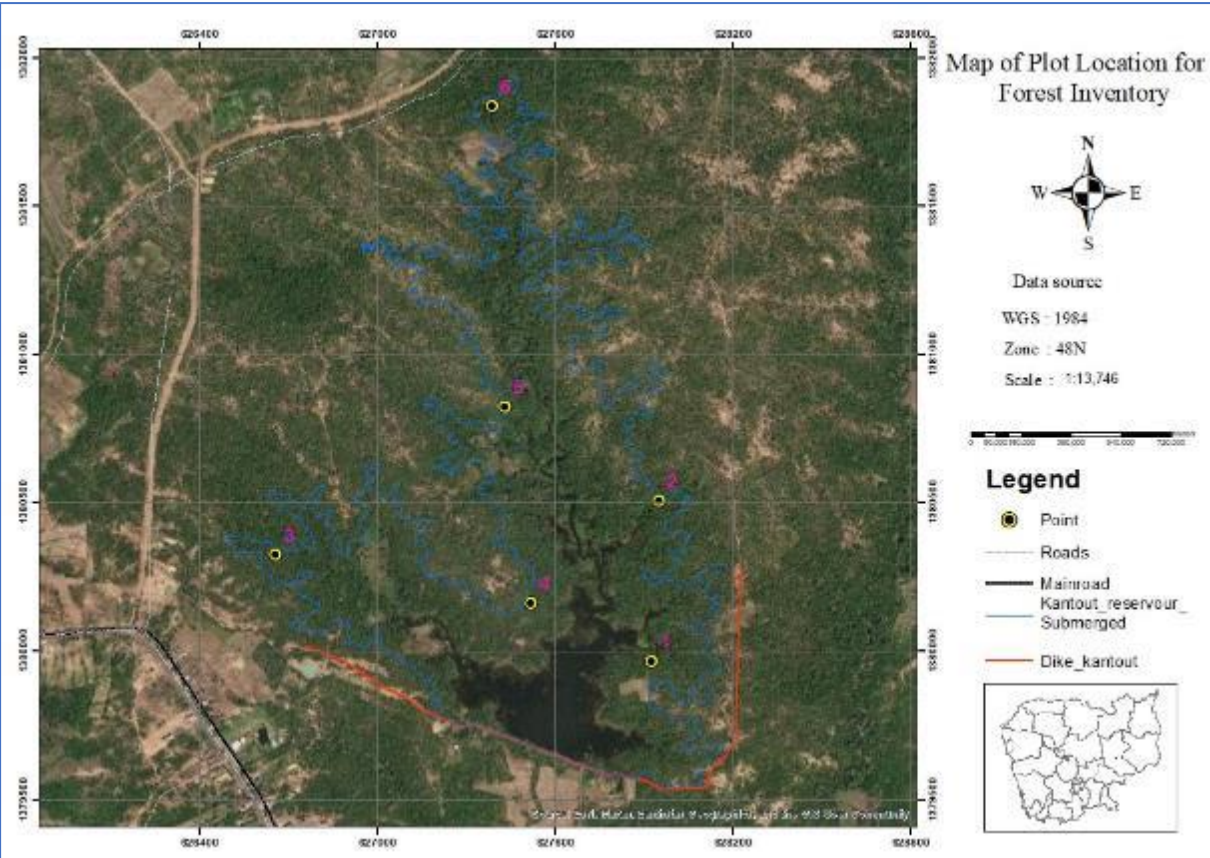
Sampling techniques. Inside the watershed, the forest role plays important in ecology that's including biodiversity. The Cambodia National Forest Inventory method was applied to record the data on forestry, wildlife, bird, and other fauna and flora data. The forest inventory was conducted only in Kantout reservoir because there is a community forestry in that area. The nested plot method was used in the sampling design because of its simplicity for long-term monitoring. Concentric nested circular plots were used to simplify the sampling design. For rectangular plot, there are 4 sub-plots. The size of the plot is (30m x 50m) which set up to measure the tree DBH ≥ 30 cm. The first sub-plot (15m x 30m) is to measure the tree DBH ≥ 15 cm while the second sub-plot (10m x 10m) is for measuring the tree DBH ≥ 5 cm. The third sub-plot (5m x 5m) is set up in order to measure the sapling $1\text{cm} < \text{DBH} < 5\text{m}$, while the fourth sub-plot (2m x 2m) is used to count the regeneration/seedlings (DBH $< 1\text{cm}$).

Rectangular Plot Layout



Six rectangular plots were set up to inventory the forest and biodiversity in the damage area (Figure 2). Two plots were set up for testing in March, 2023 while four other plots were just recently set up in June, 2023 in order to cover the area where there will be a possibility impact on biodiversity. The whole data sheet was provided in appendix in order to support explaining the recording of biodiversity for this assessment.

Plot distribution for forest inventory



- **Drone Observation**

The drone, DJI Mavic Mini, was operated in each sub-project location in order to capture the geographic information data that link to biodiversity habitat. The operated fly height was 80m from the ground surface. Due to the limited capturing capacity, the coverage area was: 97 hectares in Srae Huy, 62 Hectares in Svay Chrum, and 58 hectares in Kantout.



- **Integrated Biodiversity Assessment Tool (IBAT)**

IBAT is a web-based map and reporting tool that provides fast, easy and integration access to three of the world’s most authoritative global biodiversity datasets: IUCN Red List of Threatened Species, World Database on Protected Areas, and World Database of Key Biodiversity Areas. It helps incorporate biodiversity considerations into key project planning and management decisions, including screening potential investments, siting an operation in a given region, developing action plans to manage for biodiversity impacts, assessing risks associated with potential sourcing regions, and reporting on corporate biodiversity performance. Through an interactive mapping tool, it is easily to access and use this up-to-date information to identify biodiversity risks and opportunities within or close to a project boundary. The coverage area of the IBAT is 50km², therefore, many of the species under the IUCN red list were found in the distance of 50km where Mekong River and Wildlife Sanctuary located.

5.2 Aquatic Plant

Aquatic plants play important role in ecological function; it can be a feed for animal and people; and it is a natural water treatment inside the reservoir. Similar to other wetland in Cambodia, some aquatic species such as *Nymphaeaceae*, *Elchhornia Crassipes*, or *Ipomoea aquatic etc.* were found in the reservoir. In Kantout reservoir eleven species were found and those species are out of the IUCN red list. However, two species were found in *Unknown* scientific name. One among of those two species is an invasive species that threaten other aquatic species. The density of the existing species in Kantout is not rich as there is an invasive species that dominant inside the reservoir.

Existing aquatic plants species in Kantout reservoir

| No | Local Name | Scientific Name | Confirmed by Local People | Confirmed by IBAT | IUCN Category |
|----|-------------------|--------------------------------------|---------------------------|-------------------|---------------|
| 1 | ព្រាលីត | <i>Nymphaeaceae</i> | √ | x | x |
| 2 | សារាយ | <i>Cabomba Caroliniana</i> | √ | x | x |
| 3 | ក៏ដោក | <i>Elchhornia Crassipes</i> | √ | x | x |
| 4 | ត្រកួន | <i>Ipomoea aquatica</i> | √ | x | x |
| 5 | ចន្ទលក្ខី | <i>Marsilia quadrifolia</i> | √ | x | x |
| 6 | ក៏ពឹងពួយស | <i>Catharanthus Roseus</i> | √ | x | x |
| 7 | ក៏ពឹងពួយ ក្រហម | <i>Ludwigia adscendens</i> | √ | x | x |
| 8 | ស្លាបចង្វា | <i>Alisma plantago-aquatica</i> L | √ | x | x |
| 9 | កញ្ជ្រក | <i>Neptunia oleracea</i> | √ | x | x |
| 10 | ហៀន | <i>Unknown</i> | √ | x | x |
| 11 | រំចង់ | <i>Unknown</i> | √ | x | x |

5.3 Aquatic Animal

Aquatic animal including fish, crab, frog, eel, snake, etc. were found in Kantout reservoir. It was reported by the fishery community and local people that there were many species and number of aquatic animals in the reservoir in the last 10 years. However, because of invasive species of aquatic plant that made the reservoir shallow, it affects the natural habitat of aquatic animal. On the other hand, it was also reported that the water in the reservoir used to be polluted because garbage storage was established around 10km at the upper stream of the reservoir that resulted in reducing the amount of aquatic animal. In addition, illegal fishing is also reported to be one of the reasons in the declining amount of aquatic animals in the reservoir. Thus, according to the consultation meeting as well as the key informant interview, currently the amount of aquatic animals in the reservoir is low due to the high sediment level that makes the reservoir shallow, pollution, and illegal fishing.

In total, 45 aquatic animal species were found in Kantout reservoir. Among these, 34 species are under the IUCN red list: 14 species are Least Concern (LC), 10 species are Critical Endanger (CN), 9 species are Endanger (EN), and 1 species is Vulnerable (VU). Most of these red list species were found by IBAT with 50km radius around Kantout reservoir. After discussing with all stakeholders, especially with local fisherman and fishery community, they confirm that those Critical Endanger (CR), Endanger (EN), and Vulnerable (VU) species are not present in the reservoir. These species live in the distance of 40-50km in Mekong River. Consulted people confirmed that the following species are found in the reservoir: *Channa Striata*, *Pseudomystus siamensis*, *Pristolepis Fasciata*, *Anabas testudineus*, *Macrogathus Siamensis*, *Hypsibarbus Malcolmi*, *Channa Micropeltes*, and *Ophisternon Bengalense*. These are classified as Least Concern (LC) species by IUCN. The table below provide a list of species found in Kantout reservoir which was validated/confirmed with local people and local authority.

List of aquatic animals in Kantout reservoir

| No | Common Name | Scientific Name | Confirmed by Local People | Confirmed by IBAT | IUCN Category |
|----|---------------------|----------------------------------|---------------------------|-------------------|---------------|
| 1 | ត្រីវិស | <i>Channa Striata</i> | √ | x | LC |
| 2 | ត្រីអណ្តែង | <i>Clarias Macrocephalus</i> | √ | x | x |
| 3 | ត្រីកញ្ចុះ | <i>Pseudomystus siamensis</i> | √ | x | LC |
| 4 | ត្រីកន្ត្រប់ | <i>Pristolepis Fasciata</i> | √ | x | LC |
| 5 | ត្រីខ្សាច់ | <i>Channa Limbata</i> | √ | x | X |
| 6 | ត្រីក្រាញ់ | <i>Anabas testudineus</i> | √ | x | LC |
| 7 | ត្រីឆ្មារ | <i>Macrogathus Siamensis</i> | √ | x | LC |
| 8 | ត្រីចង្កា | <i>Rasbora Paviel</i> | √ | x | X |
| 9 | ត្រីក្រាញ់ | <i>Trichogaster Trichopterus</i> | √ | x | X |
| 10 | ត្រីឆ្មារ | <i>Hypsibarbus Malcolmi</i> | √ | x | LC |
| 11 | ត្រីក្រាញ់ | <i>Ompok Hytophthalmus</i> | √ | x | X |
| 12 | ត្រីឆ្មារ | <i>Channa Micropeltes</i> | √ | x | LC |
| 13 | ត្រីកញ្ចុះ ក្រហម | <i>Yasuhikotakia modesta</i> | √ | x | X |
| 14 | ត្រីក្រាញ់ | <i>Monotreta cambodgiensis</i> | √ | x | X |
| 15 | ត្រីដំរី | <i>Oxyeleotris marmorata</i> | √ | x | X |

| | | | | | |
|----|------------------|------------------------------------|---|---|----|
| 16 | ត្រីកន្ទុរ | <i>Trichogaster pectoralis</i> | √ | x | X |
| 17 | កង្កែប | <i>Limnonectes larvaepartus</i> | √ | x | X |
| 18 | អន្ទង់ក្រាវ | <i>Ophisternon bengalense</i> | √ | x | LC |
| 19 | អន្ទង់ដំណើប | <i>Monopterus albus</i> | √ | x | X |
| 20 | ក្រពើស៊ីមែនស៊ីស | <i>Crocodylus siamensis</i> | x | √ | CR |
| 21 | អណ្តើកយក្សអាស៊ី | <i>Heosemys grandis</i> | x | √ | CR |
| 22 | អណ្តើកក្បាលល្វើង | <i>Heosemys annandalii</i> | x | √ | CR |
| 23 | អណ្តើកកវែង | <i>Indotestudo elongata</i> | x | √ | CR |
| 24 | ត្រីរាជ | <i>Pangasianodon gigas</i> | x | √ | CR |
| 25 | ត្រីពោនឆ្នេរ | <i>Pangasius Sanitwongsei</i> | x | √ | CR |
| 26 | ត្រីកលរាំងមាស | <i>Probarbus jullieni</i> | x | √ | CR |
| 27 | ត្រីកលរាំង | <i>Catlocarpio siamensis</i> | x | √ | CR |
| 28 | មីនស្គាល់ | <i>Datnioides pulcher</i> | x | √ | CR |
| 29 | អណ្តើកអាស៊ី | <i>Cuora amboinensis</i> | x | √ | EN |
| 30 | ផ្សោត | <i>Orcaella brevirostris</i> | x | √ | EN |
| 31 | ត្រីត្រសក់ស | <i>Probarbus labeamajor</i> | x | √ | EN |
| 32 | មីនស្គាល់ | <i>Hemityrion laosensis</i> | x | √ | EN |
| 33 | មីនស្គាល់ | <i>Fluvitrygon oxyrhynchus</i> | x | √ | EN |
| 34 | មីនស្គាល់ | <i>Schistura bairdi</i> | x | √ | EN |
| 35 | មីនស្គាល់ | <i>Pangasianodon hypophthalmus</i> | x | √ | EN |
| 36 | មីនស្គាល់ | <i>Pelochelys cantorii</i> | x | √ | CR |
| 37 | មីនស្គាល់ | <i>Laubuka caeruleostigmata</i> | x | √ | EN |
| 38 | មីនស្គាល់ | <i>Urogymnus polylepis</i> | x | √ | EN |
| 39 | មីនស្គាល់ | <i>Megophrys synoria</i> | x | √ | VU |
| 40 | មីនស្គាល់ | <i>Micryletta erythropoda</i> | x | √ | LC |
| 41 | មីនស្គាល់ | <i>Harmandia somboriensis</i> | x | √ | LC |
| 42 | មីនស្គាល់ | <i>Unionetta fabagina</i> | x | √ | LC |
| 43 | មីនស្គាល់ | <i>Macrogathus circumcinctus</i> | x | √ | LC |
| 44 | មីនស្គាល់ | <i>Mastacembelus favus</i> | x | √ | LC |
| 45 | មីនស្គាល់ | <i>Macrobrachium rosenbergii</i> | x | √ | LC |

*Note: DD= Data Deficient; LC=Least Concern; NT=Near Threaten; VU=Vulnerable; EN=Endangered; CR=Critically Endangered; EW= Extinct in The Wild; EX= Extinct; NE=Not Evaluated

5.4 Birds

Both aquatic birds and wildlife birds are included in this assessment. According to the consultation meeting and IBAT result, 26 bird species were found in the target area. Among these species only 11 species were confirmed by local people that they're existing in Kantout reservoir. 10 among 11 species

are under the IUCN red list: 8 species are Least Concern (LC); 1 species is Near Threaten (NT), and 1 species is Endanger (EN). The local people reported that they used to see more bird species such as *Leptoptilos dubius*, *Pseudibis gigantean*, *Nettapus Coromandelianus*, *Common flameback*, *Heliopais personatus*, *Gyps bengalensis*, *Sarcogyps calvus*, *Pseudibis davisoni*, *Thaumatibis gigantean*, *Gyps tenuirostris*, and *Asarcornis scutulata*. However, they have never seen those species since 2013. It is because of lacking the feed inside the reservoir and over hunting.

List of birds existing in Kantout reservoir

| No | Khmer Name | Scientific Name | Confirmed by Local People | Confirmed by IBAT | IUCN Category |
|----|-----------------|---------------------------------|---------------------------|-------------------|---------------|
| 1 | កុក | <i>Casmerodius Albus</i> | √ | X | LC |
| 2 | លលក | <i>Streptopelia Chinensis</i> | √ | X | X |
| 3 | ត្រងក | <i>Leptoptilos dubius</i> | X | √ | EN |
| 4 | ទទា | <i>Francolinus Pintadeanus</i> | √ | X | LC |
| 5 | ទាព្រៃ | <i>Sarkidiornis Melanotos</i> | √ | X | LC |
| 6 | ប្រីក | <i>Dendrocygna javanica</i> | √ | X | LC |
| 7 | មាន់ព្រៃ | <i>Gallus Gallus</i> | √ | X | LC |
| 8 | មាន់ទឹក | <i>Amaurornis Phoenicurus</i> | √ | X | LC |
| 9 | សេក | <i>Psittacula alexandri</i> | √ | X | NT |
| 10 | ភ្លោក | <i>Pavo muticus</i> | √ | X | EN |
| 11 | ក្រដេវីច | <i>vanellus indicus</i> | √ | X | LC |
| 12 | ក្រសា | <i>Ardea cinerea</i> | √ | X | LC |
| 13 | ត្រយង | <i>Pseudibis gigantea</i> | X | √ | CR |
| 14 | ប្រីក | <i>Nettapus Coromandelianus</i> | X | √ | LC |
| 15 | ត្រសេះ | <i>Common flameback</i> | X | √ | LC |
| 16 | ទា | <i>Heliopais personatus</i> | X | √ | CR |
| 17 | ត្នាតកស | <i>Gyps bengalensis</i> | X | √ | CR |
| 18 | ត្នាតក្បាលក្រហម | <i>Sarcogyps calvus</i> | X | √ | CR |
| 19 | ត្រយងស្លាបស | <i>Pseudibis davisoni</i> | X | √ | CR |
| 20 | ត្រយងយក្ស | <i>Thaumatibis gigantea</i> | X | √ | CR |
| 21 | ត្នាតតូច | <i>Gyps tenuirostris</i> | X | √ | CR |
| 22 | ទាស្លាបស | <i>Asarcornis scutulata</i> | X | √ | EN |
| 23 | មីនស្គាល់ | <i>Rynchops albicollis</i> | X | √ | EN |
| 24 | មីនស្គាល់ | <i>Sterna acuticauda</i> | X | √ | EN |
| 25 | ត្រយងស្លាបស | <i>Pseudibis davisoni</i> | X | √ | CR |
| 26 | មីនស្គាល់ | <i>Motacilla Samveasnae</i> | X | √ | NT |

*Note: DD= Data Deficient; LC=Least Concern; NT=Near Threaten; VU=Vulnerable; EN=Endangered; CR=Critically Endangered; EW= Extinct in The Wild; EX= Extinct; NE=Not Evaluated

5.5 Forest Timber

As mentioned above, the reservoir is a part of community forestry and covered by deciduous forest. Therefore, many type of timber species were found in that area. The national forest inventory was applied in the forest area of Kantout community forestry to see the situation of the forest. In total, eighty-four

forest timber species were found in the area of Kantout reservoir. Among of those species, only 18% are under IUCN red list. Those species are: *Dalbergia oliveri*, *Pterocarpus macrocarpus*, *Afzelia xylocarpa*, *Vatica philastreana*, *Cratoxylum cochinchinense*, *Mitragyna sp.*, *Irvingia malayana*, *Litsea glutinosa*, *Phyllanthus Emblica*, *Sindora siamensis*, *Irvingia malayana*, *Diospyros undulata*, *Terminalia alata*, *Shorea Obtusa*, *Dipterocarpus Tuberculatus*. The IUCN red list include: nine species for Least Concern (LC), two species for Nearly Threaten (NT), one species for Critical Endanger (CR), and three species for Endanger (EN).

List of forest timber existing in Kantout reservoir

| No | Khmer Name | Scientific Name | Confirmed by Local People | IUCN Category |
|----|-------------|-----------------------------------|---------------------------|---------------|
| 1 | ស្មៅ | <i>Xylia Xylocarpa</i> | √ | X |
| 2 | ផ្លែក | <i>Shorea Obtusa</i> | √ | NT |
| 3 | ញាវ | <i>Morinda Tomentosa</i> | √ | X |
| 4 | ល្អិត | <i>Terminalia Alata</i> | √ | X |
| 5 | ខ្លុង | <i>Dipterocarpus Tuberculatus</i> | √ | NT |
| 6 | សង្កែ | <i>Combretum quadrangulare</i> | √ | X |
| 7 | ផ្លែក | <i>Pterocarpus macrocarpus</i> | √ | EN |
| 8 | ក្រុង | <i>Aporosa ficifolia</i> | √ | X |
| 9 | ពពាលខែ | <i>Terminalia bialata</i> | √ | X |
| 10 | ស្មៅក្របី | <i>Knema corticosa</i> | √ | X |
| 11 | ល្វាង | <i>Catunaregam tomentosa</i> | √ | X |
| 12 | ល្បើង | <i>Cratoxylum cochinchinense</i> | √ | LC |
| 13 | កណ្តាល | <i>Careya arborea</i> | √ | X |
| 14 | រកា | <i>Bombax anceps</i> | √ | X |
| 15 | បេង | <i>Afzelia xylocarpa</i> | √ | EN |
| 16 | នាងនួន | <i>Dalbergia oliveri</i> | √ | CR |
| 17 | ម្នី | <i>Mitragyna sp.</i> | √ | LC |
| 18 | ចំបក់ | <i>Irvingia malayana</i> | √ | LC |
| 19 | ត្រឡាត់ | <i>Vatica philastreana</i> | √ | EN |
| 20 | ពពួលបាយ | <i>Litsea glutinosa</i> | √ | LC |
| 21 | អង្កាង | <i>Zizyphus cambodiana</i> | √ | X |
| 22 | ស្មៅ | <i>Aporosa ficifolia</i> | √ | X |
| 23 | ពពាល | <i>Morinda tomentosa</i> | √ | X |
| 24 | កន្តកព្រៃ | <i>Phyllanthus Emblica</i> | √ | LC |
| 25 | ត្របែកព្រៃ | <i>Lagerstroemia floribunda</i> | √ | X |
| 26 | ចារ | <i>Butea superba</i> | √ | X |
| 27 | កកោះ | <i>Sindora siamensis</i> | √ | LC |
| 28 | កណ្តាល | <i>Careya arborea</i> | √ | X |
| 29 | ត្រឡប់ព្រៃ | <i>Scolopia spinosa</i> | √ | X |
| 30 | ក្រូចភ្នំ | <i>Hymenocardia punctata</i> | √ | X |
| 31 | ត្រើល | <i>Gluta laccifera</i> | √ | X |
| 32 | ប្រេស | <i>Albizia lebbeck</i> | √ | X |
| 33 | ចំបក់ | <i>Irvingia malayana</i> | √ | LC |
| 34 | នាំនា | <i>Nageia wallichiana</i> | √ | X |
| 35 | ជ្រៃ | <i>Ficus microcarpus</i> | √ | X |
| 36 | ជ័រចុង | <i>Shorea vulgaris</i> | √ | X |
| 37 | ឈើទាលបង្ហយ | <i>Dipterocarpus costatus</i> | √ | X |
| 38 | ឈើភ្លើង | <i>Diospyros undulata</i> | √ | LC |
| 39 | ឈ្មួល | <i>Dalbergia nigrescens</i> | √ | X |
| 40 | ល្អិត | <i>Terminalia alata</i> | √ | LC |
| 41 | ដង្កៀបក្តាម | <i>Antidesma ghaesembilla</i> | √ | X |

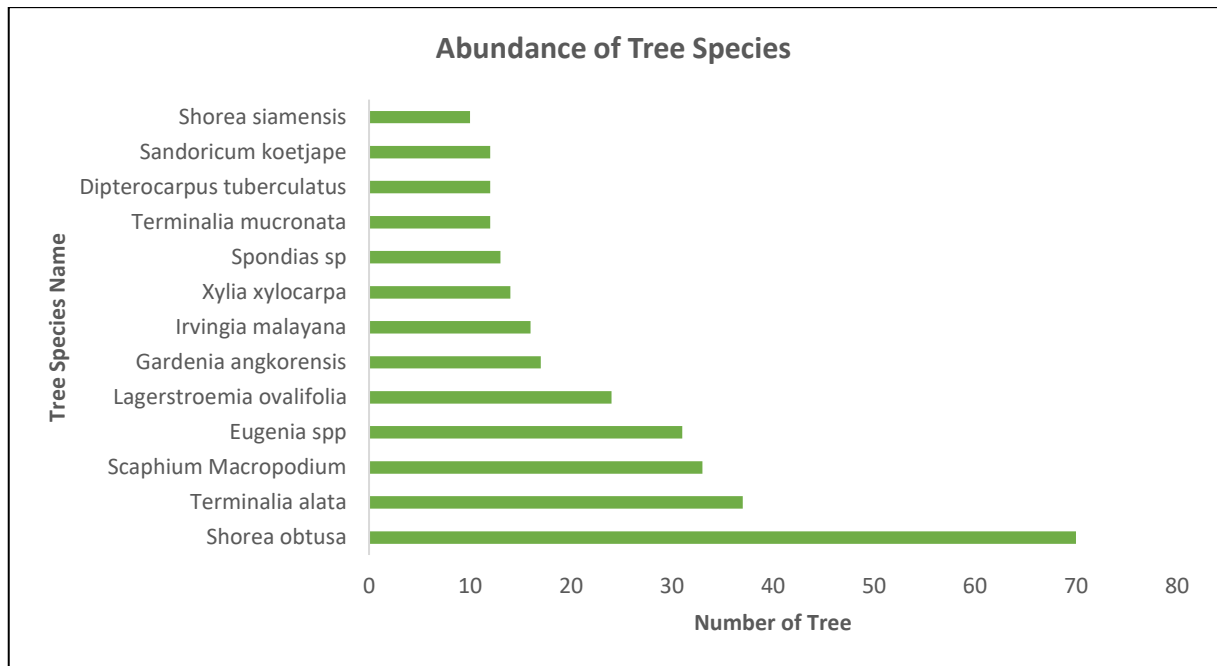
| | | | | |
|----|---------------|-----------------------------------|---|---|
| 42 | ដៃគ្នា | <i>Gardenia angkorensis</i> | √ | X |
| 43 | តោហុក | <i>Dioscorea membranacea</i> | √ | X |
| 44 | ត្រកបែកព្រៃ | <i>Lagerstroemia speciosa</i> | √ | X |
| 45 | ត្រកយើង | <i>Diospyros pilosanthera</i> | √ | X |
| 46 | ត្រកាច | <i>Dipterocarpus intricatus</i> | √ | X |
| 47 | ត្រកាំង | <i>Ficus altissima</i> | √ | X |
| 48 | ថ្លើមអណ្តើក | <i>Glogidion sp.</i> | √ | X |
| 49 | ទ្រមូង | <i>Garcinia oliveri</i> | √ | X |
| 50 | ទ្រមែង | <i>Carallia brachiata</i> | √ | X |
| 51 | ប្រាំដំឡើង | <i>Terminalia mucronata</i> | √ | X |
| 52 | បំពេញរាង | <i>Sandoricum koetjape</i> | √ | X |
| 53 | ផ្លែក | <i>Shorea obtusa</i> | √ | X |
| 54 | ពង្រ | <i>Scheicheria oleosa</i> | √ | X |
| 55 | ពពេល | <i>Shorea roxburgshii</i> | √ | X |
| 56 | ពោនស្វា | <i>Spondias sp</i> | √ | X |
| 57 | ព្រីងព្រៃ | <i>Eugenia spp</i> | √ | X |
| 58 | ព្រីងអាចម៍ចាប | <i>Syzygium baviense</i> | √ | X |
| 59 | ភ្លឺវិ | <i>Baccaurea ramiflora</i> | √ | X |
| 60 | ភ្លឺ | <i>Dillenia sp.</i> | √ | X |
| 61 | ភ្លឺធំ | <i>Dillenia ovata</i> | √ | X |
| 62 | ភ្លឺវិ | <i>Dipterocarpus tuberculatus</i> | √ | X |
| 63 | មៀនព្រៃ | <i>Dimocarpus longan</i> | √ | X |
| 64 | រការ | <i>Bombax ceiba</i> | √ | X |
| 65 | រយោង | <i>Parkia sumatrana</i> | √ | X |
| 66 | រាំងភ្នំ | <i>Shorea siamensis</i> | √ | X |
| 67 | រោល | <i>Xerospermum noronhianum</i> | √ | X |
| 68 | ល្បឿង | <i>Cratoxylum cochinchinense</i> | √ | X |
| 69 | ល្វាក | <i>Terminalia alata</i> | √ | X |
| 70 | សុក្រី | <i>Anneslea fragrans</i> | √ | X |
| 71 | ស្កង់ | <i>Tetrameles nudiflora</i> | √ | X |
| 72 | ស្នាត្រកបី | <i>Knema corticosa</i> | √ | X |
| 73 | ស្នាច | <i>Melaleuca leucadendron</i> | √ | X |
| 74 | ស្រម | <i>Terminalia chebula</i> | √ | X |
| 75 | ស្រឡៅ | <i>Lagerstroemia calyculata</i> | √ | X |
| 76 | ស្រឡៅដូ | <i>Lagerstroemia ovalifolia</i> | √ | X |
| 77 | ស្វាយព្រៃ | <i>mangofera indica</i> | √ | X |
| 78 | សំរង | <i>Scaphium Macropodium</i> | √ | X |
| 79 | សំរោង | <i>Sterculia foetida</i> | √ | X |
| 80 | ឡើវរាវ | <i>Glochidion rubrum</i> | √ | X |
| 81 | អង្កោល | <i>Adenia viridifolia</i> | √ | X |
| 82 | អង្ក្រង | <i>Zizyphus cambodiana</i> | √ | X |
| 83 | អង្ក្រង | <i>Zizyphus cambodiana</i> | √ | X |
| 84 | អំបែងថ្លៃ | <i>Schoutenia hypoleuca</i> | √ | X |
| 85 | មានព្រៃ | <i>Dimocarpus longan</i> | √ | X |
| 86 | ក្រាយ | <i>Polyalthia cerasoides</i> | √ | X |
| 87 | ដក់ដោក | <i>Schoutenia glomerata</i> | √ | X |
| 88 | ឈើភ្លើង | <i>Diospyros nitida Merr</i> | √ | X |

*Note: DD= Data Deficient; LC=Least Concern; NT=Near Threaten; VU=Vulnerable; EN=Endangered; CR=Critically Endangered; EW= Extinct in The Wild; EX= Extinct; NE=Not Evaluated

The result of forest inventory found that *Shorea Obtusa* was the most abundance species in the research site with the total amount of seventy trees, follow by *Terminalia alata*, *Scaphium Macropodium*, and *Eugenia spp* (37,33, and thirty-one, respectively). Other species were noted the range below 24 trees such

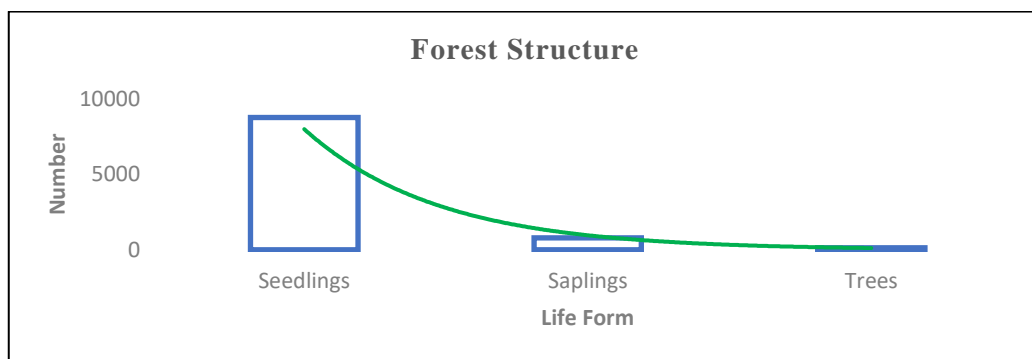
as *Lagerstroemia ovalifolia*, *Gardenia angkorensis*, *Irvingia malayana*, *Xylia xylocarpa*, *Spondias sp*, *Terminalia mucronata*, *Dipterocarpus tuberculatus*, *Sandoricum koetjape*, and *Shorea siamensis*.

Abundance Tree Species in Kantout Reservoir



Tree density in the target area is 127 tree per hectare while the sapling is four hundred and seedling is 5,000 per hectares. The result indicated the richness of next generation in Kantout community forestry. The mean density of seedlings per hectare is much higher than that of saplings and trees. The occurrence of a high number of seedlings on the forest floor indicates that the forest is regenerating.

Forest structure



The proportion of trees of the smaller diameter (5-10 and 11-20) class was higher as showed in Figure04. Therefore, it was indicated that the younger forest stands in the target area. The Figure04 also pointed the balance of DBH distribution in all studied-plot such as DBH class 11—20 cm was 30.3%; DBH class 31—40 cm was 20.1%; DBH class 5—10 cm was 18.2%; DBH class 21—30cm was 16.6%; DBH 41—50 cm was 9%; and DBH >50 cm was 5.7%. Therefore, the result of DBH class indicated that the forest in Kantout area is the young forest.

5.6 Wildlife

Both aquatic birds and wildlife birds are included in this assessment. According to the consultation meeting and IBAT result, 26 bird species were found in the target area. Among of these species only 11 species were confirmed by local people that they're existing in Kantout reservoir. 10 among 11 species are under the IUCN red list: 8 species are Least Concern (LC); 1 species is Near Threaten (NT), and 1 species

is Endanger (EN). The local people reported that they used to see more bird species such as *Leptoptilos dubius*, *Pseudibis gigantea*, *Nettapus Coromandelianus*, Common flameback, *Heliopais personatus*, *Gyps bengalensis*, *Sarcogyps calvus*, *Pseudibis davisoni*, *Thaumatibis gigantea*, *Gyps tenuirostris*, and *Asarcornis scutulata*. However, they never seen those species since 2013. It is because of lacking of the feed inside the reservoir and over hunting.

List of wildlife existing in Kantout reservoir

| No | Common Name | Scientific Name | Confirmed by Local People | Confirmed by IBAT | IUCN Category |
|----|--------------|--|---------------------------|-------------------|---------------|
| 1 | ឈ្នួស | <i>Muntiacusmuntjak</i> | √ | X | LC |
| 2 | ទន្សាយ | <i>Lepus peguensis</i> | √ | X | LC |
| 3 | ជ្រូកព្រៃ | <i>Wildbore</i> | √ | X | X |
| 4 | ត្រកួត | <i>Varanusbengalensis</i> | √ | X | NT |
| 5 | ស្នា | <i>Herpestes javanicus</i> | √ | X | LC |
| 6 | ពស់ព្រៃលើក | <i>Enhydry enhydry</i> | √ | X | LC |
| 7 | ពស់ជួន | <i>Python molurus bivittatus</i> | √ | X | VU |
| 8 | ពស់ពណ៌ក្រហម | <i>Oligodon inornatus</i> | √ | X | LC |
| 9 | ពស់ព្រៃ | <i>Pytas korros</i> | √ | X | X |
| 10 | ពស់វែកវនាម | <i>Ophiophagus hannah</i> | √ | X | VU |
| 11 | គោព្រៃ | <i>Bos sauveli</i> | X | √ | CR |
| 12 | ពង្រូល | <i>Manis javanica</i> | √ | √ | CR |
| 13 | មីនស្ពាន | <i>Pygathrix nigripes</i> | X | √ | CR |
| 14 | ទន្សាយពោះលឿង | <i>Emberiza aureola</i> | X | √ | CR |
| 15 | ខ្លាវង់ | <i>Panthera pardus ssp. delacouri</i> | X | √ | CR |
| 16 | ខ្លឹម | <i>Bos javanicus</i> | X | √ | EN |
| 17 | ក្លាន | <i>Rucervus eldii</i> | X | √ | EN |
| 18 | ដំរីអាស៊ី | <i>Elephas maximus</i> | X | √ | EN |
| 19 | សត្វទូច | <i>Hylobates pileatus</i> | X | √ | EN |
| 20 | ស្នា | <i>Macaca fascicularis</i> | X | √ | EN |
| 21 | រញ្ជីភ្លើង | <i>Nycticebus pygmaeus</i> | X | √ | EN |
| 22 | ខ្លា | <i>Panthera tigris</i> | X | √ | EN |
| 23 | រញ្ជីស | <i>Nycticebus bengalensis</i> | X | √ | EN |
| 24 | សំពោចធំ | <i>Viverra megaspila</i> | X | √ | EN |
| 25 | ក្លាន | <i>Axis porcinus</i> | X | √ | EN |
| 26 | តូច | <i>Nomascus gabriellae</i> | X | √ | EN |
| 27 | ស្នា | <i>Macaca fascicularis ssp. fascicularis</i> | X | √ | EN |

*Note: DD= Data Deficient; LC=Least Concern; NT=Near Threaten; VU=Vulnerable; EN=Endangered; CR=Critically Endangered; EW= Extinct in The Wild; EX= Extinct; NE=Not Evaluated

5.7 Fisheries Assessment

Overview.

There is a large proportion of grey and white fish, as well as black fish. The fish surveys show that the size

of fish ranges commonly from 20-400mm, so no large fish - common in the Mekong and large tributaries - are expected. These data help provide preliminary design criteria for a fishway. Similar to Svay Chrum, these fish were abundant in the reservoir, and the adjacent river and rice-field habitats (Figure 7 below). Small grey fish have high nutritional value and these fish are migrating between the river and the reservoir and rice field habitats. Upstream migrations are expected in the early- to mid- wet season (Figure 8 below) and these fish are likely to accumulate at the base of the reservoir, if it is spilling or releasing water. The surveys recorded an upstream dry season migration but this would not occur in the river downstream of the Kantout Reservoir, which is an intermittent river and does not flow in the dry season. There is likely some ambiguity in the surveys and the fishers were referring to nearby perennial rivers.

Considering the extent of grey and white fish in the reservoir, which are a valuable community resource, it would be prudent to maintain these fish populations. Upstream fish passage at the Svay Chrum Reservoir, operating for the early- to mid- wet season, would maintain these populations. Fish passage directly through regulating gates into the reservoir is a possibility but water velocities through the gates would need to be 0.5-1.0 m/s. These low water velocities are not possible if a minimum volume of water is held in the reservoir and the head differential is > 0.1m.

Key Findings.

Fish are migrating downstream in the late wet season and early dry season; although the dry season migration probably refers to nearby perennial rivers.

The fish surveys show that the size of fish ranges commonly from 20-400mm, so no large fish - common in the Mekong and large tributaries - are expected. These data help provide preliminary design criteria for a fishway.

Figure 6 – Species diversity (black, grey and white fish) of fish catch at Tantout in the reservoir and downstream in adjacent streams, channel and rice fields...

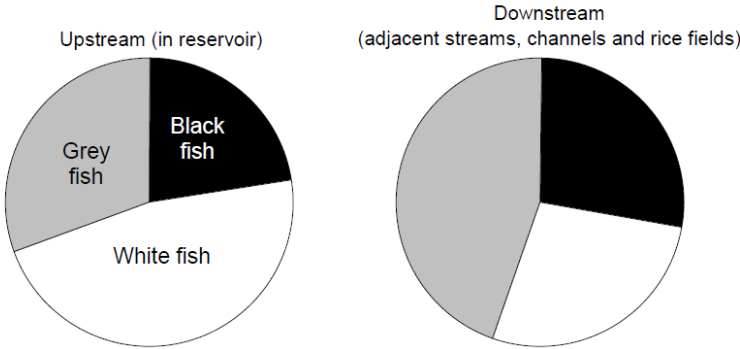
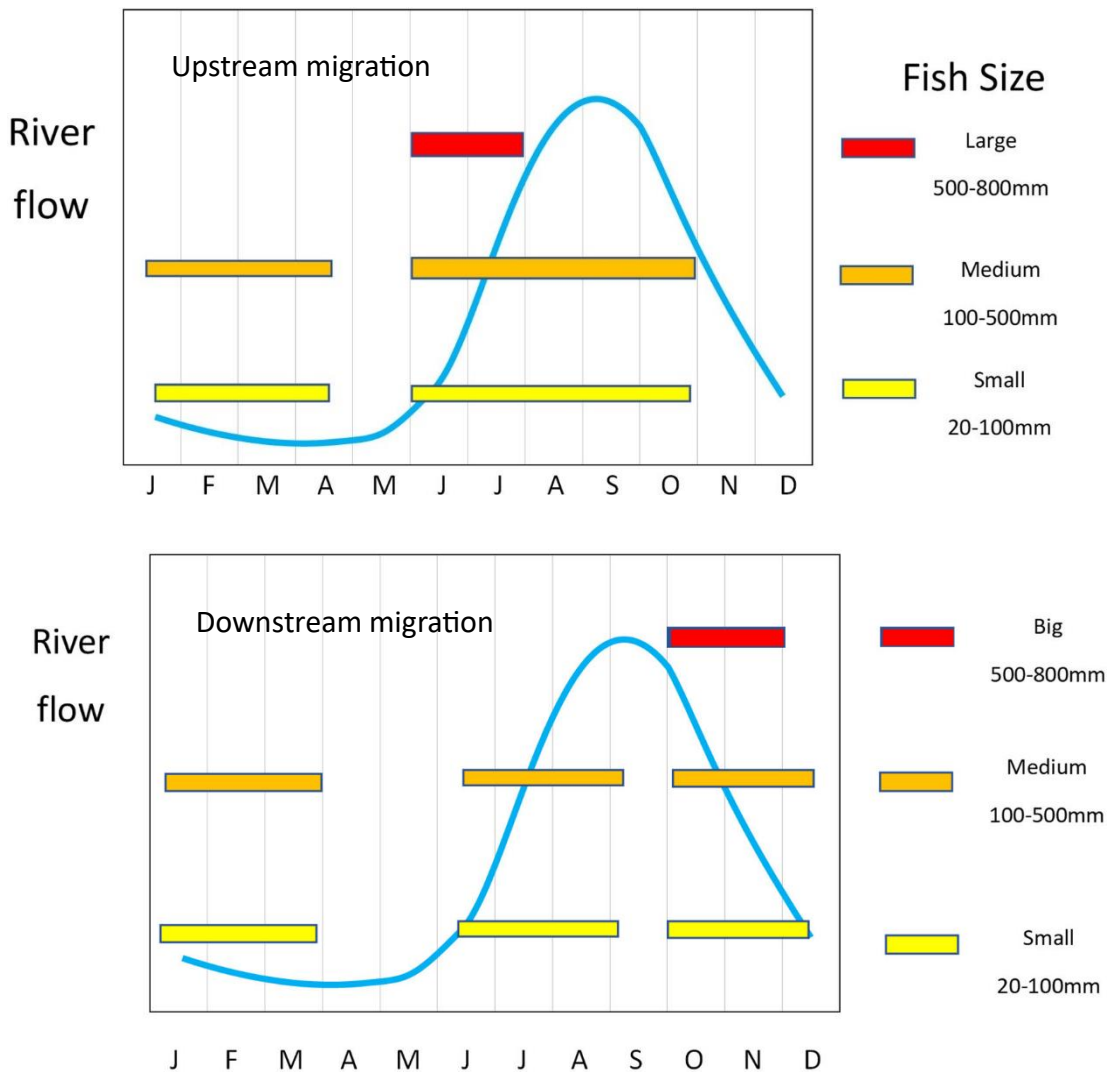


Figure 7 – Fish species and abundance from fisher surveys from Kantout, grouped by ecology

Fish species and abundance from fisher surveys from Kantout, grouped by ecology.

| | Species name | Abundance | |
|----------------------------------|-----------------------------------|---------------------------------|---|
| Blackfish | <i>Anabas testudineus</i> | ● | |
| | <i>Channa striata</i> | ● | |
| | <i>Mastacembelus armatus</i> | ● | |
| | <i>Monopterus albus</i> | ● | |
| | <i>Trichogaster trichopterus</i> | ● | |
| | <i>Channa gachua</i> | ● | |
| | <i>Channa micropeltes</i> | ● | |
| | <i>Clarias batrachus</i> | ● | |
| | <i>Clarias macrocephalus</i> | ● | |
| | <i>Trichopodus microlepis</i> | ● | |
| | <i>Macrognathus semiocellatus</i> | ● | |
| Grey fish | <i>Betta prima</i> | ● | |
| | <i>Cyclocheilichthys repasson</i> | ● | |
| | <i>Esomus longimanus</i> | ● | |
| | <i>Hampala dispar</i> | ● | |
| | <i>Hampala macrolepidota</i> | ● | |
| | <i>Mystus atrifasciatus</i> | ● | |
| | <i>Mystus bocourti</i> | ● | |
| | <i>Parambassis siamensis</i> | ● | |
| | <i>Puntius aurotaeniatus</i> | ● | |
| | <i>Puntius orphoides</i> | ● | |
| | <i>Rasbora aurotaenia</i> | ● | |
| | <i>Xenentodon sp.</i> | ● | |
| | <i>Mystus mysticetus</i> | ● | |
| | <i>Pao leiurus</i> | ● | |
| | <i>Pseudomystus siamensis</i> | ● | |
| | <i>Hemibagrus spilopterus</i> | ● | |
| | White fish | <i>Barbonymus altus</i> | ● |
| | | <i>Clupeichthys aesarnensis</i> | ● |
| <i>Cylocheilichthys apogon</i> | | ● | |
| <i>Gymnostomus lobatus</i> | | ● | |
| <i>Notopterus notopterus</i> | | ● | |
| <i>Ompok bimaculatus</i> | | ● | |
| <i>Osteochilus hasselti</i> | | ● | |
| <i>Paralabuca typus</i> | | ● | |
| <i>Pristolepis fasciata</i> | | ● | |
| <i>Crassocheilus reticulatus</i> | | ● | |
| <i>Henicorhynchus siamensis</i> | | ● | |
| <i>Hypsibarbus lagleri</i> | | ● | |
| <i>Hypsibarbus malcomi</i> | | ● | |
| <i>Hypsibarbus suvattii</i> | | ● | |
| <i>Labeo chrysophekadion</i> | | ● | |
| <i>Labiobarbus leptocheilus</i> | | ● | |
| <i>Labiobarbus siamensis</i> | | ● | |
| <i>Labocheilus melanotaenia</i> | | ● | |
| <i>Chitala ornata</i> | | ● | |
| <i>Nemacheilus masyae</i> | | ● | |
| <i>Neodontobutis aurarmus</i> | | ● | |
| <i>Puntioplites falcifer</i> | ● | | |
| <i>Yasuhikotakia modesta</i> | ● | | |

Figure 8 – Migration patterns of fish at Kantout. Dry season migrations refer to adjacent perennial streams.



Mitigation measures.

- *Fish Migration Pathways and Fish Passage Sites*

The main route for upstream migration is along the stream leading up to the reservoir, which would mainly occur in the early wet season. This identifies the three regulators in the river as fish passage sites and the spillway and regulator at the reservoir. Downstream passage can occur via the spillway and regulating gates, or the two irrigation offtakes.

- *Fish Passage Options*

Table 8 and Table 9 (below) present the proposed infrastructure in the river and at the reservoir, with fish passage options. A fishway is suggested at the reservoir (spillway/main regulator) for upstream passage to maintain grey and white fish populations. Overshot gates are recommended for downstream passage. Although the reservoir will spill much less when it is raised, fish passage would be useful if it is combined with environmental flow to attract fish into the area.

Providing downstream fish passage at the irrigation offtakes at the reservoir will improve survival of fish passing into the irrigation areas. This is likely to improve fish populations in the rice fields and channels, particularly of grey fish, which have high nutritional value. No upstream passage is suggested at these offtakes.

The three regulators in the river downstream of the reservoir are fish passage sites. The objective would be to provide upstream passage in the early wet season; and hold water for fish habitat in the dry season. A fish passage solution for these sites will depend on their operation and a hydraulic analysis. If these are operated as open structures during the early- to mid- wet season then they can be designed to pass fish upstream, by using lay-flat gates (Figure 14) and a small rock-ramp fishway downstream to increase tailwater and depth through the gates. A hydraulic analysis is needed of discharge and the structure, to calculate the size of the gates and the depth of tailwater to ensure water velocities < 1.0 m/s.

Figure 9 – Fish migration pathways at Kantout, shown with proposed upgrading of irrigation infrastructure and fish passage sites.

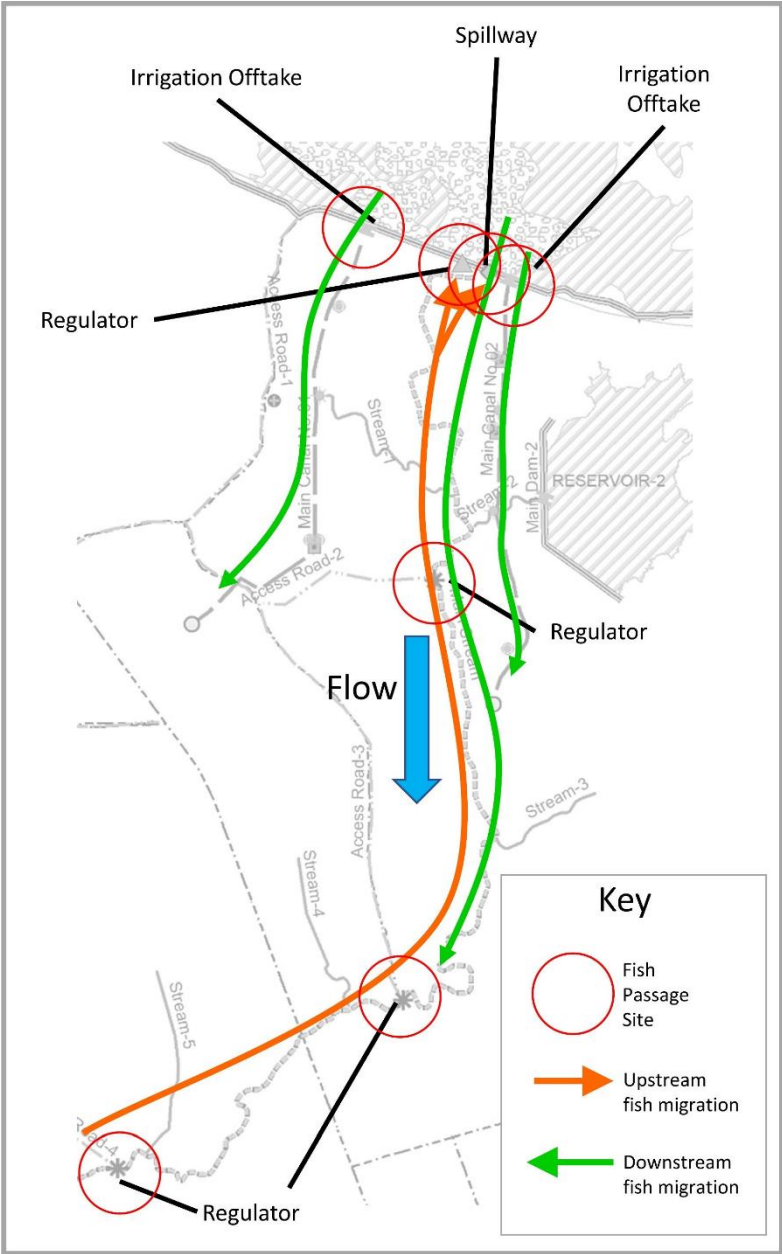


Table 8 – Structures at Kantout Dam

| | Spillway | Head Regulator-01 | Head Regulator-02 | Under Sluice |
|--|--|--|--------------------------|---------------------|
| Water Level up stream (m) | 34.4 | 34.4 | 34.4 | 34.4 |
| Bed level down stream (m) | 27.4 | 29 | 29 | 28 |
| Different water level U/S and D/S (m) | 7 | 5.4 | 5.4 | 6.4 |
| Fish Passage Options US: upstream DS: downstream | DS: Smooth spillway, long apron, no dissipating blocks | US: Upstream fishway to operate for the first few months of the wet season; head difference would be less than 5.4m. Integrate with spillway. DS: overshot gate may be required | DS: overshot gate | DS: overshot gate |
| Approximate cost | USD 700,000 | USD 40,000 | USD 40,000 | USD 80,000 |

Table 9 – Structures in the river downstream of Kantout Dam.

| | Cross Regulator-01 | Cross Regulator-02 | Cross Regulator-03 |
|---------------------------------------|---|---------------------------|---------------------------|
| Water Level up stream (m) | 25.5 | 23 | 22 |
| Bed level down stream (m) | 23.5 | 21 | 20 |
| Different water level U/S and D/S (m) | 2 | 2 | 2 |
| Fish Passage Options | Hydraulic analysis required. A likely option is lay-flat gates and downstream rock-ramps to increase depth and reduce velocities through the gates. | | |
| Approximate cost | USD 40,000 | USD 40,000 | USD 40,000 |

Annex 6 – Assessment of Dam Safety and Emergency Preparedness Plan

6.1 Dam Safety Assessment

Please see stand-alone document.

6.2 Emergency Preparedness Plan (EPP)

Please see stand-alone document.

Annex 7 – Guide for Conducting Meaningful Consultation with Ethnic Minority Peoples

1. Introduction

This guide provides a brief introduction and first-hand guidance to individuals who are tasked to directly facilitate a meeting with ethnic group, or are involved in a team whose task is to moderate a meeting with an individual or a group of people who are from ethnic groups. By ethnic group, it refers to those who has a spoken language other than Khmer language.

2. Principles

This guide is grounded on the following key principles of the World Bank's ESS7 (Indigenous People). It is required that under the WB financed project, projects are expected to make every effort to:

- **Ensure that development process fosters full respect** for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous Peoples.
- **Avoid adverse impacts** of projects on Indigenous Peoples, or when avoidance is not possible, to **minimize, mitigate and/or compensate** for such adverse impacts.
- **Promote sustainable development benefits and opportunities** for Indigenous Peoples in a manner that is accessible, culturally appropriate and inclusive.
- **Improve project design and promote local support** by establishing and maintaining an ongoing relationship based on meaningful consultation with the Indigenous
- **Recognize, respect and preserve the culture, knowledge, and practices** of Indigenous Peoples, and to provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.

3. Steps to Engaging a Meaningful Consultation with Ethnic Groups

- **Step 1 – Get to know about EG**
 - Study about EG to be consulted with
 - Meet with local village chief, EG opinion leaders to learn about local practices, taboos
 - Conduct field observation/ Exchange with experienced colleagues
- **Step 2 – Prepare before fielding for consultation**
 - Prepare IEC materials (booklet, manuals, guidance note...)
 - Prepare meeting outline, key topics, and agenda for consultation, question guide, meeting template

- Share meeting agenda and key information with EG peoples with whom the meeting will be conducted (“prior, and “informed”)¹¹
- Make interpretation arrangement
- **Step 3 – Meeting with target EG group/individuals**
 - Build rapport
 - Conduct consultation (based on meeting agenda in Step 2)
 - Manage and maintain a “free” conversation.
 - Take notes
 - Share/validate key consultation results with participants by the end of meeting
 - Inform participants of possible next consultation to follow up on issues raised
- **Step 4 – Review and Process Consultation Feedback**
 - Peruse and process consultation feedback
 - Prepare meeting minutes/ documentation
 - Share meeting minutes with relevant stakeholder (e.g. management)
- **Step 5 – Incorporate consultation feedback into project design/implementation**
 - Conduct meeting with relevant stakeholder to discuss consultation feedback
 - Incorporate feedback into project design/implementation
 - Report back to consulted people on decision/progress made as to concerns, issues, expectation raised by consultation participants.

4. Commonly used consultation techniques

- **Focus Group Discussion:**
 - A focus group discussion (FGD) is a way to gather together people from similar backgrounds or experiences to discuss a specific topic of interest.
 - The group of participants (8-10 persons) is guided by a moderator (facilitator) who introduces topics for discussion and helps the group to participate in a lively and natural discussion amongst themselves.
 - Allow participants to agree or disagree with each other to obtain an insight into how a group thinks about an issue, about the range of opinion and ideas, and the inconsistencies and variation that exists in a particular community in terms of beliefs, experiences and practices.
- **Key Informant Interview:**
 - To get information about a pressing issue or problem in the community from a limited number of well-connected and informed community experts.
 - To understand the motivation and beliefs of community residents on a particular issue.
 - To get information from people with diverse backgrounds and opinions and be able to ask in-depth and probing questions.
 - To discuss sensitive topics, get respondents’ candid discussion of the topic, or to get the depth of information you need.
- **Tips for Facilitators**
 - Preparing the room
 - Arrive at least half an hour early to set up the room
 - Check your laptop, papers, pens
 - Opening the session
 - Introduce yourself, your assistant

¹¹ “Free” refers to a consent given voluntarily and absent of coercion, intimidation or manipulation. “Prior”: consent is sought sufficiently in advance of any authorization or commencement of activities. “Informed” refers mainly to the nature of the engagement and type of information that should be provided prior to seeking consent and also as part of the ongoing consent process.

- Introduce purpose of the focus group.
- Explain to participants that they have been invited to share their opinions and that you will guide the discussion by asking the group to reflect on specific questions.
- Tell them what time the session will conclude.

Explain the ground rules for the focus group discussion

- These will set the tone and expectations for behavior so that everyone will feel safe and willing to participate.
- Participation in the focus group is voluntary.
- It's all right to abstain from discussing specific topics if you are not comfortable.
- All responses are welcome – are no right or wrong answers.
- Please respect the opinions of others even if you don't agree.
- Try to stay on topic; we may need to interrupt so that we can cover all the material.
- Speak as openly as you feel comfortable.
- Avoid revealing very detailed information about your personal health.
- Help protect others' privacy by not discussing details outside the group.

Closing the session

- End the discussion by summarizing the main points. If there is time, invite participants to reflect on the main ideas
- Ask if they have any additional thoughts to share.
- Thank the group for participating; let them know how the discussion results will be used.
- Collect and save all notes (save the file if you type in on laptop)
- Their ideas/suggestion will be used to a) design the project, b) prepare documents that help ensure avoid/minimize the adverse impact on local people while enhancing project's positive impacts.

5. List of Do and Don't Do

- ✓ Show respect to consulted people who are the poor, vulnerable, disadvantaged people
- ✓ Being on time;
- ✓ Speaking slowly and clearly. Repeat as necessary. Check if people understand. Explain as necessary;
- ✓ Using local ethnic spoken language if possible, or through the assistance of native interpreter
- Do not use slang;
- Avoid talking about issues that should not be spoken/discussed (based on initial information gathered from Step 1.

Annex 8 – Grievance Redress Procedures

1. Redress Procedure for Complaints related to Land Acquisition

Under this project, to facilitate the grievance redress, the informal and formal steps are combined for convenient use of affected people, as follows:

- **Step 1 – Commune/Sangkat level.** APs will seek assistance from commune/Sangkat chief or community elderlies who will discuss with the leader of the PRSC-WG to find a solution. Verbal grievance can be provided to the commune/Sangkat chief or community elderlies. So, no written complaint is required. It is noted that even if the complaint is made verbally, the complaint will be registered in project's logbook, including resolution process and result for such verbal grievance for monitoring purpose. Upon receipt of the verbal complaint, the PRSC-WG will consult with the IRC-WG to ensure the complaint is addressed timely. If the grievance is not resolved to the satisfaction of the AP, or if the AP prefers, s/he may lodge their complaint through the formal route which includes the steps below.
- **Step 2 – District level.** AH can lodge a written complaint to the Head of the District Office (where the subproject is located). The AH can bring a community elderly or their representative to discuss their grievance at the District Office. A conciliation meeting shall be held and a decision be made within 15 working days from the date of complaint is received by the District Office. If the complaint is resolved to the satisfaction of the AH, the IRC-WG will inform GDR's Department of Internal Monitoring and Data Management (DIMDM) who will review and seek the approval of the Director General of GDR for appropriate remedial action. GDR will inform the AF of the decision/ remedial action within 15 working days from the receipt of the grievance by the District Office. If the complaint is rejected at this step, District Office will inform the AH of the rejection in writing. If the complainant is not satisfied with the decision/resolution result, s/he can proceed to step 3 (below).
- **Step 3 – GDR level.** The complainant who is not satisfied with proposed resolution from Step 2 shall lodge a written complaint to the GDR for resolution. The GDR, through its DIMDM, will carry out a holistic review of the complaint and submit a report on its findings with the relevant recommendations, if any, to the Director General of GDR for review and decision. GDR may conduct a field visit to meet the complaint and the IRC-WG to gather relevant information. The final report must be completed within 30 working days from the date of receipt of the complaint by GDR for submission to the Director General of GDR who will make a final decision within 5 working days of receipt of the final report. In the event that the subject matter requires a policy level intervention, it will be referred to the IRC for a decision which may require that an additional 10 working days be extended from the original deadline for final decision.
- **Step 4 – Provincial level.** AH will submit a written complaint to the PGRC through the Provincial Governor's Office. The complainant or a representative will be given an opportunity to present its case during a meeting and the PGRC may consider any compelling and special circumstances of the AH to inform their decision. The GDR will send a representative, as a non-voting member, to provide an explanation to the rejection of the complaint at Step 3 with the GDR. The decision of the PGRC must be made on a consensus basis and will be final and binding except when the matter relates to government's policy. Decisions related to government's policy matters on land acquisition and resettlement are decided by the IRC. The PGRC will have 40 working days from the date of receipt of the complaint to reach a final decision. The decision of the PGRC will be sent to the IRC (through the GDR) for endorsement before any remedial action is taken.

There are no fees or charges levied on the AH for their lodgment of complaint and for complaint resolution for the above 4 steps.

- **Step 5 – Court of Law.** If the aggrieved person prefers filing a lawsuit at the Provincial/Municipal Courts, as applicable, to seek a resolution, AP can do so but will bear cost related to the lawsuit as per

the Expropriation Law. When the case is brought to a Court of Law, there is no involvement of the GDR, PRSC or IRC-WG unless there is a judicial order from the competent courts.

2. Redress Procedure for Complaints related to Labor and Working Conditions

Project workers can lodge their grievance/complaint as follows:

- **Step 1 – Employer Level (Contractor and Subcontractor).** Aggrieved person (AP) can submit their grievance to their Employer who serves as the first focal point for receiving and resolving grievance. Grievance can be lodged verbally or in writing, in person or by phone, text message, mail or email (anonymous complaint is accepted). The Employer involved will resolve the case no later than 15 working days. Once resolved and the AP is satisfactory, the Employer will report the case, including resolution process and results, to the SEO of the MOWRAM for information and record. If the AP is not satisfied with the resolution of their Employer, the Employer will refer the AP to the SEO of MOWRAM, if needed and inform the AP of this referral. It is noted that if a complaint concerns the safety and health of one or several individuals, such complaint shall be resolved as soon as possible – depending on the nature and urgency of the grievance.
- **Step 2 – PMU level.** MOWRAM SEO will resolve the complaint referred to by the Employer (Step 1) and acknowledge receipt of the AP's complaints within two weeks from the date of complaint receipt. If the SEO of MOWRAM cannot resolve the complaint, the SEO Team will consult with the Project Manager/Director for resolution. The SEO of the MOWRAM will inform the AP (in writing) of the PMU's resolution result within 30 days from the date of complaint receipt. If the AP is not satisfied with the resolution result proposed by PMU, PMU will refer the case to the Project Steering Committee of the project and shall inform the AP (in writing) of this referral.
- **Step 3 – Project Steering Committee level.** At this level, the case will be resolved no later than 21 days. The AP will be informed of the resolution decision in writing. In case the grievance has not been solved within the specified timeframe, or the AP does not agree with the proposed resolution, the AP can approach the Labor Inspector of his/her province or municipality.
- **Step 4 – Court of Law.** If the AP is not satisfied with the resolution proposed above, a multistakeholder committee will be established (ad-hoc) to resolve the dismissed grievance – as an alternative for affected person going to court. If the grievance could not be resolved satisfactorily by the multistakeholder committee, the affected person may resort to the court of law. The cost associated with the lawsuit shall be borne by the AP. The decision of the Court will be final.

3. Redress Procedure for Complaints related to SEA/SH

Under the project, the GRM for SEA/SH mainly serves to: (i) refer complainants to a local GBV service provider; and (ii) record resolution of the complaint. In line with the above, the following principles apply so as to recognize SEA/SH victim as principal decision makers in their own care, and treat them with agency, dignity and respect for their needs and wishes:

- **Multiple channels** are in place for easy access and lodge complaints.
- **SEA/SH survivors will be referred to a local GBV service provider** for immediate support if they make a complaint directly to PMU.
- **Confidentiality of survivors is protected.** GM operator (at PMU and local GBV service providers) will keep confidential for SEA/SH allegation report.
- **No identifiable information on the survivor shall be collected and stored** in Project Grievance Logbook.
- **Costs of operating the SEA/SH GRM will be covered by the project.**

It is noted that under this project, GBV service provider will be engaged for subprojects that are rated "High" or "Substantial" for SEA/SH risks – based on SEA/SH risk assessment as part of site-specific ESMP.

The following channels can be used to submit a grievance related to SEA/SH:

- **Channel 1** – AP who believe the SEA/SH incidence is related to project workers can follow steps outlined in Section 6.4.2 (above) to lodge a SEA/SH complaint.
- **Channel 2** – Alternatively, AP can lodge their complaint, verbally or in writing, to the GRM’s Focal Point within the SEO of MOWRAM for advice and resolution (contact of GRM Focal Point is provided in Section 5.1 (Resources)).
- **Channel 3** – If AP wants to bring the case to the Court of Law, AP can follow steps below for prosecution. Prosecution related to SEA/SH is administered under the Criminal Code and the Code of Criminal Procedure and is as follows:
 - **Step 1 – Judicial Police.** SEA/SH victim or a representative can submit their grievance to a local Judicial Police (JP) Officer. JPs include a) Commune/ Sangkat Chief, b) Commune/ Sangkat/ District/ Provincial/ National Police, and c) District/ Provincial/ National Military Police. The JP is responsible for receiving, recording complaints, and may conduct preliminary investigations to identify and arrest the perpetrator. The JP will also collect evidence to support the prosecutors. If the SEA/SH happens at home and/or falls under the domain of domestic violence (as per Law on the Prevention of Domestic Violence and Protection of Victims), the SEA/SH survivor may seek support from a local qualified Judiciary Police Officer (appointed by the Ministry of Women’s Affairs) who can act as a complaining party on behalf of the SEA/SH survivor¹².
 - **Step 2 – Prosecutor.** Upon receiving the completed written record from the JP, the prosecutor can decide on if the prosecutor will hold a file without processing it further or conduct proceedings against the perpetrator. The prosecutor may bring the case to the Court of Law and present the evidence in Court hearings.
 - **Step 3 – Investigation by Judge.** During this step, the investigating Judge will conduct interrogation of the charged person and perform other required investigation procedure.
 - **Step 4 – Hearing.** After issuing an order of indictment, the investigating Judge will submit the case to the trial court president who shall arrange a date for the trial. The decision of the Court on SEA/SH resolution is final.

4. Redress Procedure for General Complaints

In case individuals, households, or communities are affected by any other aspects, for instance, environmental impacts such as increased dust, noise, or lack of safety measures that increase risks of traffic accident to road users or to local IP, various channels will be established for convenient use by affected parties, including IPs. These include:

- **PMU GRM focal point’s telephone** (See also SEP, particularly Section 5.1 – Resources).
- **Local IP leaders** (in case affected individual/households are IP)
- **Contractor’s hotline:** to report cases that they think contractors can solve timely (contact detail of Contractos will be posted at construction sites, and distributed to IPs (through Subproject Information Booklet) during consultation, and post at public billboard of Commune/Sangkat offices, pagodas, etc.
- **Commune/Sangkat offices**

¹² In 2007, Inter-Ministerial Prakas No. 64 was issued by the Ministry of Women's Affairs (MoWA) and the Ministry of Justice (MoJ) appointing MoWA officials who have legal qualifications to be officials of the MoWA Judicial Police. The roles and authority of the JPO under MoWA is defined in the MoWA's Prakas No. 072 KKN/BS (2007) and is as follows: (1) act as a plaintiff representing the victim (2) prepare reports and records (3) monitor and follow up on relevant investigations (4) follow up on Court's procedures (decisions and convictions). In addition, Prakas of the Ministry of the Interior (No. 3840, 2020) on Establishment and Functioning of the Commune/ Sangkat Committee for Women and Children, has defined the roles and responsibilities of these Committees in prevention, mitigation, and collaboration with juridical agencies to prevent, resolve cases related to domestic violence, sexual abuses, sexual harassment, human trafficking (such as exportations of women and children in commune/ sangkat for sexual exploitation).

Annex 9 – Simplified Pest Management Plan

1. Rationale

In Cambodia, around 90% of cultivated land is used for rice production. Rice alone accounts for about 70% of the country's total calorie supply. Rice production contributes an estimated 44% of rural household income, making the rice sector an area for strategic development in the country. Despite rice is the major crop in Cambodia, rice production is characterized by widespread misuse of pesticides. This is due to inconsistent enforcement of current regulation and a lack of information on pesticide safety and alternative pest management techniques among rice farmers. Most pesticides are imported and labelled in a foreign language incomprehensible to farmers. It is common that rice farmers mix two to five pesticides by intuition, leading to pesticide poisoning among farmers and adverse impact on environment¹³. Rice farmers tend to apply more pesticide when they see pests on their field¹⁴. Vegetable farmers also typically mix various types of pesticides per spray which is not good practice¹⁵.

The CWSIP project will 1) improve overall water security for all stakeholders in the targeted basins in three provinces, 2) exploit the potential of the unused water resources and increase agricultural productivity in the targeted basin, and 3) enhance the overall capacity of the water resources management of the central government, concerned local governments, and concerned communities. Through three out of five project components, The project, will improve 1) Water Service Delivery, 2) Agricultural Productivity, and 2) Water Resources Management. The project does not involve procurement of pesticides.

Under CWSIP, the project will support target farming population in irrigated area to improve their use of good agricultural practices, including integrated crop water management, climate-smart agriculture (diversification into high-value crop plantation, public-private-partnership and commercialization), as well as agribusiness and trade development. The CWSIP does not involve procurement of chemical fertilizers, pesticides, and/or other toxic agrochemicals nor promote use of chemical agricultural inputs during project implementation. However, rehabilitation /upgrading of existing reservoirs/irrigation system, etc to be financed under the Project are expected to increase the agricultural command areas, including the number of crop per year. This increased crop may give rise to increased use of fertilizers, pesticides, and/or other toxic agrochemicals in the subproject areas which are unintended impact of the project.

2. Key pesticide management outcomes in Cambodia

Pesticide Use and IPM implementation in Project Provinces: General Directorate of Agriculture (GDA)'s survey in 2014 and nation-wide inspections in 2013 of pesticide and herbicide suppliers in provincial capitals and other main distribution hubs, indicate that the most commonly sold products include: abamectin, chlorpyrifos, cypermethrin, glyphosate, imidacloprid. In the Northern provinces, where a large part of the herbicide use is on corn and rubber plantations, the main products sold are the herbicides Glyphosate, Paraquat and Atrazine. Nowadays, on Rice and Maize cultivation farmers don't use pesticide accept some vegetables. These inspections have also shown that the most problematic highly hazardous products, such as monocrotophos, methyl parathion, methamidophos, mevinphos, endosulfan, etc., are no longer found on the market with the exception of the occasional old bottle. The only banned products that still are found regularly are paraquat and methomyl. This is because these products were banned only recently (2010) and are still permitted in the neighboring countries from where they are informally brought in by users or retailers. The banning of highly hazardous pesticides in China does not seem to have led to dumping of old stocks in Cambodia. There are no known large stocks of obsolete pesticides.

Insecticides are used mainly on vegetables (such as Long Yard Bean, Chilly, Cabbage, Chinese Cabbage) marketable high-value crops and plantation crops, notably rubber. Field surveys by the national IPM program and GDA indicate there still is wide-spread abuse of pesticides among farmers. Lack of knowledge among

¹³ <https://ipmil.cired.vt.edu/our-work/projects/rice-ipm-for-cambodia/>

¹⁴ Matsukawa, M., Ito, K., Kawakita, K. et al. Current status of pesticide use among rice farmers in Cambodia. *Appl Entomol Zool* 51, 571–579 (2016). <https://doi.org/10.1007/s13355-016-0432-5>.

¹⁵ Sim Sokcheng, Keo Socheat and Sarom Molideth. 2021. Pesticide Use Practices in Cambodia's Vegetable Farming. CDRI Working Paper Series No. 128. Phnom Penh: CDRI.

farmers is a major constraint. Abuse includes mixing without justification (just to be sure), use of wrong pesticides, use of wrong dosages, etc. Adequate protective gear is hardly being used. Shops often have gloves and masks for sale, but these tend to be inadequate for protection against hazardous chemicals. Buyers of pesticides rarely also buy protective gear and shops do not provide it for free. Half used pesticide bottles or packages are often stored within the house or near homesteads, often in easy reach of children. Empty pesticide containers are often discarded at the border of fields or in drainage ditches.

3. Government regulation related to pest management

Pest management practices in Cambodia have been promoted through the expansion of the National Integrated Pest Management (IPM) Program by both the government and NGOs. These agencies have been working together to establish a Pesticide Reduction Network to develop awareness of the risks associated with pesticide use amongst farmers.

As a key function, Ministry of Agricultural and Forestry (MAFF) has been examining and implementing various international legal guidelines and instruments relating to regulating the trade, distribution and use of pesticides in Cambodia. These include adherence to the FAO Code of Conduct on the Distribution and Use of Pesticides, the Stockholm Convention on Persistent Organic Pollutants, and the WTO sanitary and phytosanitary measures.

Following the promulgation of the Law on Management of Pesticides and Fertilizers as Royal Kram Number 0112/005 on 14th January 2012, MAFF had developed five Prakas in relation to Procedures for Registration and Business Operations, as follows:

- Prakas No. 415/MAFF dated 17 August 2012, on Procedures and Standard Requirements for Fertilizer Registrations;
- Prakas No. 456/MAFF dated 19 October 2012, on Procedures and Standard Requirements for Pesticide Registrations;
- Prakas N. 484/MAFF dated 26 November 2012, on List of Pesticides in the Kingdom of Cambodia;
- Prakas No. 119/MAFF, dated 11 April 2013, on Procedures for Management of Fertilizers for Business Operations;
- Prakas No. 120/MAFF dated 11 April 2013, on Procedures for Management of Pesticides for Business Operations.

Within MAFF, the Department of Agriculture Legislation and GDA are mandated to oversee all pesticide regulations and use.

4. International Code of Conduct on the Distribution and Use of Pesticides:

The following rules are observed for IPM:

- The standards of conduct set forth in this Code: 1.7.6. are designed to promote Integrated Pest Management (IPM) (including integrated vector management for public health pests);
- Concerted efforts should be made by governments to develop and promote the use of IPM. Furthermore, lending institutions, donor agencies and governments should support the development of national IPM policies and improved IPM concepts and practices. These should be based on scientific and other strategies that promote increased participation of farmers (including women's groups), extension agents and on-farm researchers.
- All stakeholders, including farmers and farmer associations, IPM researchers, extension agents, crop consultants, food industry, manufacturers of biological and chemical pesticides and application equipment, environmentalists and representatives of consumer groups should play a proactive role in the development and promotion of IPM.
- Governments, with the support of relevant international and regional organizations, should encourage and promote research on, and the development of, alternatives posing fewer risks: biological control agents and techniques, non- chemical pesticides and pesticides that are, as far as possible or desirable, target-specific, that degrade into innocuous constituent parts or metabolites after use and are of low risk to humans and the environment.
- Governments should provide extension and advisory services and farmers' organizations with adequate information about practical IPM strategies and methods, as well as the range of pesticide products available for use.
- Governments should ensure that any pesticide subsidies or donations do not lead to excessive or unjustified use which may divert interest from more sustainable alternative measures.

5. Current governmental implementation arrangements related to pest management

Integrated Pest Management (IPM) refers to all pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.

Under MAFF, Plant Protection Centers and their branches in provinces as well as Agricultural Extension Centers at district level are governmental agencies that coordinate and work on Integrated Pest Management Programs. These activities are built on National IPM program that was initiated with assistance from the FAO, DANIDA and other donors since early 1990s which is largely being maintained using national budget.

IPM activities implemented by these local authorities and technical backstopping by experts from GDA include conducting field surveys, making forecast, monitoring and checking progress of on-field pest development. Using the forecast based on the timing, scale and level of damages that the key pests may cause, provincial plant protection authorities recommend policies, plans, and measures for pest management purpose.

Relevant authorities such as Plant Protection Centers and Agricultural Extension Centers also conduct IPM training for farmers. Farmers learn how to implement various integrated measures such as pest identification, pest control, pest analysis, pest surveillance, and apply measure to control pest, such as applying chemical and botanical control agent, promoting application of biological measures for pest management, reducing chemicals and practice sustainable IPM. Farmers are also trained on proper use of chemical pesticide and fertilizers to ensure efficiency in pest management, ensuring safety for human, natural enemy, and the environment. Communication campaigns on plant protections and quarantine legislations and advance IPM technics to the farmers are also carried out depending on budget availability, etc.

GDA's Plant Protection Center, including the national IPM program, has developed a 3-day curriculum for a Farmer Training on Pesticide Risk Reduction (FT-PRR) which is intended to raise awareness, develop capacity and help rural communities formulate and implement their own action plans for pesticide risk reduction. As of June 2014, some 4,900 Lao farmers (including 1,600 women) have participated in FT-PRR courses in 149 villages of 34 Districts in 9 provinces. Season-long Integrated Pest Management training through Farmers Field Schools (FFS) often includes these short-duration FT-PRR courses. These FFSs allow farmers to learn about and adopt Integrated Pest Management as to reduce overuse of pesticides in crop production. 10. The National IPM Program has implemented 806 season-long IPM Farmers Field Schools, with over 24,350 rice, vegetable and fruit farmers trained. More, however, remains to be done. Pesticide Risk Reduction and IPM adoption at farm level remains a priority for the Government.

Operational costs of plant protection agencies are allocated form state fund. Their staff also work on projects and programs that are financed by other international funding and conduct additional annual trainings (using international budget) for farmers.

6. Objective of Simplified Pest Management Plan

This Simplified Pest Management Plan (S-PMP) aim to see out plan and measures to ensure the project does not unintentionally give rise to increased overuse of chemical agricultural inputs (such as chemical pesticide, fertilizers, and plant growth regulators, etc.). This S-PMP will be integrated into on-going pest management program and effort that provincial DAFF in project provinces have been doing and make sure pest management efforts target areas where water access are improved through project investment activities.

To mitigate this potential impacts as a 'good practice', the subproject owner will prepare and implement a S-PMP aiming to increase famers knowledge on Government regulations, policies, and/or technical guidelines related to safe use (application, storage, and disposal) of pesticides and toxic agrochemicals likely to be used by farmers as well as promote the application of an Integrated Pest Management (IPM) practice that are appropriate for the agriculture productions in the subproject area through training and other capacity building activities.

Key Elements - The elements of the S-PMP include the followings:

- Preventing pest problems;

- Monitoring for the presence of pests and pest damage;
- Establishing the density of pest population, which may be set at zero, that can be tolerated or corrected with a damage level sufficient to warrant treatment of the problem based on health, public safety, economic or aesthetic threshold;
- Treating pest problems to reduce population below those levels established by damage thresholds using strategies that may include biological, cultural, mechanical and pesticidal control methods and that shall consider human health, ecological impact, feasibility and cost effectiveness; and
- Evaluating the effects and efficacy of pest treatments.

Decision Making

Detecting a single pest under the Project will not always mean control is needed. A decision to use pesticides will be taken only as the very last resort and will also be based on conclusions reached from an agro-ecosystem analysis and trials. The decision will also depend on the number of pest and diseases found in the respective crop and the level of damage they are doing. If it is absolutely necessary to spray crops with pesticides, use of selective rather than broad-spectrum pesticides shall be strictly observed.

Pest Monitoring and Surveillance

A process for the reporting and identification of unusual plants, animals and pests will be established to

track and document all pest cases, be it minor or major in a pest inventory register. Pest surveys will be conducted on a regular basis to detect new infestations and will include the types, abundance, location of pest plants, date when first spotted or seen, and date when reported. This information will be

gathered from surveillance or monitoring system to be put in place, periodic surveys to be conducted and feedback from farmers/farm assistants. The data will be managed in a standardized way so that trends can be established. A rapid response process for the management of new infestations will be established to treat and manage new pest infestations as soon as they are identified.

| Potential Impacts | Proposed Mitigation |
|---|---|
| Contamination of ground water resources | <ul style="list-style-type: none"> • Conducting trials on relatively flat land with less than 2% slope reducing the possibility of run off and at a distance of more than 500m away from water sources |
| Effect of pesticides on non-target species | <ul style="list-style-type: none"> • Use pesticides that are systemic and narrow range and specific to sucking insects. |
| Effect of pesticides on grazing areas, settlements | <ul style="list-style-type: none"> • Spraying in morning hours when weather is cool and less windy to reduce on spray drifts. • Locating trials or plots at distance of between 500-1000m away grazing areas or human settlements |
| Possibility of increasing resistance of pests to the pesticide | <ul style="list-style-type: none"> • Training of field staff responsible on recommended usage of the pesticide |
| Harmful effects on staff applying pesticides | <ul style="list-style-type: none"> • Provision and usage of safety clothing and working gear to staff |
| Harm to persons within the homestead where the chemical is stored | <ul style="list-style-type: none"> • Designation of a separate and secured storage room for pesticide • Warnings and notices to increase awareness |

7. Mitigation measures

It is expected that there will be no procurement of pesticides under the project and that pesticide use, overall, will decline as a result with the introduction of good agricultural practices. To ensure the tendency of increased overuse of pesticide does not happen with subproject where project intervention take place, the project will prohibit procurement of large pesticides using the “negative list” and provide training to key staff and farmers

on integrated pest management, safe use of pesticides, and organic farming practices. This will be integrated as part of the safeguard training. This S-PMP will be applied to the project activities that involve:

- a) Any rehabilitation/upgrading of weirs/reservoirs/dams/existing irrigation schemes that are likely to prompt farmers to increase their use of pesticides:
- b) Change/introduction of best agricultural practices such as integrated crop water management, Climate-smart agriculture, and
- c) Promotion of agribusiness and trade related to farm products produced from target command area, and neighboring areas.

The plan is comprised of three parts:

- (i) Application of government regulation on pesticide control;
- (ii) Training of the integrated pesticides concept and/or other approaches for the safe use of pesticides; and
- (iii) Monitoring.

Annex 10 – Terms of Reference for Additional Field-Based Survey, Critical Habitat Assessment, and Biodiversity Management Plan

Notes:

- This TOR consists of two parts – Part 1 is for an International Biodiversity Specialist and Part 2 for a National Biodiversity Specialist.
- The National Consultant will lead the field-based surveys, validation, and consultation, and will work closely with the International Biodiversity Specialist. The National Biodiversity Specialist will have the overall guidance and technical support from the International Biodiversity Specialist for the works covered under Part 2.
- The key deliverables of both specialists is the Critical Habitat Assessment (CHA) for Kantout subproject, including Biodiversity Management Plan for each subproject. The CHA will be based on the previously collected baseline and assessment (conducted in April-June 2023), and additional baseline collection and consolidated assessment that are expected to be completed as described in two TORs below.

TERMS OF REFERENCE

CAMBODIA WATER SECURITY IMPROVEMENT PROJECT (CWSIP)

BIODIVERSITY ASSESSMENT (ADDITIONAL INPUTS)

Part 1 – ToR for International Biodiversity Specialist

1. INTRODUCTION

The Project Development Objective of Cambodia Water Security Improvement Project (CWSIP) is to improve aspects of water security and increase agricultural water productivity in selected river basins. More specifically, the proposed project will support improvements to water availability and reliability of bulk and irrigation water services as well as to flood and drought resilience in the selected areas. However, it will not purposely target water quality improvement. The proposed project consists of four components with an estimated cost of US\$150 million and is expected to be implemented over a period of six years: Component 1: Improve Water Resources Planning and Institutions, Component 2: Improve and sustain water service delivery for irrigation and domestic use, Component 3: Support Services to Increase Climate Resilience And Water Use in Irrigated Agriculture. Component 4: Project Management, Coordination, and Monitoring and Evaluation.

Component 1: Improve Water Resources Planning and Institutions. This component will lay the foundation for improved management of water resources in Cambodia. This involves the strengthening of national systems for planning, developing, managing and allocating water resources, as well as setting up of procedures and norms for operating and maintaining water resource infrastructure at local levels. This will include supporting the preparation of River Basin Management Plans (RBMPs) and Water Accounting and Water Tenure Assessments to implement water allocation and licensing in the selected basins. Results

from the World Bank-funded Mekong IWRM Project (P104806), such as the river basin profiles, basin-wide water resource assessments, and the Cambodia-Vietnam joint transboundary water resource management action plan, will serve as the foundation to develop the RBMPs. Lastly, this component will review existing policies and regulations in support of Integrated Water Resources Management (IWRM), and provide technical support and backstopping to MOWRAM, MAFF, and relevant provincial governments.

Component 2: Improve and Sustain Water Service Delivery. In order to achieve the delivery of improved and sustained water services to end users, the component will finance: 1) rehabilitation and upgrading of targeted existing water resources infrastructure and 2) establish new or staff existing FWUCs and support financial sustainability of FWUCs, and 3) provide technical assistance to PDWRAMs/FWUCs to manage, operate and maintain (MOM) these systems in an effective manner. Under this component, existing multi-purpose water resources infrastructure will be rehabilitated including improved dam safety and management, increased water retention capacity for irrigation & domestic water supply and flood control. In addition, the component will finance the modernization of irrigation facilities and performance of the irrigation system to provide reliable and sustainable water service delivery to end users. Monitoring of water resources availability (Component 1) plays an essential role in achieving this.

Component 3: Support Services to Increase Climate Resilience And Water Use in Irrigated Agriculture. This component will support MAFF, the PDAFFs, and local stakeholders building on the investments carried out under Component 1 and 2 and building on activities and other relevant World Bank projects for increased agricultural productivity. The focus will be on improving efficiency of water use and the integration of crop and water management at farm level, including climate smart agricultural practices and adoption of climate resilient crops.

Component 4: Project Management, Coordination, and Monitoring and Evaluation. The objective of this component is to provide adequate supports to Executive Agency and Implementing Agencies to provide institutional and technical capacity building, coordination, and social and environmental risks management, communication, and M&E for project management at all levels. Component 5: Contingent Emergency Response Component (CERC) (US\$0). This allows an immediate response to an eligible crisis or emergency, as needed, from other components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available because of the emergency. An Emergency Response Manual will be prepared in year 1 of the project and included in the POM, which will describe implementation arrangements for the component, including its activation process, the roles and responsibilities of implementing agencies, a list of activities that may be financed, environmental and social (E&S) aspects, and fiduciary arrangements.

2. BACKGROUND

MOWRAM has conducted a Biodiversity Assessment as part of the Feasibility Study (the Report is attached to this ToR). The outcome of the assessment is – among others – the list of all species (including Endangered species) found in the project area of influence. A further assessment is needed to meet the World Bank’s ESF Policy on Biodiversity Conservation and Sustainable Management of Living Natural Resources (Environmental and Social Standard 6 or ESS6), particularly in the following areas:

- (i) *Consideration of invasive alien species (IAS),*
- (ii) *Classification of modified and natural habitat,*
- (iii) *Assessment of protected areas,*
- (iv) **Critical Habitat Assessment (CHA), including, if relevant, Assessment of No Net Loss and Net Gain requirements, and**
- (v) *Impacts and mitigation having addressed points (i) to (v).*

3. OBJECTIVE

The main objective of the consultancy is to provide additional inputs on biodiversity assessment to meet the ESS6 requirements.

Specifically for CHA, the consultancy aims to (i) determine whether the subprojects are situated in critical habitat based on identified high biodiversity values; and (ii) assess the subproject related impacts on critical habitat features – and where an adverse impact is likely, determine the appropriate course of action which may include identification of mitigation measures and future management plans.

4. LOCATIONS

The Assessment will be conducted in the project area of influence of Kantout subproject.

5. SCOPE OF WORK

The proposed scope of works and key activities of the three schemes are in the concept stage in preparation for the Project appraisal. Detailed scope, design or plans will be developed during detailed engineering design. In consistency with the project design and urgency on the timeline, the task for this additional biodiversity assessment will be detailed as followings.

CRITICAL HABITAT ASSESSMENT (CHA)

The CHA will be conducted using the developed in SAR for an ESS6-aligned CHA (Annex 1). This approach requires the classification of modified and natural habitat and assessment of protected areas as described below.

5.1. Consideration of Invasive Alien Species (IAS).

The assessment will:

- i. Provide biodiversity baseline on the presence of invasive alien species or non-native species of flora and fauna within the subprojects' area of influence, to facilitate the classification of modified and natural habitat;
- ii. Identify potential risk to natural and critical habitats and impacts related to project activities within the subprojects' area of influence; and
- iii. Propose preventive and remediative mitigation measures where necessary that aim to reduce the risk of transportation, transmission or accidental introduction of IAS.

5.2. Classification of Modified and Natural Habitat.

The assessment will include:

- (i) Classification of modified and natural habitat within the subprojects' area of influence;
- (ii) Identification of potential impacts related to project activities within the subprojects' area of influence; and
- (iii) Proposed appropriate mitigation measures in accordance with the mitigation hierarchy to achieve no net loss and preferably a net gain of biodiversity.

5.3. Assessment of Protected Areas.

The assessment will:

- i. Provide information about whether the subproject sites are affecting legally protected and internationally recognized areas of high biodiversity value as defined by ESS6 (legally gazetted

- areas will consider four zones according to the National Law: Core, Conservation, Sustainable and Community Zones);
- ii. Demonstrate that the proposed subprojects in such areas are legally permitted, and in consistent with the government recognized management plans;
 - iii. Consult and involve protected area sponsors and managers, project-affected parties including Indigenous Peoples, and other interested parties on planning, designing, implementing, monitoring, and evaluating the proposed project, as appropriate;
 - iv. In cases where project sites are within or nearby PAs, the task includes identification of potential adverse impacts related to project activities within the subprojects' area of influence;
 - v. Propose mitigation hierarchy so as to prevent or mitigate adverse impacts from subprojects activities that could compromise the integrity, conservation objectives or biodiversity importance of such an area.
 - vi. Propose additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area

5.4. Impact, Mitigation and Future Management Plan

- a) Assess the subproject related direct, indirect and residual impacts on critical habitat features
- b) And where an adverse impact is likely, mitigation measures to be proposed that are designed to maintain a high biodiversity value in the project area of influence, and support the conditions necessary to maintain viable populations of endangered species and other priority features. Both preventative and remediative steps in the mitigation hierarchy (avoidance, minimization, restoration, compensation or offsets) are to be identified to achieve net gains of biodiversity values.

6. DELIVERABLE AND TIMEFRAME

The Specialist will submit the report within timeframe as below.

| Deliverables | Timeframe | Number of Days |
|---|---------------------------|----------------|
| Supplementary Study to the Biodiversity Assessment Report including Critical Habitat Assessment (CHA) | Earlier or by 13 Nov 2023 | 12 |
| Total Days | | 12 |

The output of the assessment will be integrated into the Project design. It will also feed into the baseline data (biological baseline) of the project's E&S instruments (ESMF and the subsequent ESMPs of the relevant subprojects).

7. WORKING ARRANGEMENT

The Specialist will lead the assessment, draft and finalise the CHA report; and will work together with the national biodiversity specialist. The national biodiversity specialist (separate ToR) will conduct consultation and/or field work for data collection.

8. LIST OF DOCUMENTS

The following is the list of documents prepared by MOWRAM and shared with the Specialist as a background information:

1. Feasibility Study: The package includes the Biodiversity Assessment Report
2. Project Appraisal Document (PAD)
3. Environmental and Social Risk Summary (ESRS)
4. Environmental and Social Management Plan for Kantout subproject.

Part 2 – ToR for National Biodiversity Specialist

With the same project background, the National Biodiversity Specialist will carry out the following key works for each of the three subprojects.

- Within the new submerged area (95.69 hectare), **collect additional samples** (15 sampling points) to meet the national sampling requirements. Additional sampling allows more accurate estimation of the quantity of trees that would be adversely affected (dead) due to future inundation. The more accurate the loss estimation is (particularly for young previous wood tree on IUNC red list (Excel file), the better the biodiversity management plan is designed to achieve **no net loss and preferably a net gain (ESS6)**. Bank requires biodiversity offset need to be designed and implemented in a manner that achieve measurable, additional, and long-term conservation outcome (ESS6, para 16).
- As part of the above works, **consult with local community**, authorities, and forest administration **to confirm if the location (already identified) could be used for tree replanting program** (to offset the affected trees in submerged area)
- Above additional baseline (collected through field visit & stakeholder consultation) **will focus only on 1) sensitive species that could be found in the 2) subproject's area of influence**. Validation of species presence in subproject area (estimated 5-10km in radius) against IBAT's screening radius (50km) has been done in previous field trip but will be quickly validated again through stakeholder consultation to enhance the reliability of the biodiversity assessment. This increases the reliability of the report findings that inform what and how measures should be taken in the biodiversity management plant prepared for Kantout.
- Validate the following IBAT result against subproject's area of influence:
 - Aquatic animals: IBAT (9 EN species/10CR)
 - Birds: IBAT (5EN species/7CR)
 - Flora (IBAT 3EN/1CR)
- Conduct Critical Habitat Assessment, based on the assessment result, prepare Biodiversity Management Plant as necessary.