

Initial Environmental Examination (IEE)

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CAM: Greater Mekong Subregion Biodiversity Conservation Corridors Project

Kandoal sea barrier subproject -
Kandoal commune, Koh Kong province

November 2018

Prepared by Ministry of Environment, the Kingdom of Cambodia for the Asian Development Bank.

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ABBREVIATIONS

ADB	Asian Development Bank
AP	Affected Persons
BCC	Biodiversity Conservation Corridors
BOD	Biological Oxygen Demand
CEMP	Contractor Environmental Management Plan
CPA	Community protected Area
CQS	Consultant's Qualifications
DDIS	Detailed Design and Implementation Supervision
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FA	Forestry Administration
FGD	Focus Group Discussions
FS	Feasibility Study
GDANCP	General Dept. of Admin. For Nature Conservation and Protection
GDLC	General Directorate of Local Community
GIC	Grant Implementation Consultants
GRM	Grievance Redress Mechanism
GPS	Geographic Information System
GMS	Greater Mekong Sub-region
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Def. Syndrome
HH	Household
IA	Implementing Agency
IEE	Initial Environmental Examination
IEIA	Initial Environment Impact Assessment
IUCN	International Union for Conservation and Nature
MOE	Ministry of Environment
NCDD	National Committee for Sub-national Democratic Development
NOL	No Objection Letter
NPA	National Protected Area
NCS	National Steering Committee
PAM	Project Administration Manual
PDOE	Provincial Department of Environment
PIU	Project Implementation Unit
PPCR	Pilot Program for Climate Resilience
PPE	personnel protective Equipment
PPIU	Provincial Project Implementation Unit
RGC	Royal Government of Cambodia
R-PPTA	Regional Project Preparatory Technical Assistance
SPS	Safeguard Policy Statement ADB (2009)
TA	Technical Assistance
ToR	Terms of Reference
TSP	Total Suspended Particulates
UXO	Unexploded Ordinance

NOTES:

The Project refers to the PPCR grant funded additional project for Cambodia, "Promoting Climate Resilient Agriculture, Forestry, Water Supply and Coastal Resources in Koh Kong and Monduliri Province", which will be supplementary to the GMS Biodiversity Conservation Corridors (BCC) Project. Government refers to the Royal Government of the Cambodia. \$ refers to US dollars.

Currency Equivalent

(Official exchange rate of the National Bank of Cambodia as of May 2018)

Currency Unit	-	Riel (KHR)
USD 1.00	=	KHR 4,060

Weights and Measures

°C	-	Celsius/centigrade
dBa	-	decibel audible
ha	-	hectare/s
Km	-	Kilometer
m	-	meter/s
mm	-	millimeter/s
m/s	-	Meter/second

NOTES

In the report, "\$" refers to US dollars, unless otherwise stated.

This Initial Environmental Examination (IEE) is a document of the Borrower. The views expressed herein do not necessarily represent those of ADB Board of Directors, Management, or staff and may be preliminary in nature. The IEE and its environmental management plans will be updated during project implementation.

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EXECUTIVE SUMMARY

The Biodiversity Conservation Corridors project (BCCP) commenced implementation in April 2010 and received Additional Financing (BCCP-AF) during 2014 to support supplementary livelihood and small-scale infrastructure activities through the Pilot Program for Climate Resilience (PPCR). One of the small-scale infrastructure sub-projects is concerned with the construction of a bio-engineered sea barrier (dike) in Kandoal commune located in Koh Kong province to reduce salt water intrusion and enable increase crop productivity in the area. The Initial Environmental Examination (IEE) together with an Environmental Management Plan (EMP) has been prepared to assess and analyse the potential environmental impacts and to identify mechanisms to mitigate these potential impacts and to develop a management plan for their application and monitoring.

The Policy, Legal and Administrative Framework is described including the ADB Safeguards Policy Statement (SPS, 2009), and the related legislation of the Royal Government of Cambodia (RCG).

The Kandoal sea barrier subproject is described in detail including information on location, design specifications, layout, the physical structures and the proposed schedule of implementation. There is a description of the physical environment including the physical resources (topography, soils/agriculture, soil structure), climate (rainfall, temperature), air quality, hydrology and oceanography, surface water quality, ecological resources, fisheries, fauna, protected eco-systems and protected areas in Cambodia. There is a description of economic development in the area (road networks and communications, irrigation systems, water supplies, land use, resources and livelihoods, solid waste management, agriculture, cropping patterns, agricultural practices, forest products, fishing) and a description of the social and cultural resources (population, poverty, gender issues, community health and safety).

The detailed design together with the field validation and community consultation meetings identifies that the potential environmental impacts related to the dike construction are relatively minor compared to the benefits resulting from the scheme operation. The potential environmental impacts were screened and assessed based on the engineering detailed design. The significance of potential adverse and beneficial effects was assessed based on subjective appraisal of magnitude, geographic extent, duration and frequency, reversibility of identified effects. Each environmental impact has been described followed by recommended mitigation measures for the different project phases: pre-construction, construction and operation.

For the pre-construction phase, the most significant impact is the clearance of 2,950 *Melaleuca* (myrtle family) trees, compensatory planting is proposed as part of the project. Other requirements during pre-construction phase are UXO clearance, access road, establishment of construction camp and Grievance Redress Mechanism (GRM). There will also be some temporary impacts from the camp and construction facilities.

For construction phase good practice mitigation measures will be adopted to minimise soil erosion and impact on water quality, dust dispersion and noise impact. Solid waste should be disposed of at a licensed facility. Areas of impact will be clearly demarcated and workers instructed to avoid damage to forest and hunting of wildlife. Appropriate measures will be implemented to protect environment/health and safety of public and workers. Construction materials will be from licensed suppliers.

For the operation phase mitigation measures are specified in relation to fertiliser and pesticide use, maintenance of the dike and associated structures, and illegal deforestation and hunting activities.

An Environmental Management Plan (EMP) has been prepared to provide guidance for inspection, monitoring and mitigation measures for the Kandaol sea barrier Subproject during

pre-construction/design, construction, and operation of the project. The EMP provides mitigation measures for each environmental impact identified, institutional responsibilities for the implementation of the EMP and the cost of implementing the mitigation and enhancement measures. The EMP includes the location where the monitoring activities will be undertaken during the pre-construction, construction period, the parameters to be monitored and frequency, responsibilities for implementation and verification, and the estimated costs of implementation. An Environmental Monitoring Plan has also been prepared to indicate location, method/frequency and responsibilities of implementation of all aspects of the EMP including cost estimates for these activities which need to be included.

The institutional arrangements are described for the subproject including the assigned responsibilities for each Executing Agency and Implementing Agency, as well as district coordinators, National Steering Committee, Financiers and other project implementing organisations. The schedule for the submission and review of environmental management and reporting reports is described for the pre-construction/ construction phases and during operation/maintenance.

During the design of the subproject a series of four public consultations were conducted to ensure full information disclosure and the outcome of all these discussions has been summarised. A Grievance Redress Mechanism (GRM) has been designed and as a general policy the subproject will work proactively towards the prevention of grievances through the implementation of impact mitigation measures and community liaison activities during both construction and operation. The GRM is based upon an initial informal approach to achieve satisfactory resolution to the local level, together with a formal approach when the grievance can be elevated to higher authorities to intervene.

The overall assessment indicated that the Kandoal sea barrier subproject will not have significant adverse impacts on the environment and will have overriding benefits for the target beneficiaries in resolving existing environmental and socio-economic issues associated with the present condition and increasing resilience to climate change.

Without the subproject there will be continued pressure on forest resources, and fisheries as a relatively low income is derived from agricultural production which is exacerbated by cumulative effects of other human activities in the area, notably by improved access provided by the rehabilitated highway (NR 48), immigration to the area and increased forest resource harvesting activities. With the subproject there will be reduced pressure on forest and mangrove resources through the promotion of alternative higher income-generating activities. External pressures will continue to exist but assistance to the subproject provides an opportunity to increase community awareness of sustainable natural resources utilization.

Based on the IEE, the subproject provides many benefits directly in terms of improved livelihood and health, with reduced risk to life and properties. During the construction phase, a number of temporary negative impacts (e.g. dust, noise, vibration, reduced air quality, road safety, worker's safety, wastewater, solid waste, water contamination and traffic congestion) may occur. However, those impacts can be minimized by the implementation of the recommended mitigation measures of the EMP.

A. INTRODUCTION

1. The Biodiversity Conservation Corridors Project (BCCP) commenced implementation in April 2010, and during 2014 Additional Financing (BCCP-AF) was provided to support supplementary livelihood and small-scale infrastructure activities through the Pilot Program for Climate Resilience (PPCR). The BCCP is being implemented by two Executing Agencies (EAs), namely the Ministry of Environment (MoE)/General Directorate of Local Community (GDLG) and the Ministry of Agriculture, Forestry and Fisheries (MAFF)/Forestry Administration (FA). Each of the EAs has established a Project Implementation Unit (PIU) at national level and a Provincial Project Implementation Unit (PPIU) in each of the two target provinces of Koh Kong (KKG) and Mondulkiri (MDK). There are five service providers that have been contracted jointly by the EAs to support the implementation of a range of activities.

2. The intended impact of the Project is climate resilient, sustainable, forest ecosystems that provide income and employment to project households in the biodiversity corridors of Cambodia. The intended outcome is sustainably managed biodiversity corridors in Cambodia. The Project seeks to (i) empower communities to manage their forest resources through demarcation of boundaries, forest management planning and achieving legal approvals for Community Forests (CFs) or Community Protected Areas (CPAs); (ii) restore habitat and degraded forest lands by planting native tree species and agro-forestry that incorporates improved sources of non-timber forest products; (iii) improve livelihoods and income-enhancing small-scale infrastructure; and (iv) generate short-term employment for project households through project activities.

3. The Additional Financing (PPCR) support for the Project aims to strengthen the climate adaptation of the BCCP and under Output 3, which is concerned with Livelihoods Improvement and small-scale infrastructure, funds are provided for the investment in (i) rainwater harvesting ponds and climate resilient high value crop productivity; (ii) climate resilient irrigation and System of Rice Intensification (SRI); (iii) sea barriers (dikes) reducing salt water intrusion; and (iv) ecosystem-based adaptation in one catchment area.

4. Under the PPCR funded activities Sub-project 3 is concerned with the construction of two bioengineered sea barriers in Koh Kong province, located in Kandoal and Andoung Tuek communes. The dikes, which consist of an earth bund, will prevent the incursion of salt water during the winter high tides between November and December, which affects the coastal and estuarine communes. In addition, support is being provided for the introduction of saline resistant crop varieties and production techniques to improve the incomes of the communities. Because of its vulnerability to climate change, and especially sea water intrusion, the commune of Kandoal was included as an additional target commune to the Project.

B. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

5. This section discusses the ADB's requirements and national and local legal framework that guided assessment of the potential Project impacts. It also identifies relevant international environmental agreements to which Cambodia is a party.

ADB Safeguards Policy Statement (SPS 2009)

6. The ADB's SPS (2009) requires all ADB financed projects to undergo an assessment. The purpose is to identify potential environmental and social impacts and avoid, or when avoidance is not possible, minimize and mitigate adverse project impacts.

7. In line with SPS, the Project has been evaluated using the Rapid Environmental Assessment Checklist (Appendix A). The adverse environmental impacts associated with the Project are considered site-specific and reversible. Therefore, the Project has been classified as a Category B for environment.

Legislations of the Royal Government of Cambodia

8. Cambodia's current Constitution, which was confirmed in 1993 by the Royal Government of Cambodia (RCG), identifies environmental issues that are to be considered during project development and implementation. Specifically, Article 59 of the Constitution states that: The state shall protect the environment and balance the abundant natural resources and establish a precise plan of management of land, water, air, win, geology, ecological systems, mines, energy, petrol and gas, rock and sand, gems forests and forestry, products, wildlife, fish and aquatic resources. The Ministry of Environment was established to implement this provision.

9. The Law on Environmental Protection and Natural Resource Management (NS/RKM/1296/36), which was issued in 1996, is the primary law governing environmental management in Cambodia. The law requires the RCG to prepare national and regional environmental plans, which are expected to cover a wide range of issues, including environmental assessment, pollution prevention and control, public participation and project disclosure.

10. As required by the Law on Environmental Protection and Natural Resource Management, a National Environment Strategy and Action Plan (NESAP) is being developed. The NESAP will identify priority policy tools and financing options for sustainable natural resource management and environmental protection. It will guide government ministries, private sector, civil society, and development organizations to mainstream environmental considerations in policies, plans, and investments. The final draft NESAP is expected to be produced in late-2016 and will require endorsement by the National Council for Sustainable Development and then approval by the Council of Ministers.

11. Following the issuance of the Law on Environmental Protection and Natural Resource Management, the Ministry of Environment passed regulations (also referred to as sub-decrees) to provide further protection for the environment, including:

- Sub-decree No.27 on water pollution control, issued on 6 April 1999;
- Sub-decree No.36 solid waste management, issued on 27 April 1999;
- Sub-decree No.42 on air pollution and noise disturbance, issued on 10 July 2000;
- Sub-decree No.72 on environmental impact assessment process, issued on 11 August 1999; and
- Law on the management and exploitation of mines resources, adopted on 13 July 2001.

12. For consideration of other applicable environmental standards and criteria, such as ambient air quality, vibration, noise, contaminated soil, and workplace and community safety the protocols of the Environment, Health and Safety Guidelines of the World Bank (2007) apply.

13. A range of national environmental policy documents also exist within Cambodia such as the National Environmental Action Plan (1998-2002) and the National Biodiversity Strategy and Action Plan (NBSAP) of 2002.

14. Law on Nature Reserves. The Royal Decree on Protected Natural Areas was issued in November 1993. The regulation provides protection for the environment, land, forests, wetlands and coastal zones. The regulation covers 23 natural protected areas in Cambodia, representing 18% of the total land area of the country or 2.2 million hectares. The Ministry of Environment is responsible for implementing this law.

15. In 2008, Cambodia introduced the Protected Area Law No. NS/RKM/0208/007 which defines the National Parks (IUCN Category II), Wildlife Sanctuaries (IUCN Category IV), Protected Landscapes (IUCN Category V), Multiple-Use Areas (IUCN Category VIII), and Ramsar sites which includes two sites in IUCN Categories IV and VIII. The 2008 Protected Areas Law defines the framework of management, conservation and development of

protected areas and aims to ensure the management, conservation of biodiversity, and sustainable use of natural resources in protected areas. The law reinforces the Ministry of Environment's responsibility to administer and manage protected areas.

16. Law on Historical Monuments. All national monuments in Cambodia are protected by the Law on the Protection of Cultural and National Heritage, which was promulgated in 1996. This is supplemented by the "Decision on the Definition of 3 Zones to Protect Temple Surrounding Areas in All Provinces and Municipalities Except Angkor Wat" (1996). The law protects a range of cultural heritage sites, including small temples and ancient structures in Cambodia.

17. The Labor Law was issued in March 1997 to govern relations between employers and workers. It governs all employment contracts to be performed within the territory of the Kingdom of Cambodia.

18. Law on social security schemes were issued in 2002. This law seeks to set-up a social security scheme. It includes references to: i) a pension scheme, which provides old age benefits, invalidity benefit and survivors' benefit; and ii) an occupational risk scheme, which is in charge of providing employment injury and occupational disease benefit.

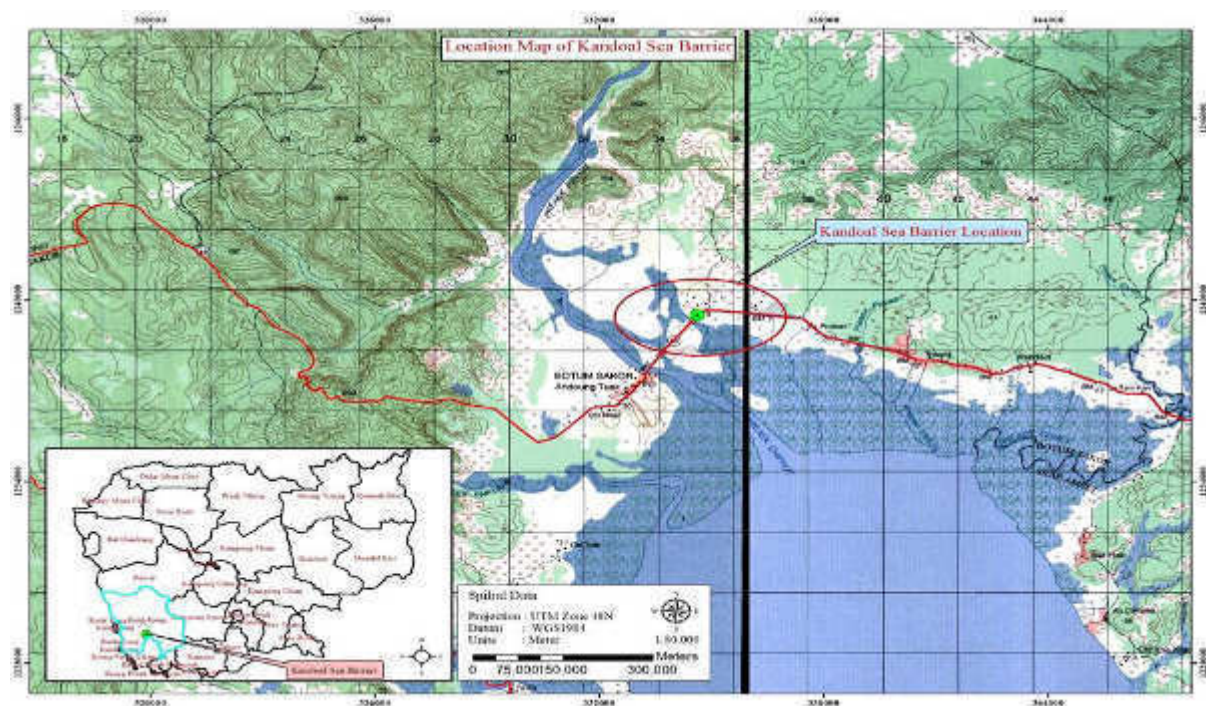
19. Occupational Health and Safety. The First Occupational Safety and Health (OSH) Master Plan (2009-2013) was developed by the Ministry of Labor and Vocational Training with technical support from the International Labor Organization (ILO). It contains the following priority areas: strengthening national OSH systems; improving safety and health inspections and compliance; promoting OSH activities by employers' and workers' organizations; implementing special programs for hazardous occupations; extending OSH protection to small enterprises, and informal and rural workplaces; and promoting collaborative actions with hazardous child labor and human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) projects and activities.

C. DESCRIPTION OF KANDOAL SUBPROJECT

20. The Kandoal sea barrier subproject is located in Kandoal commune and Botumsakor district, Koh Kong Province. The subproject encompasses three villages, namely Prolean, Kandaol and Thnong (see Figure 1). The northern border of the subproject is Sovann Baitong village, which is a new village in the commune; to the east with Thnong village; to the west with Andoung Tuek village (located in Andoung Tuek commune); and to the south with the coastal zone in the Gulf of Preah Sihanouk (Kampong Som bay).

21. Under the Kandoal sea barrier subproject a dike will be constructed with a total length of 5.3 km. It will be constructed within the area of Prolean village with four drainage structures and flap gates. The dike will be upgraded with a laterite road having a width of four meters including a one-meter strip in both sides of the shoulder. This dimension will be equally divided on each side of the centerline comprising (i) a three-meter carriageway; and (ii) a one-meter shoulder.

Figure 1: Location of Kandoal sea barrier



22. The parameters for the design of the embankment are based upon those developed during the feasibility study (2013) and these are shown in Table 1.

Table 1: Design parameters for Kandoal sea barrier

Embankment Top Level	S. Barrier I	1.5m
	S. Barrier II	1.5m
Embankment Top Width	S. Barrier I	4.0m
	S. Barrier II	4.0m
U/S Slope (Sea Side)	1:1.5	
U/S Slope (Slope Field Side)	1:1.5	
Free Board	S. Barrier I	0.3m
	S. Barrier II	0.3m
High Tide Level	S. Barrier I	1.2m
Highest High-water Level (HHWL)	S. Barrier II	1.2m

Figure 2: Layout of Kandoal sea barrier subproject

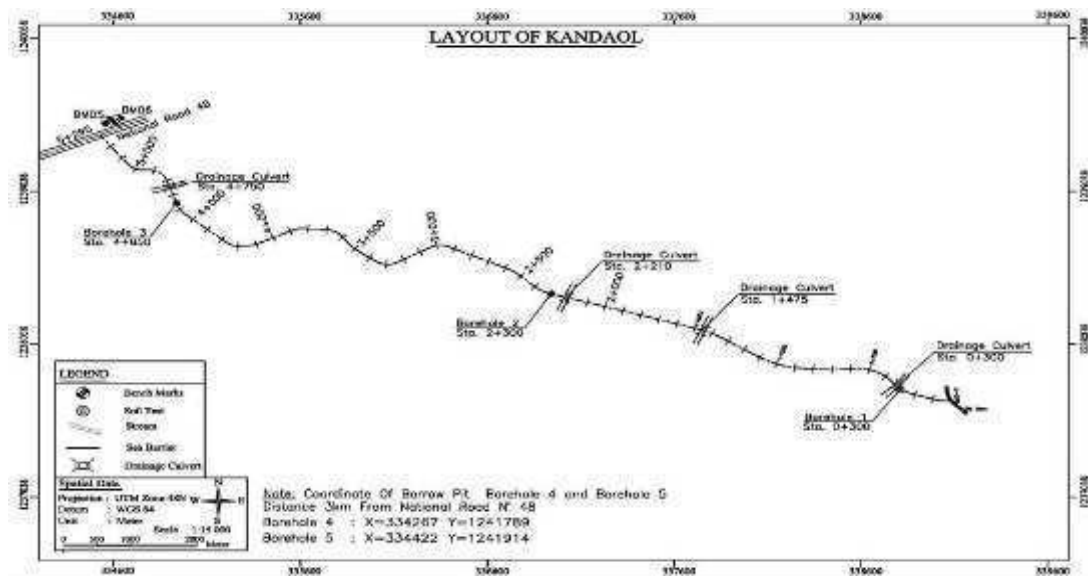
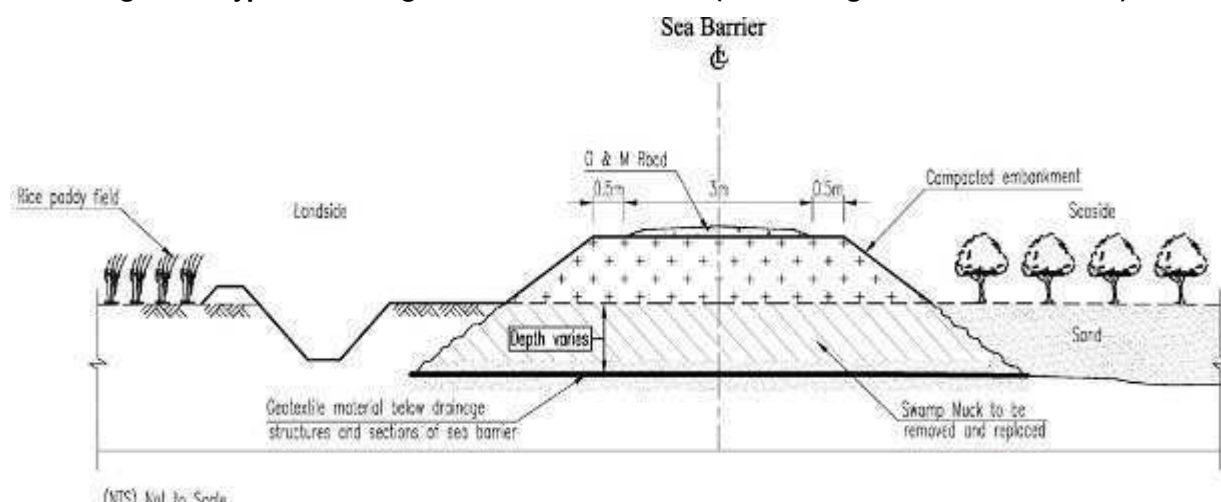


Figure 3: Layout Map of Kandoal sea barrier subproject



23. The Kandoal sea barrier will be constructed of homogenous material from a local excavation site. It will have a top bank elevation estimated at 50 m above the HHWL during the highest spring tides. Typical technical drawing is shown in Figure 4.

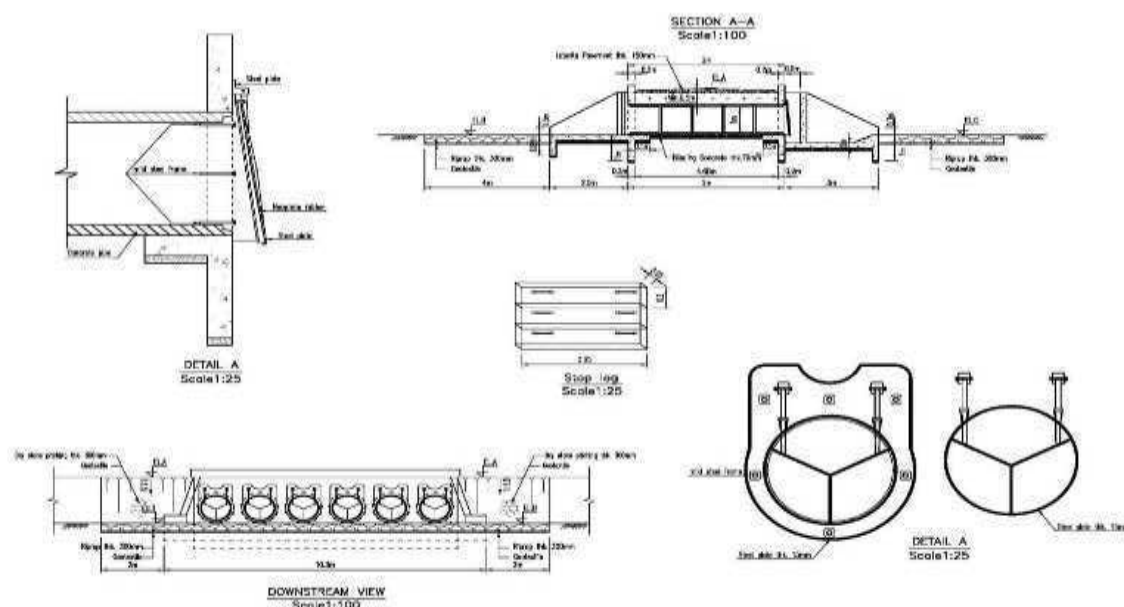
Figure 4: Typical drawing of Kandoal sea barrier (Final design not drawn to scale)



C.1 Drainage structures, slide and flap gates

24. The drainage structure has been planned and designed to drain storm water runoff water during the 25 years return period (RP). The drainage structure that has been selected is a concrete culvert with 80 cm diameter of concrete pipe having u/s and downstream head walls together with cut-offs as shown in Figure 5. For this project pipe culvert with two (2) cells and six (6) cells were designed for installation at the proposed locations.

Figure 5: Typical drawing of pipe culvert and flap gate



C.2 Proposed schedule of implementation

25. The implement schedule is proposed for 12 months. The civil works are expected to commence by December 2018 and be completed by November 2019. For the construction schedule, it is assumed that the net construction period would be nine months.

D. DESCRIPTION OF ENVIRONMENT

D.1 Physical Resources

a) Topography

26. The Koh Kong coastline is characterized by small islands, sandy beaches, mangroves, and estuaries; and is dominated inland by the mountains of the Cardamom range. The subproject area is situated on a low relief portion of the coastline, with an elevation of less than 10 meters. Recent studies of the project indicated that the highest elevation of the command area of the subproject is around 2.3 m which comprises a small hill and residential area. The lowest elevation of command area is -0.06 m where is the rice field area. The proposed command area is quite flat land water is easily distributed. The terrain is quite flat land with a generally slight slope. The level in the command area of the reservoir varies from 0.5 m to 0 m with a land slope about 0.005 %. The land level is not sufficiently sloping to cause any velocity of flow and sedimentation occurring.

27. Topographic surveys were conducted for all proposed structures including the terrain of the field; existing embankment and drainage; roads and streams are identified; horizontal and vertical points are taken with installation of benchmarks. Point elevations in the rice field were taken to draw the counter lines for the design sketch. In addition, based on field validation, the proposed subproject is located in the coastal areas and some parts of this commune is in floodplain, coastal and some other part is in the high land.

b) Soils and Agriculture

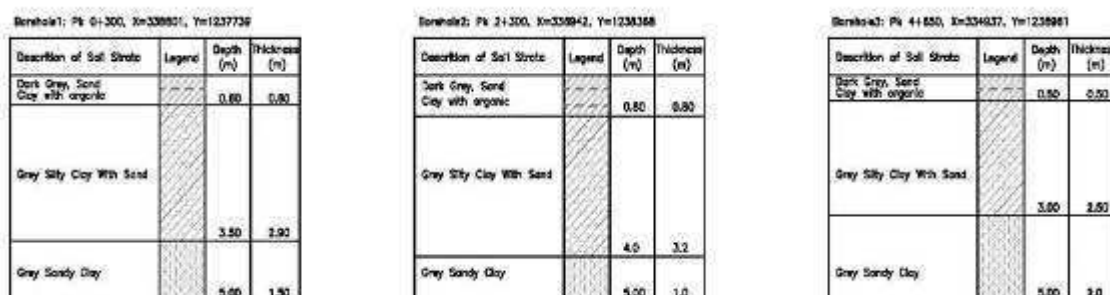
28. Most soils located close to the coast are alluvial lithosols, red-yellow podzols, coastal complex soils and alumisols (ADB 2010a); many coastal area soils are acid lithosols (from TA-7459, FS Report, 2013). The soil was classified as having three layers including (i) dark grey sandy clay with organic material (0.0 to 0.6 m); (ii) Grey silty clay with sand (0.6 to 3.5 m); and (iii) grey sandy clay (3.5 to 5.0 m). Based on the CARDI Classification of Soil Types this shows that the subproject area includes the following soil types: (i) red-yellow podzols; (ii) cultural hydromorphic; (iii) alluvial lithosols; and (iv) brown alluvial soils.

29. In summary, the soil in the command area comprises mostly deep, poorly drained silty loams and silty clays with few very fine concretions from 0.40 m down to 1.5 m. These soils are very suitable for intensive dry season irrigated rice cultivation. Other soils found in this area are sandy-clay loams to sandy-clay over coarse abundant very hard concretions at 1.0 m - 2.0 m. These soils are highly to moderate suitable for the dry and wet season rice.

c) Soil structure

30. The result from the soil tests were used to review the stability of the foundation, and to analyze the settlement and stability due to consolidation of barrier structure, as well as identifying unsuitable soil to be removed and replaced.

Figure 6: Kandoal sea barrier soil borings



d) Climate

31. The tropical climate of Cambodia is determined by the south-western monsoon winds, bringing a pronounced rainy season from May to October, a cool and dry season from November to February, and two hot dry months in March and April (ADB 2010a). In many places, the weather is affected by local conditions such as altitude and aspect. Rainfall intensity can be high, causing high runoff and serious erosion and flooding.

32. Although sheltered to some extent by the Annamite mountain range, the entire country remains at risk of typhoons that may cause flooding. The main typhoon season is from June to November. Rainfall in Cambodia varies considerably throughout the country, from more than 5,000 mm on the seaward slopes of the south-western highlands to about 1,200-1,400 mm in the central lowland region. Average temperatures in the country vary between 18 - 25°C as low and 28 - 35°C as highs, with considerable local variation in function of altitude and aspect (ADB 2010a).

33. **Rainfall:** The annual mean rainfall in Koh Kong province can exceed 5,000 mm compared with an average of 1,500 mm in inland areas. The relative humidity is high throughout the year, usually exceeding 90%, and even in the dry season rarely falls below 50%. The monthly rainfall for the past five years from 2012 to 2016 is shown in Figure 7. Based on the field consultation meeting, it is indicated that annual rainfall in the proposed subproject has increased for the last two years (confirmed by the community people and local authorities).

34. **Temperature:** The temperatures are fairly uniform the country, with only small variations from an average annual temperature of around 28°C. January is the coldest month where temperatures may fall as low as 12°C and April is the hottest where temperatures may reach 42°C. Most of Cambodia's regions have an average wind velocity of less than 3 m/s. Maximum wind speeds can reach in excess of 20 m/s during the wet season. During the dry season the maximum wind velocities are lower and are commonly in the range of 6-8 m/s. The monthly minimum and maximum temperatures for Koh Kong province from 2012 to 2016 are shown in Figures 7 and 8.

35. **Air quality:** There is growing concern regarding the increasingly poor air quality in rural areas of Cambodia. Air pollution is linked to the increasing number of vehicles, industrial development and overall urbanization that is occurring. As a result of the predominantly rural setting in the subproject area, there are no available data on air quality and noise levels in the project area or for Koh Kong province. However, the levels of air pollution in the rural areas remains relatively low and in general within the subproject area the air quality is still good.

36. **Hydrology and Oceanography:** The subproject is located at the head of Kampong Som Bay, and the main water source in this area are Boeung Meas and Peak Khmoa rivers. The dike is located at the interface of a small Melaleuca forest and the upland rice fields; several small ephemeral creeks flow into the Melaleuca forest and drain into the south side of the mouth of Preaek Ta Ok. The nearby marine area is shallow, adjoining the low relief mangrove fringe along the shoreline. Flooding occurs every year in Kandaol commune during the rainy season; rain water and salt water mix and flow over low areas covering and damaging paddy fields approximately from 30% to 50%. The immediate objectives of the subproject are to improve the use of water resources and to take advantage of the potential for irrigated agriculture. The climatic and hydrological aspects of the subproject area have been studied by an investigation of the water levels in the stream or main canal before after the system is flooded. The water level in the main canal is dependent on the water level in the reservoir and operating gates. The maximum water level will be 1.0 m from the ground level and in the case of the dike freeboard is 0.5 m.

Figure 7: Monthly rainfall in Koh Kong province (mm): 2012 - 2016

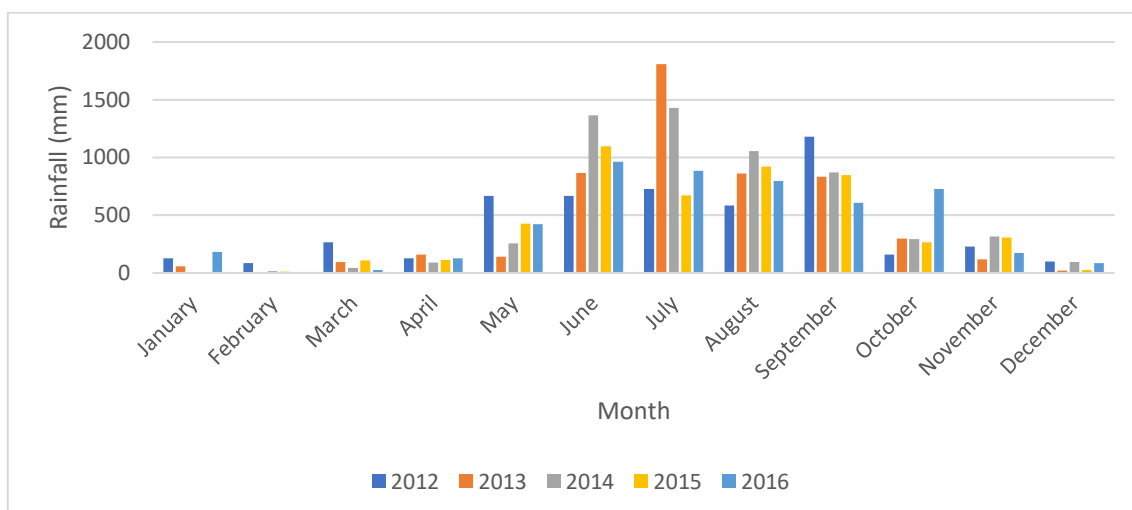


Figure 8: Monthly minimum temperatures in Koh Kong province ($^{\circ}\text{C}$): 2012 - 2016

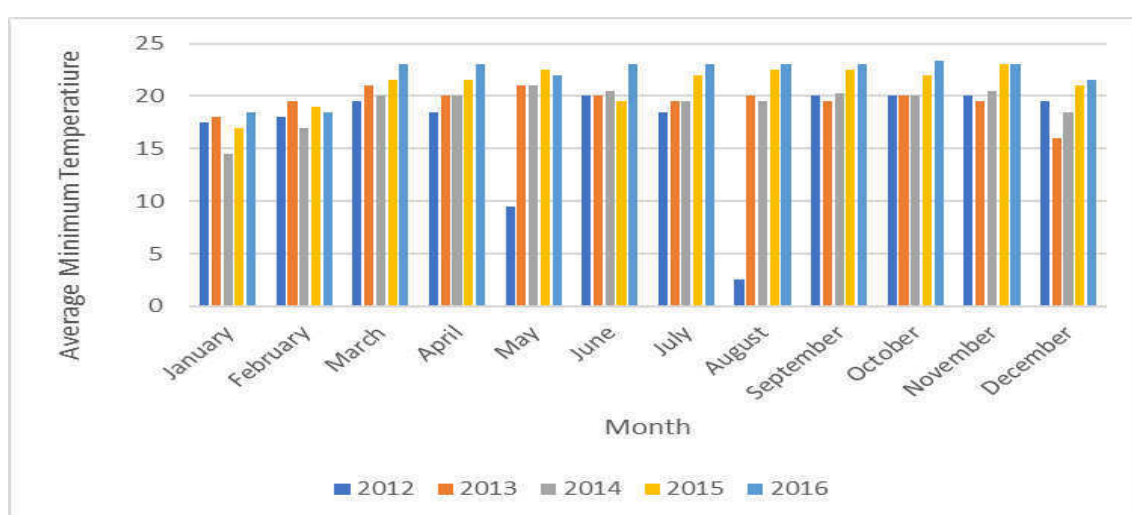
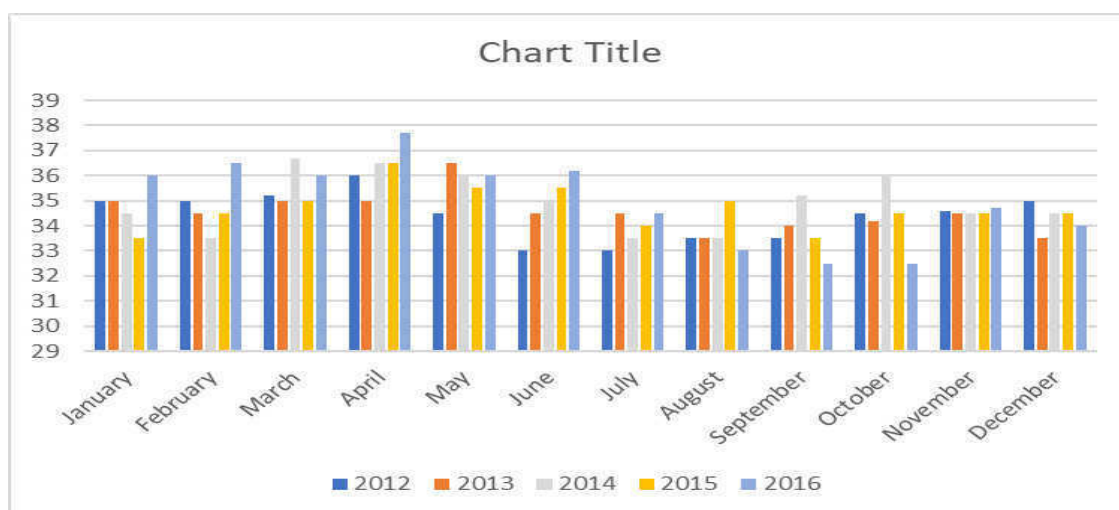


Figure 9: Monthly maximum temperatures in Koh Kong province ($^{\circ}\text{C}$): 2012 - 2016



37. **Surface water quality:** The sub-project will cross the streams and the lake. Surface water in the project area is generally used for irrigation purposed and domestic use. Within the subproject area saline water may occur associated with the sea level rise and erosion of lake embankments that causes turbidity in some of the watercourse. Surface water pollution from domestic sewage is encountered along sections where densely populated villages are found and run-off into the surrounding crop land may be expected. In December 2017, no private piped water supplies were observed in the village. However, the residents are consuming other sources of water for drinking and other domestic uses. Based on the data from the NCDDS in 2010 this indicated that in Kandaol commune, people are normally using water sources from pumps or mixed wells; ring wells; lakes; natural ponds, pond; and reservoirs. Based on field validation and observations, these indicate that there are three main water sources utilized by people for drinking purposes in the area. The three most prominent sources are (i) ring wells/pump wells; (ii) ponds; and (iii) rain water the latter becoming prominent only in the wet season. There is no information on water quality of surface water within the project area.

38. **Groundwater:** Groundwater is used by the local people both for domestic and commercial uses. Based on field interviews and observation, water quality and quantity are affected during dry season (shortage and salty). However, monitoring of the volume and quality has not been undertaken in the project area.

e) Ecological Resources

39. **Forest vegetation:** According to the site visit by the GIC environmental specialists (September 2018) together with results of the community consultation for Kandoal sea barrier subproject, it can be seen that major impacts will be removal of 2950 secondary growth melaleuca trees (approximately 5-6 years old) over an area of 6.4 ha for barrier construction. There will also be temporary conversion of land for a construction camp (in the below pictures). Melaleuca is a genus of nearly 300 species of plants in the myrtle family, the species found at the site is *Melaleuca Leucadendra* commonly known as weeping paperbark which is a common species. Community consultations confirmed that there are some common bird species in the subproject area, including swallow, white heron, teal, and dove. The below pictures are the current natural resource and land use at the proposed subproject site.



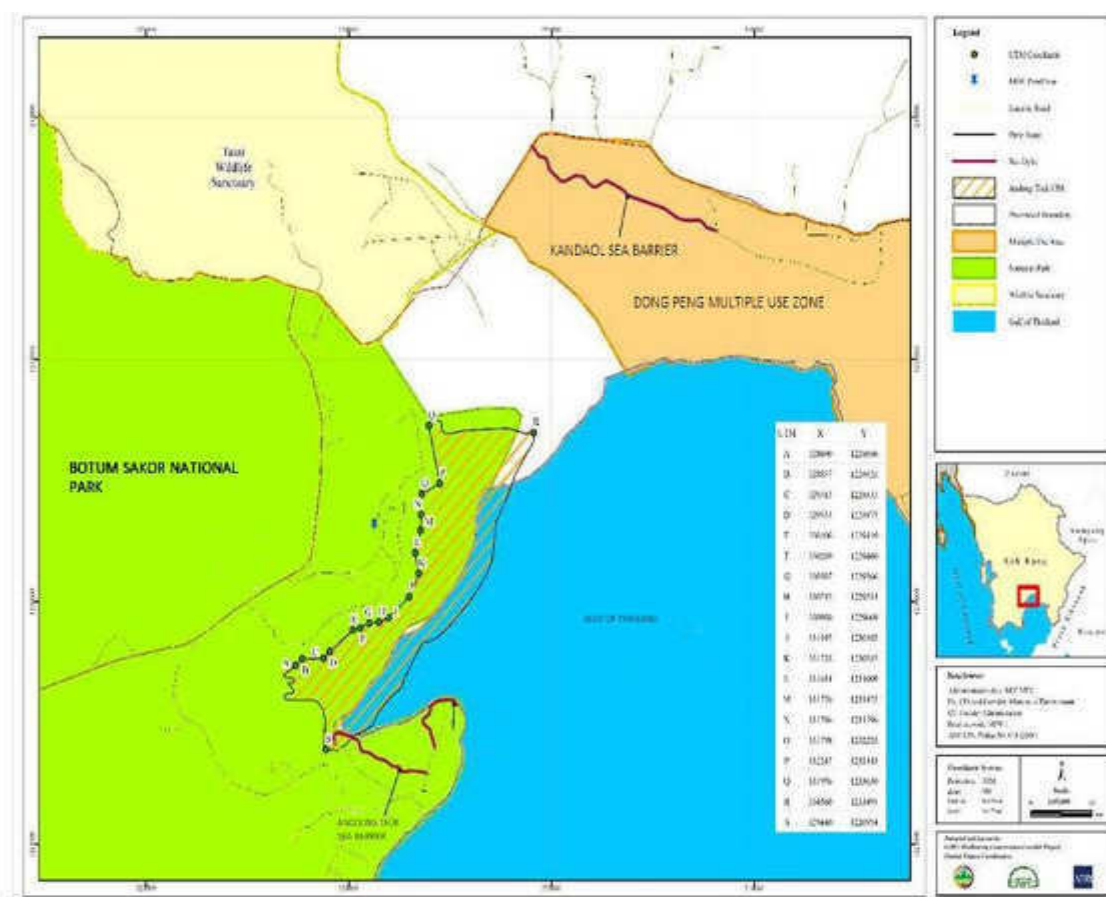


40. **Fisheries:** Fishing activities are conducted mainly during the rainy season when fish populations are high as reported by the members of the local community. Fisheries along Kandaol sea barrier are limited to subsistence catches only. Species fish catch include the following: (i) Kranh (*Anabas testudineus*), (ii) Ros/Phtuk (*Chana striata*), (iii) Andaeng reung (*Clarias batrachus*), (iv) Andaeng toun (*Clarias macrocephalus*), (v) Chhpin prak (*Barbonimus gonionotus*), (vi) Chhpin (*Hypsibarbus lagleri*), and (vii) Slat (*Notopterus notopterus*). However, the sea fisherfolks have a Community Fishery that appears to be working well for the villagers of Kandaol, Thnong, and Prolean. Community consultees consider that some species of freshwater fish will be increased in terms of the quantity such as Kranh (*Anabas testudineus*), Ros or Phtuk (*Chana striata*), Andaeng reung (*Clarias batrachus*), Andaeng toun (*Clarias macrocephalus*), Chhpin prak (*Barbonimus gonionotus*), Chhpin (*Hypsibarbus lagleri*) due to the dike construction against sea water impact on some natural habitats in the rice field.

41. **Fauna:** Based on the field validation together with the community consultation meeting conducted in September 2018, there are common wildlife species in the wider project area of influence, such as tiger-cat, monkey, wild pig, crab, otter and snakes, none of these species are protected or of particular conservation value. The subproject is located in the community development zone of Dong Peng wildlife sanctuary which is a disturbed area.

42. **Protected ecosystems:** The proposed sub-project is located within the multiple use area and community development zone of Dong Peng Wildlife Sanctuary as shown in Figure 10. This zone is where socio-economic development for local communities is allowed, such as paddy fields and field gardens. The proposed subproject is approximately 15 kms from Botum Sakor National Park (BSNP) which encompasses an area of 1,713. km². Based on the Protected Areas Law 2008, MOE has divided the park into four management zones.

Figure 10: Location of Kandoal sea barrier sub-project and the protected area



Types of zone	Description
Core zone	Management area(s) of high conservation values containing threatened and critically endangered species, and fragile ecosystems.
Conservation zone	Management area(s) of high conservation values containing natural resources, ecosystems, watershed areas, and natural landscape located adjacent to the core zone.
Sustainable use zone	Management area(s) of high economic values for national economic development and management, and conservation of the protected area(s) itself thus contributing to the local community, and indigenous ethnic minorities' livelihood improvement.
Community zone	Management area(s) for socio-economic development of the local communities and indigenous ethnic minorities and may contain existing residential lands, paddy field and field garden or swidden agriculture (chamkar)

Source: Cambodia National Report Protected Areas Law, MoE 2008 (TA – 7459, IEE report, 2013)

D.2 Economic Development

43. **Road network and communication.** Most of existing roads are embankment roads that are extremely difficult to use during the wet season. They are generally passable in the dry season only. The mobile communication networks are good and all service provider networks can be connected in the subproject area.

44. **Irrigation system network.** Irrigation is dependent on the availability of the water from upstream and rainfall during the wet season. The drainage of excess water is through drainage structures with flap gates. Farmers are also be able to control the water levels in the rice fields by stop logs.

45. **Water supplies.** Residents in the commune use well water and ponds for drinking, washing and in the rainy season use rain water for drinking. Interviewees indicated that tube wells for drinking water are needed in Kandaol and Prolean as the existing tube wells could no longer be used for drinking due to poor water quality, and a community pond is needed in Thnong as well. The quality of water is not adequate to ensure good health since some well water appears to have a high iron content and some do not appear to be clean.

46. **Land use.** In Kandaol subproject area about 90% of the land is used for paddy production and another 10% is village and residential area that is located along the national (NR48) and rural road only. Except for the residential and village area, all the open land will be used for agriculture purpose especially rice production.

47. **Resource use and livelihoods.** Among the commune households, 78.7% (170 hhs) are farmers, 16.3% are workers, fishermen and 5% are government officers (Commune Database of Kandaol commune, 2017). During the public consultation meeting on 15 December 2017 the following sources of household income were noted: (i) rice farming and some vegetable; (ii) fishing; (iii) collection and sale of non-timber forest products (NTFPs); and (v) labor and livestock farming. Agriculture is the primary livelihood of the people in Prolean though soil quality is poor as a result of seawater intrusion, followed by use of forest resources to supplement daily food consumption; fishery is the secondary livelihood. Other livelihood activities include collecting resources around mangrove forest, fishing in streams and occasionally hunting wildlife such as wild pig and deer in protected areas though suitable areas are far.

48. **Solid waste management.** Generally, solid waste is of many types that are generated from different sources such as domestic waste, industrial waste, and agricultural waste. The Sub-decree on Solid Waste Management, that is under responsibility of MoE, and construction contractors or project owners should ensure that the waste management in subproject area is well managed in accordance with the guideline, which was established by the MoE for disposal, collection, storage, recycling, transportation and dumping of waste. In addition, the RGC has developed a guideline jointly with the Ministry of Interior (MoI) and MoE which defines penalties for throwing garbage (waste) disorderly and establishment of dumping sites in cities and provinces. Regarding to solid waste management within the subproject area, no entity is responsible for this. However, the local residents normally do their own on-site disposal including burning or burying within their own compound. Thus, the solid waste in these communities is very poor managed and need to be improved.

49. **Agriculture.** Based on the public meeting in Prolean village, rice is cultivated only in the floodplain area. Only one rice crop is grown during the wet rice season from early June until harvest time in December. Yields are reported to be low ranging from 1.2 - 1.5 tons per ha. In this village, rice is produced only once a year using local varieties which are adapted to the quality of the land but this results in low yields. Rice production is carried out on an area of about 190 ha by about 170 families. Some 78.7% of the households cultivated small rice areas; on average, each household cultivated 1.1 ha. Rice yields in Prolean are very low, only 1.1 ton per ha on average - due to the use of local rice seed, low usage of fertilizers and pesticides, and sea water intrusion. Other crops in the villages include fruit trees and vegetables for household consumption. Livestock is widely raised for draft power and for household consumption. Chickens and to a lesser extent, pigs, are widely raised by 78% of households.

50. **Cropping patterns.** The cropping system within the project area is dominated by the traditional wet season. Recession rice is to broadcast in the dry season when the water in the project area starts to sink down. The farmers start their activities from early January and finish it at the end of April. Under present situation the rice crop is largely to use rain fed due to the very restricted water supply from the river. The rice crop flowers in the late February to early March and is harvested in April. Production of crops other than rice is done on a very limited scale within the irrigated area due to lack of water. Some household maintains a small home

garden adjacent to the house. Within this area a wide range of crops are cultivated for home consumption.

51. **Agricultural practices.** The social impact study, which was conducted in 2017, indicated that the main crop production in the areas was rice crop, some orchard, and vegetable growing. The farmers perform agriculture activities depending on the circumstances. For the rice crop, farmers practiced only one time a year and used animal draft power or small hand tractor for ploughing. However, the production from the rice crop is not enough to their needs, with a slight surplus for sale, but the returns to rice production are very low. Most of farmers, when they grow rice crops, use chemical fertilizer (18-46-0/DAP/Urea/Manure) and small amounts of compost. The rice land is used only once per year, and that after the rice is harvested the field is not used for other cropping because of the lack of irrigation and knowledge of crop production techniques for other off-season cropping. Cash crops grown in the sub-project area is not practiced. Some diversified crops are produced by self-seeding and have very low yields and produce very little income.

52. **Forest products and wildlife collection.** NTFPs that are being collected include resin and honey which provides supplementary cash income to the households. Other wild products such as vegetables, wild fruits and wild animals are collected for home consumption. Resin and mushroom are the major NTFPs harvested particularly in the northern part of subproject area. Fuel wood collection and some charcoal production are also being carried out both for household use and for selling. As noted above, Prolean village and adjacent mangrove have been part of a USAID-funded project to develop sustainable practices in the wild honey bee supply chain (USAID 2010).

53. **Fishing.** Over the last two to three years, the harvest of sea catch has declined considerably and caused people to migrate to other areas to find work including going across the border to Thailand. The decline in fish production is attributed to commercial fishing methods without adequate control by government authorities. However, the sea fisherfolks have a Community Fishery that appears to be working well for the villagers of Kandaol, Thnong, and Prolean villages and regulates the access to fish in managed areas through local management plans agreed upon by co-management institutions. Some local people feel that establishment of the community fishery has not generally benefited all local people, with benefit mainly to a small group of people. From the discussion, approximately 5% of total households in Prolean village are involved in fishing. They mainly fish for various species of sea fish, crab, shrimp and mussels. The fishermen normally collect mussels from the sea. Fishing is done using motorized boats, and with use of equipment such as nets for catching fish and crabs and tools for collecting mussels. In the dry season, fishermen are able to catch sufficient sea species for family income but in the rainy season, catch is much lower, attributed to the mix of salt and fresh water, and people are occupied with their paddy fields.

54. The main species of freshwater and marine fish that are caught on the subproject area are shown in the Tables below.

Table 2: Freshwater fish species

Order	Family	Scientific name	Local name
Osteoglossiformes	Notopteridae	<i>Notopterus notopterus</i>	Trey Slat
Cypriniformes	Cyprinidae	<i>Hypsibarbus sp.</i>	Trey Chhpin
		<i>Osteochilus hasselti</i>	Trey Kros
		<i>Esomus longimanus</i>	Trey Changwa phlieng
Siluriformes	Clariidae	<i>Clarias macrocephalus</i>	Trey Andaing Toun
		<i>Clarius batrachus</i>	Trey Andaing Roueng
	Bagridae	<i>Mystus multiradiatus</i>	Trey kanchos chhnoht
	Siluridae	<i>Ompok hypophthalmus</i>	Trey Ta aun

Order	Family	Scientific name	Local name
Perciformes	Channidae	<i>Channa macropeltes</i>	Trey Chhdaur
		<i>Channa striata</i>	Trey Phtuok/Raws
		<i>channa lucius</i>	Trey Khan Chorn Chey
	Nandidae	<i>Pristolepis fasciata</i>	Trey Kantrawb
	Anabantidae	<i>Anabas testudineus</i>	Trey Kranh
	Belontiidae	<i>Trichogaster trichopterus</i>	Trey Kamphlieng
		<i>Trichogaster pumila</i>	Trey Kroem tun Sai
Synbranchiformes	Synbranchidae	<i>Ophisternon bengalense</i>	Antong
		<i>Macrognathus siamensis</i>	Trey Chhlonh

Source: Local people interviews, 2018

Table 3: Marine fish species

No	Local Name	Scientific name	No	Khmere Name	Scientific name
1	Trey Tok Ke	<i>Aethaloperca rogaa</i>	10	Trey Spung Sor Krorhorm	<i>Lutjanus argentinaculatus</i>
2	Trey Ta-ok	<i>Arius sp</i>	11	Trey Ang Keuy	<i>Lutjanus johnii</i>
3	Trey Ta-ok Sor	<i>Carangoides sp</i>	12	Trey Bos Tra	<i>Lutjanus russelli</i>
4	Trey Ta-ok	<i>Caranx sp</i>	13	Trey Kantuy Reoung	<i>Megalaspis cordyla</i>
5	Bobel	<i>Himantura sp</i>	14	Trey Kbok Kaoung Kang	<i>Mugil cephalus</i>
6	Kampot	<i>Lagocephalus spadiceus</i>	15	Trey Chang Koum Bei	<i>Otolithes rubber</i>
7	Trey Spung Sor	<i>Lates calcarifer</i>	16	Trey Kalang	<i>Scomberoides sp</i>
8	Trey Krab Khnol	<i>Lethrinus nebulosus</i>	17	Trey Krorchok Krobei	<i>Stolephorus indicus</i>
9	Trey Kbok	<i>Liza waigiensis</i>	18	Trey Sambou Hea	<i>Gazza minuta</i>

D.3 Social and Cultural Resources.

55. **Population.** Based on the Commune Database (2010) it is indicated that the total population of Kandaol commune has increased from 3,373 persons to 4,369 persons in 2007 and 2010 respectively. However, in 2017, the total population of 4,138 persons, it is found that the population in this commune has decreased (4,138 persons), whereas the number of households has increased. Only 3.2% of Khmer-Islam are living in this area were observed.

Table 4: Population in Kandaol commune (2007 - 2010)

Family	2007	2008	2009	2010
Total number of families	685	708	891	903
Increase/Decrease	-	3.40%	25.80%	1.30%
Total population	3,373	3,388	4,294	4,369
Increase/Decrease	-	0.40%	26.70%	1.70%
# of female headed household families	220	156	241	234

Source: CBD Online, Commune Database Online, 2010

Table 5: Population in Kandaol commune (2017)

No.	Village	#of families	# of population		Over 18 Years Old	
			Total	Male	Total	Male
1	Tam Kan	222	926	460	582	281
2	Kandaol	137	580	289	409	202
3	Thnong	130	626	327	412	215
4	Prolean	216	932	470	574	293
5	Sovann Baitong	252	1074	525	668	303
Total		957	4138	2071	2645	1294

Source: Commune Database, December 2017

56. **Poverty.** In 2015 about 18.7 % of the households were classified as poor families, and it is indicated that the poverty rates were actually reduced (CDB Database 2014). At the same time within the project area at Kandaol commune of Kandaol sea barrier subproject, the percentages of poor people are around 15.97%.

57. **Gender issues.** In terms of the demographic composition of Kandaol commune, the population is found to comprise: total population of 4,138 persons, and 2,967 women (49.9 %); poor people around 15.9 % (3,922 persons), over 18 years of age 63.9 % (2,645 persons), while the minority groups they are living in the community were not reported. This is shown in the figure below. However, based on the Commune Database of Kandaol commune indicates the main minority groups are Khmer-Islam, there are around 31 households with the total of 119 persons. Socio-economic conditions particularly gender disparities can also be discerned from population data. The overall sex ratio of 100.1% (sex ratio between men and women) in Kandaol Commune is higher than the national average was 96.1%. Overall the domestic violence in the community is declining from 4.80% to 2.10% in 2008 to 2010 respectively. The detail in the below table.

Table 6: Domestic violence in Kandoal commune (2008 - 2010)

Description		2008	2009	2010
Number of persons having domestic violence		34 families	16 families	19 families
% families facing domestic violence		4.80%	1.80%	2.10%
Domestic violence cases reported by village chiefs		41 cases	16 cases	16 cases
Where	Physical violence	7 cases	5 cases	5 cases
	Sexual violence	0 cases	0 cases	0 cases
	Mental violence	29 cases	11 cases	11 cases
	Household economic violence	5 cases	0 cases	0 cases
# administrative decisions on domestic violence		39 cases	16 cases	16 cases
% of administrative decisions on domestic violence		95.12%	100.00%	100.00%

Table 7: Migration of women

Description	2008	2009	2010	
	%	%	%	Number
Total number of migrants	1.83%	1.30%	1.30%	57 persons
Number of female migrants	0.86%	0.65%	0.57%	25 persons
Total number of migrants, who go to work with company-factory (with certain job)	1.33%	0.58%	0.50%	22 persons
Number of female migrants with certain job	0.62%	0.42%	0.37%	16 persons
Total number of migrants with uncertain job	0.50%	0.72%	0.80%	35 persons
Number of female migrants with uncertain job	0.24%	0.23%	0.21%	5 persons

58. **Community Health and Safety.** In the subproject area, the residents have indicated that in the last few years children have faced many problems with dengue fever and some old people have had diarrhea and diabetes. Sanitary latrines are in high demand amongst the villagers. Discussion with local people also indicated that there is no UXO in Prolean village. Several unexploded weapons were found many years ago and were cleared by Cambodian Mine Action Centre. However, based on the consultation meeting with local communities and local authorities, it is impossible to show clearly where there are risks of mines or UXO. Unsafe areas, if known, should be cleared before project implementation, proceeds.

59. **Culture.** The residents are largely Khmer and do not have indigenous communities. Although minority groups were reported such as Khmer-Islam there are 31 households (119 persons/48 females). The proposed dike route is through areas that are currently used for rice cultivation or close to current village dwellings but no important physical cultural resources in the villages or along the proposed route of the dike were not identified during site inspection.

E. SCREENING POTENTIAL ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

60. Based on the detailed design together with the field validation and community consultation meetings, it is identified that the potential environmental impacts related to the dike construction indicate that they are relatively minor, when compared to the benefits resulting from the scheme operation. Environmental impacts are classified as they relate to three stages which are pre-construction, construction, and operation stage. In this IEE the potential impact has been screened for both negative and positive potential impact, and mitigation measures are identified for each negative impact.

61. The potential environmental impacts have been screened and assessed based on the engineering design and location of the proposed alignment of the dike. The ADB Rapid Environmental Assessment (REA) Checklist was also used for the environmental categorization of the subproject. Field finding in the field has been used to collect the information for the compilation of the REA. Based upon the results of the environmental and social field investigations, recommendations were presented to the relevant stakeholders and local communities in the subproject area on the potential environmental impacts that are expected to occur. The potential environmental impacts, mitigation measures for each impact which are recommended to reduce the impacts, are described in this chapter.

62. Potential impacts have been assessed by the initial identification of potential adverse and beneficial effects, identification of measures to mitigate potential adverse impacts, and determination of significance and likelihood of residual adverse effects after implementation of mitigation. The significance of potential adverse effects was based on subjective appraisal of magnitude, geographic extent, duration and frequency, reversibility of identified effects. Each environmental impact is described followed by recommended mitigation measures for the different project phases: pre-construction, construction and operation.

E.1 Pre-construction phase.

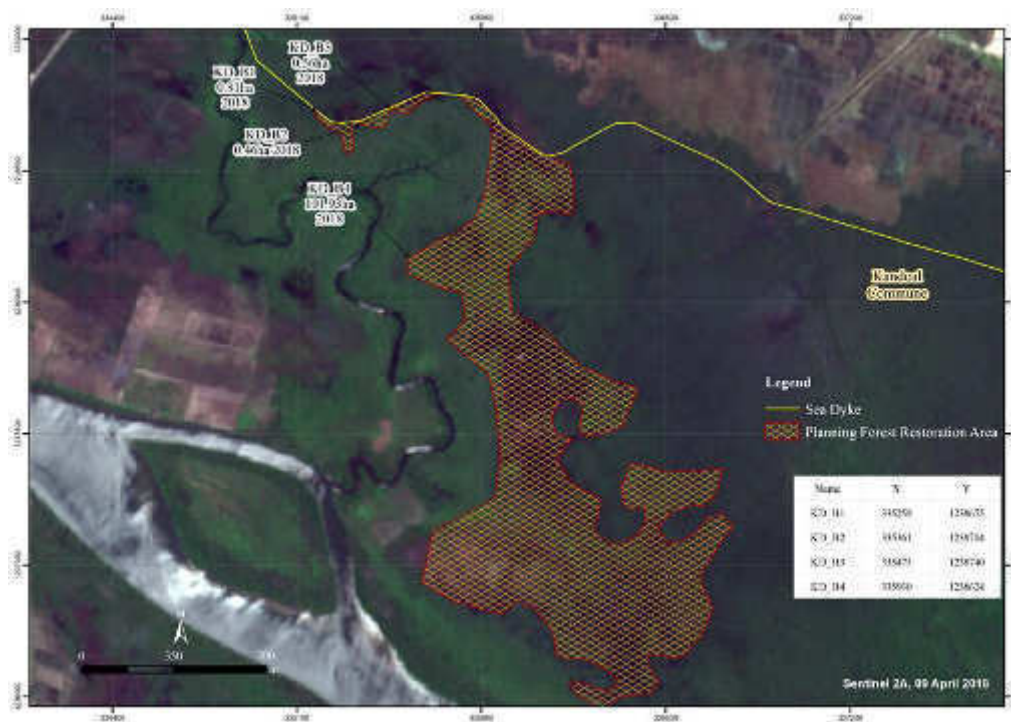
63. During the pre-construction/design stage, there is no significant impact on the environment and social and cultural resources, which is resulting from human activities. The activities related to the project alignment and research for preparing project design only.

a) Project site and engineering design

64. The proposed dike is located in the coastal area of Prolean and Kandaol villages, Kandaol commune, Botum Sakor districts, Koh Kong province. The proposed subproject will not encroach on private agricultural land nor on residential areas. There are trees at the end of the dike and on the access road towards National Road 48. Also, the dike alignment will require removal of 6.4 ha of young secondary growth *Melaleuca* trees during the dike construction.

65. **Mitigation measures.** The height of the dike will be elevated to minimized and reduce the prolonged inundation and unnecessary flooding of the rice field. The alignment of the dike may be realigned to avoid any potential encroachment of private lands. The design principle for the drainage facilities is to control and maintain the water canal to flow into the area behind the dike to benefit the up and down-stream users. An alternative approach is to drain water from paddy field naturally through the existing stream to avoid flood disaster during the wet season via drainage structures. These drainage structures will be constructed as shown in the layout plan shown in the subproject description of this report. To compensate the loss of 2,950 melaleuca trees, MoE will replant 3,000 mangrove and melaleuca trees along the dike and also over an area of 103.6 hectares adjacent to the subproject site as shown in map (Figure 11). This will compensate the loss of trees, enhance existing forest and mangrove resources, protect the dike from erosion and provide habitats for fish and wildlife resources. During the pre-construction stage of implementation of the subproject the location of worker's camps, access road, storage facilities, for construction materials, and equipment of the contractor must be carefully identified to minimize additional vegetation clearance and be located away from water resources.

Figure 11: Map of replantation of mangrove forest



b) Setting up construction camp

66. The construction site for the workers' camp and disposal sites will be temporarily established by the project contractor. The spoil materials from project preparation will also require temporary land. The contractors should check that the location for temporary premises will avoid farmland and forest area and that all temporary locations have been restored or repaired at the end of construction. In addition to temporary land occupation by the contractor for the construction staging areas, the setting up and operations of construction camps will have a low and short-term impacts (during construction period only). The land occupied will be restored to its previous state or to a better condition. Worker accommodation and camps will generate wastewater from toilets, bathrooms and kitchen. Solid waste from the camp is another source of pollution and health hazard. Workers may also be at risk from malaria and dengue, unsanitary camp conditions, lack of clean water and sanitary facilities.

67. **Mitigation measures:** Developed or cleared private land should be preferred for the construction camp. This will eliminate the need for clearing. Camps should not be located on productive lands, at or near sensitive habitats and at least 300 m from local resident houses if possible. Pollution prevention in construction camps will require the proper management of wastes by the contractor. This should include provision of septic tanks for wastewater effluent from toilets, bathroom and kitchen. The grey water from the septic tank should be disposed in a leaching field. Discharge of wastewater into sewer or water body should conform with the standards set by the Sub-Decree on Water Pollution Control No. 27 ANRK.BK. Proper solid waste management should likewise be implemented. Waste bins for segregating waste should be provided within the camp with regular collection schedule. Waste should be segregated with recyclables sold to recyclers; organic wastes composted and non-recyclable wastes disposed in authorized disposal facilities or using local solid waste service. Hazardous substances such as used oil and empty paint, busted lamps and spills from refueling and storage of oils will be segregated from the regular garbage and should be disposed through an authorized hazardous waste disposal facility. Oil spills and drips should be collected through an oil pit in the refueling and oil storage area. Protection of health and safety of workers in the camp is part of the contractors' obligation. The contractor should provide safe, suitable and comfortable accommodation, kitchen, dining and sanitary facilities (toilet and bath); ample supply of clean water; first aid supplies and personal protected equipment (PPE) for workers. Camp surroundings should be kept clean to prevent breeding of insect vectors. A trained health and safety officer should be designated by the contractor to ensure the proper implementation of the environment, health and safety programs and induction and training of the workforce during the construction phase. For security and to maintain order in the camp and to avoid social conflicts with the local community, camp rules should be established and effectively disseminated to the workforce. These camp rules should address health, safety and security of workers and compliance with the EMP. The contractor shall conduct training and orientation on environmental protection, Government's environmental regulations and requirements, hygiene, health, first aid, safety and security. The training program should be defined in the Construction Environmental Management Plan (CEMP). The CEMP to be prepared by the contractor should present a detailed plan of the construction camp including the layout, the sanitary facilities, septic tank, drainage, access road, fuel storage, equipment yard and spill kits. The contractor must secure permits from the landowner, local government and other relevant agencies. All permits should be submitted with the CEMP to the MoE by the contractor prior to start of any construction activities.

c) Risk of Land Mines and UXO

68. The new Flap Gate and pipe culverts will be constructed in a new location. However, the risks remain since there may be deep seated mines that could be exploded by heavy construction equipment. Consultation meetings with local communities are necessary to know clearly where there are risks of mines or UXO. Unsafe areas should be cleared before project implementation.

69. **Mitigation measures:** De-mining shall be done before earth work, especially in construction site new access road and quarries. The project owner shall do good cooperation with local de-mining authority CMAC or other local de-mining agency to deal on this issue.

d) Damage to existing structures

70. No existing structures were observed, but small trees will be damaged by the project. To lessen the project impacts, the road and temporary access were designed in such a way that trees and adjacent structures will not be affected. Resettlement framework for the Project and Cambodian laws, policies, and regulations should be complied with.

e) Establishment of Grievance Redress Mechanism

71. To ensure that there is an effective and workable Grievance Redress Mechanism (GRM) established and applied during construction, the design must include a description of the operations of system. This entails raising awareness of local authorities and the community of their rights and obligations to closely monitor the activities during construction so that any grievances that they have can be addressed fully. The contractors will be made fully aware of all of their responsibilities and the fact that the community members are fully empowered to address any grievances during the construction phase to the site managers, and that if they do not receive a satisfactory response there is a mechanism for the them to raise their grievances to higher levels and for strong action to be taken against the contractor and to resolve the grievance fully. At the local level the Village Chiefs and Commune Chief will be fully briefed on the GRM, as well as the district administration the and MoE/PPIU team. The MoE/PIU will take full responsibility for instigating these awareness raising activities, and furthermore for providing clear explanations of this to the contractor prior to contract signing.

E.2 Construction phase.

a) Access road

72. The existing access road to the project site is one of the major items to be considered for the design and implementation of the project. Rehabilitation of existing access roads and bridges/culverts to the project site need to be included in the engineering design of the project. The route for the existing access road to the dike is 6 km and the existing rural road will need to be strengthened to accommodate construction traffic which may include heavy traffic transporting construction materials to the project site. Some environmental impacts (such as dust noise and traffic, smoke and land) will result from the road and bridge/culvert rehabilitation and construction. Clearing forest for enlarging the existing access road to the project site, borrow pit development, noise, vibration, soil erosion, water supply, health protection for the workers, and drainage systems should be considered as environmental impact factors of the project activities relating to the access roads construction and rehabilitation. The impact caused from the use of the access road will have minor impacts on the natural resources (land resources nearby the existing road while construction or machinery movement) due to the size and site selection, based on the proposed access road size and alignment selection.

73. **Mitigation measures:** The existing access road will be used to reduce damage to existing trees and protective vegetation nearby the dike alignment cover and to precautionary measures to avoid any risks to local people as well as project worker's health. The contractor will provide (if needed) a temporary drainage system, culvert and bridge to maintain public access road and at crossings of the natural waterways and or streams. The contractor will have to use good excavation machinery and other equipment with low pollutant emissions. There should be limited tree removal/cutting based on the cross-section design.

b) Impacts on water quality

74. This impact will be generated during earth works and from the excavated materials and backfills used for dike construction and the excess soils. All excavated and unsuitable materials will be dumped properly at official approved disposal area. The impact of the earth works on water quality will be temporary and will be significantly reduce to the minimum by a

timely implementation of the following mitigation measures: (i) selection of disposal area for dumping (unsuitable soil); (ii) selection of better excavation equipment; (iii) careful implementation of earth works, and (iv) installation of a silt fence if necessary.

75. **Mitigation measures:** The cutting of forest and earth works will be done in the dry season to reduce soil erosion and waste flushing into the water courses. If construction is not completed in dry season appropriate erosion and sediment control measures (retention pond and blue fine mesh cloth/plastic) shall be put in places to avoid sediment laden discharges from the site during the wet season. The project construction contractor will educate the workers not to dispose waste into the water course and provide adequate waste management facilities including sanitation latrines in the construction sites and camps. The contractor will make sure that all waste generated from humans and from construction activities will be properly collected and disposed in compliance with the solid waste management regulation or guideline of Cambodia. Water quality monitoring upstream and downstream of the project site will be done regularly by visual (if necessary use turbidity meter) to ensure the quality of water during construction does not seriously impact on aquatic and terrestrial wildlife and human beings who use the water upstream of the project.

c) Dust Dispersion Impacts

76. Generation of dust is expected during earthworks and from hauling of construction materials to site. Dust pollution could be a nuisance to communities who live adjacent to the site, especially during dry season. The dust will also affect aesthetics.

77. **Mitigation measures:** The Contractor will be required to formulate and implement a dust control program that includes spraying of water on access roads and work areas within villages close to the access road. Vehicles transporting materials will be covered with tarpaulin or similar material. Properly cover on the construction materials such as the cement, soil, and aggregate when transport it to the construction site. Control vehicle speed to less than 8 km/h in unpaved areas. Post the notice on the construction works and the speed limit sign in the construction site.

d) Noise impacts

78. Similar to dust, operation of construction equipment and transporting materials will cause temporary noise and vibration. Communities and wildlife? close to work areas will be affected. The Contractor should consider proper scheduling of construction activities particularly in sensitive areas. Acoustic barriers or enclosures for working areas should be provided where required.

79. **Mitigation measures:** Vehicles and construction equipment have to be well maintained and checked for operational noise and vibration levels. Mufflers should be installed and maintained as necessary to meet these standards. The noise generated on site shall not be over the standard level of MOE, which is maximum 45 dB from 6am to 6pm. If the noise is adversely affecting any household in the area, the contractor will take the necessary measures to reduce noise impact or nuisance. The construction and dredging activities must be made known in the area or near local residents prior to commencement of the works. The works should be limited to working hours (8:00 am - 12 pm to 1:00 pm - 5:00 pm). No construction works must be observed during the night.

e) Environment, health and safety for public and workers

80. Construction staging areas for the workers' camps, asphalt/concrete mixing stations and pre-casting yards, and spoil disposal sites will be set up by the project contractors. These will be included in the CEMP of the Contractor. These construction staging areas will be temporarily set up during the construction phase. The contractor should see to it that sites for the temporary facilities will avoid farmland and that all temporary sites shall be restored to its prior state upon completion of the construction activities. The construction sites shall be properly delineated with warning signs to restrict/disallow unofficial and unnecessary access to the construction areas to prevent accidents. The CEMP shall also include proper location

of workers' camp and provision of facilities for sanitation including latrine, clean water, wash area, kitchen and potable water among others.

81. **Mitigation measures:** Prepare and adhere to safety management plan of the CEMP. The Contractor will follow all safety working standards. Tools and equipment will be provided to protect against any dangers to project staff/workers as well as to local people. Clean and potable water supply will be provided to the workers and staffs to use for domestic consumption. Treatment and protection health affect will be provided, e.g. health facilities, medicines, and medicine/doctor for examination and treatment of workers and local people to avoid the spread of disease from one people to other people. The Contractor shall pursue a good collaboration with Kandaol health Center and Botum Sakor district, in Koh Kong province, and central levels to ensure the protection against any transmission of disease in and around the project area. Contractor must cooperate with police and local authorities against drug use or drug trafficking in and around the project area. The temporary housing, workshops and storage of materials should be properly managed and any indiscriminate disposal of petroleum products or other pollutants shall strictly be prohibited.

f) Sources of construction materials and quarry sites

82. Quarrying can have long term and permanent adverse impacts such as visual impairment (scarring), changes in topography, wasteful consumption, change in land use, increased susceptibility to erosion, siltation, sedimentation and alteration of natural drainage patterns. Direct impact of borrow pits is clearance of vegetation, loss of soil resources and change in landform with indirect impacts of visual impairment, increased risk of erosion and siltation, threats to public safety, health hazards as accumulated water can serve as a breeding ground for insect vectors.

83. **Mitigation measures:** The selection of the aggregate material supplier should consider the legitimacy of the operations, i.e. licensed operators. Should the contractor opt to operate its own aggregate plant, reopening abandoned quarry sites, or borrow pit the depth of which shall in no circumstance whatever be deeper than two meters, to avoid any risk to injury to children or livestock, and it is mandatory that warning signs to prevent such physical injuries or danger to the lives of humans of domestic animals are posted at the site of the pit. It is essential to use existing quarry sites as an alternative to opening a new quarry site. The contractor should include in the CEMP a material balance estimate for cut and fill material requirements and identify possible sources for fill materials and disposal sites for spoils. Only authorized or permitted sources of fill materials or quarries should be used as sources of these materials. In the event that a new quarry would be needed for fill materials, the contractor should submit a quarry development plan to the supervising consultants together with the CEMP.

g) Soil erosion and sediment

84. Soil erosion usually occurs during site clearing, embankment works and other earth moving works. When heavy rain comes, sediments are carried into ditches, culverts, nearby water bodies and adjacent lands. The contractor will be required to implement soil erosion control to minimize soil erosion and sedimentation of waterways.

85. **Mitigation measures:** Construction activities shall be done during the dry season as far as possible to avoid potential soil erosion, Proper measures including compaction of soil, etc. will also be necessary to minimize soil erosion. Compacting and protecting exposed soil as much as possible and by replanting areas where the vegetation has been damaged. If needed, construction activities should be limited to the dry season. Removal of sediments (dredging) may be applied to maintain a certain water depth. Provide adequate cross drainage to avoid over flow or flooding and re-vegetation of erosion-prone areas.

h) Generation of wastes

86. During subproject construction, various wastes will be generated. Potential sources are wastes from construction workers, site clearing, excavation, dismantling of old structures

and from other construction-related activities. If not properly managed, it will be effected the health and sanitation in the subproject area. Garbage dump area will serve as breeding ground for disease-carrying species. Waste may even clog the drainage system. Contractor should formulate and implement a Waste Management Plan where required as a results of construction and camp activities.

87. **Mitigation measures:** Contractor shall cooperate with MOE and local authorities within project site to organize and monitor the solid waste and wastewater. Also, Contractor shall make/select an available dumpsite with appropriated location and number latrine for workers and staff should be suitable in accordance with waste management sub-degree. Provide sufficient garbage containers in the construction camps and at work site, regular disposal of wastes in an approved dumpsite or disposal site, provide sanitary facilities for workers which should be cleaned and maintained regularly. Upon completion of construction works, camps and work sites used should be restored to its original or better condition.

i) Traffic congestion

88. Traffic congestion normally occurs during the transporting materials of project's trucks and provide temporary access road for installing the drainage structures on major thoroughfares. Accidents inevitably happen also during construction. Some motorists drive at high speed and without lights at night time, construction equipment not properly park, construction wastes piled along roads and no warning signs on deep excavations.

89. **Mitigation measures:** The contractor should formulate Traffic Management Plan to be included in the CEMP. The Traffic Management Plan should include the following: (i) Install traffic/warning signs like "safety first" at the construction area including fences or enclosures (ii) orient drivers to drive at low speeds, especially in market, school, hospital, urban areas. (iii) keep the roadway or bypass accessible to commuters to avoid traffic jam (iv) park at designated area (v) Detour road should be provided and accessible to commuters (VI) Temporary access of equipment and trucks must be established and approved by the sub-district officials (VII) Provide flag men on the crossing road especially NR 48.

j) Damage to forest and hunting of wildlife by contractor/workers

90. During construction when the construction workers are deployed at the site there is a risk of hunting of wildlife and also felling of trees for fuel-wood as well as construction of temporary shelters. If the construction period extends over a period of several months this poses a major risk and can result in severe damage being sustained to the natural resources that the community are dependent on. Construction workers will be prohibited from encroaching into the forest resources and hunting as mentioned in para. 47, there will be strict enforcement of these requirements).

91. **Mitigation measures:** It is imperative that during the construction there must be no encroachment or damage to areas outside the identified corridor of impact and work. Work areas should be clearly demarcated and enforced. It is the responsibility of the contractor, PPIU, Provincial Department of Environment (PDoE), Provincial Department of Agriculture, Forestry and Fisheries (PD AFF) and the community to closely monitor the area during the construction period. If construction workers require supplies such as fuelwood and food they should procure these through local licensed suppliers. Penalties for encroachment and damage to natural resources and hunting will be strictly enforced.

E.3 Operational Phase

a) Over use and application of chemical fertilizers and pesticides.

92. During the operation of the subproject excessive use of chemical fertilizers and pesticides are anticipated in an effort to boost rice yields and to eliminate pests that inhibit rice production. The over use of these chemicals in the long term will be harmful to the physical and biological components of the environment as well as to the farmers and subproject beneficiaries.

93. **Mitigation measures:** The System of Rice Intensification (SRI) program aside from enhancing the resiliency of small-scale agriculture through introducing different high yielding drought variety of rice as well as flood, drought and salinity-tolerant crops also, will include training on integrated pest management.

b) Deterioration of the dike and associated structures

94. During operational phase the dike, through time, will be subjected to erosion and scouring during high rainfall events, sea level rise and river flooding. The most susceptible parts of the dike are the sea-side embankment, the box culverts and flap gates.

95. **Mitigation measures:** The proposed planting of mangrove and melaleuca forest along the dike will offer some protection from erosion and scouring, there should be adequate aftercare to ensure proper establishment. The dike will be managed by the local Dike Management Group, in line the guidelines of the Ministry of Water Resources and Meteorology (MOWRAM).

c) Encroachment and deterioration of natural resources

96. The dike and improved access road will support expansion of agricultural activities in the subproject area.

97. **Mitigation measures:** The commune should clearly demarcate the areas where agricultural activities are permitted and areas that are protected. Signboards should be installed indicating zoning of the protected area and permitted uses.

F. ENVIRONMENTAL MANAGEMENT PLAN

98. The Environmental Management Plan (EMP) provides guidance for inspection, monitoring and mitigation measures for the Kandaol sea barrier Subproject during pre-construction/design, construction, and operation of the project. The EMP provides mitigation measures for each environmental impacts identified, institutional responsibilities for the implementation of the EMP and cost of implementing the mitigation and enhancement measures. The Environmental Monitoring Plan includes the location where the monitoring activities will be undertaken during the pre-construction, construction period, the parameters to be monitored and frequency, responsibilities for implementation and verification, and the estimated costs of implementation.

99. The Environmental Management Plan (EMP) will be part of the technical specifications and therefore will take precedence in any conflict with the General Conditions and Contract. The EMP is a general guide for the contractor to follow. The successful Contractor shall update the Subproject EMP and prepare a Contractor's Environmental Management Plan (CEMP). The CEMP shall include the among others include traffic management plan, workers' camp and facilities, e.g. toilets and wash area, emergency response and first aid, public and workers' environment, health and safety plan, specific details on the locations of storage facility for fuel, oil etc. construction materials the borrow areas, borrow roads, field office, parking area for heavy equipment. The CEMP must be submitted to the PIU-MOE for approval prior to commencement of construction works.

100. The EMP for the Kandaol sea barrier Subproject is summarized in Table 8 below. It presents the potential environmental impacts during the pre-construction, construction and operation of the subprojects, the corresponding mitigation/enhancement measures to reduce the negative impacts are recommended and the institutional responsibilities for the implementation and supervision as well as the costs of implementation are indicated.

101. This is followed by the Environmental Monitoring Plan (EMoP) based upon the EMP in Table 9.

Table 8: Summary of EMP for Kandoal sea barrier subproject

Project Activity	Potential Environmental Impacts	Proposed Mitigation/enhancement Measures	Institutional Responsibilities		Cost Estimates (USD)
			Implementing	Supervising	
Pre-Construction					
Setting up of construction camp	Camp will generate waste from kitchen, toilet and fuel waste from construction materials.	<ul style="list-style-type: none">• Prefer use of cleared land and avoid productive lands, at or near sensitive habitats• Provide comfortable accommodation, kitchen, dining and sanitary facilities (toilet and bath) with septic tank, ample supply of clean water, first aid supplies and PPE, solid waste management, and hazardous substances area.• Designate a trained health and safety officer• Conduct training for workers on environmental protection, grievance redress mechanism, Government's environmental regulations and requirements, ADB requirements, hygiene, health, first aid, safety and security.• Camps area must be restored or cleaned to original condition after completed	Contractor	MOE/PPIU	Construction Cost
RGC approvals		<ul style="list-style-type: none">• Notify MoE about the project to ensure requirements are complete and required permits and clearances are secured prior to implementation.• Confirm approved IEE/IEIA report from MOE.	Consultant, EA	MoE	
Construction EMP (CEMP)		<ul style="list-style-type: none">• The contractor(s) will develop a Contractor EMP that includes individual management sub-plans for:<ul style="list-style-type: none">A. Spoil Site Management;B. Solid and Liquid Waste Management;C. Community and Occupational Environment, Health and Safety and Emergency Response;D. Vehicles/trucks maintenance to reduce air pollution and oil leak;E. Construction Workers Camp Management (if required)	Contractor	MOE/PIU/PPIU	Construction cost

Project Activity	Potential Environmental Impacts	Proposed Mitigation/enhancement Measures	Institutional Responsibilities		Cost Estimates (USD)
			Implementing	Supervising	
		<ul style="list-style-type: none"> The CEMP will include a map of each construction site, with copies held by the Contractor and PIU, showing as a minimum: a). storage areas for waste, b). Storage area for chemicals such as fuels, c) first aid kit and equipment used in emergency response, d) location of worker camps (if required). 			
UXO clearance	Risk to workers and local people	<ul style="list-style-type: none"> De-mining shall be done before earth work, especially in construction site new access road and quarries. The project owner shall do good cooperation with local de-mining authority CMAC or other local de-mining agency to deal on this issue. 	PIU/EA	MoE	Project Cost
Gather baseline data on surface water quality	Surface water pollution	<ul style="list-style-type: none"> Stablish the water quality prior to any construction works 	PIU/EA	MoE	Surface water quality analysis =194.00
Gather baseline data on ambient air quality and noise levels	Air and noise pollution	<ul style="list-style-type: none"> Stablish the air quality and noise levels prior to any construction works 	PIU/EA	MoE	Measurement of air quality and noise levels =1,770.00
Construction					
Access road	Property damage and trees lost	<ul style="list-style-type: none"> The access road alignments will be designed to reduce damage or risk to natural resources such as shrubs, wildlife, aquatic fauna and flora, and to avoid any risk to local people as well as project worker's health The contractor will provide the drainage system, culvert and bridge when the access road across the natural creeks or stream The contractor will plan to use good excavation machinery and trucks with low emission of pollutant. Limited tree cut based on the cross-section design. Replanting program? 	Contractor	MOE/PIU/PPIU	Construction cost

Project Activity	Potential Environmental Impacts	Proposed Mitigation/enhancement Measures	Institutional Responsibilities		Cost Estimates (USD)
			Implementing	Supervising	
Clearing, grubbing and earth work	Soil erosion, sediment and tree lost	<ul style="list-style-type: none"> Construction activities shall be done during the dry season Compacting and protecting exposed soil as much as possible and by replanting areas where the vegetation has been damaged. Rip rap on erosion-prone area to prevent erosion Removal of sediments (dredging) may be applied to maintain a certain water depth. Provide adequate cross drainage to avoid over flow or flooding and re-vegetation of erosion-prone areas. Limited trees cut based on the detail design cross section alignment 	Contractor	MOE/PIU/PPIU	Construction cost
	Reduced water quality	<ul style="list-style-type: none"> Minimize in-stream equipment use and entry of high-silt run-off during heavy rain from earthworks into streams; management protocols for handling and clean-up of fuels and other construction fluids. The cutting of forest and earth works will be done in the dry season. If construction is not completed in dry season appropriate erosion and sediment control measures (retention pond and blue fine mesh cloth/plastic) shall be put in places. Water quality monitoring upstream /downstream of the project site will be done regularly during construction. Surface water quality analysis (bi-annual sampling) 	Contractors	MOE/PIU/PPIU	Construction cost Water quality analysis = 388.00
	Increased noise level and elevated air pollution	<ul style="list-style-type: none"> Operate equipment based on timing agreed with nearby villagers Vehicles and construction equipment have to be well maintained and checked for operational noise levels, vibration and gas emissions to meet standards, Mufflers should be installed and maintained as necessary to meet these standards, The noise generated on site shall not be over the standard level of MOE, which is maximum 45 dB from 6am to 6pm, 	Contractors Village/ Commune	MOE/PIU/PPIU	Construction cost
			Contractors Village/ Commune	MOE/PIU/PPIU	Construction cost Measurement of noise and

Project Activity	Potential Environmental Impacts	Proposed Mitigation/enhancement Measures	Institutional Responsibilities		Cost Estimates (USD)
			Implementing	Supervising	
		<ul style="list-style-type: none"> If the noise is adversely affecting of the surrounding development area, the contractor will take the opportunity to contact the Project Implementation Unit for consultation or solution, The construction and dredging activities should be limited to working hours (8:00 to 17:00 only). Contractor will apply dust control program as spraying of water on access roads Properly cover on the construction materials Control vehicle speed to less than 8 km/h Undertake measurement of air quality and noise levels 			air quality = 3,540.00
	Generation of wastes	<ul style="list-style-type: none"> Contractor shall cooperate with MOE and local authorities within project site to organize and monitor the solid waste and wastewater, Contractor shall make/select an available landfill with appropriated location and number latrine for workers and staff should be suitable in accordance with waste management sub-degree, Provide sufficient garbage containers in construction camps. Camp should be restored to its original or better condition. 	Contractors Village/ Commune	MOE/PIU/PPIU	Construction cost
	Environment, Health and Safety of workers and community members	<ul style="list-style-type: none"> Prepare and adhere to safety management plan The Contractor will follow all safety working standards. Tools and equipment will be provided to protect against any dangers to project staff/workers as well as to local people. Clean (treated) water supply will be provided to the workers and staffs to use for domestic consumption. Treatment and protection health affect will be provided, e.g. health facilities, medicines, and medicine/doctor for examination and treatment of workers and local people to avoid the spread of disease from one people to other people. 	Contractor	MOE/PIU/PPIU	Construction cost

Project Activity	Potential Environmental Impacts	Proposed Mitigation/enhancement Measures	Institutional Responsibilities		Cost Estimates (USD)
			Implementing	Supervising	
		<ul style="list-style-type: none"> • Good collaboration with Kandaol health Center and Botum Sakor district, in Koh Kong province, and central levels to protect against any transmission of disease in and around the project area. • Contractor will cooperate with police and local authorities to protect against drug use or, trafficking in and around the project area. 			
	Traffic congestion	<ul style="list-style-type: none"> • Install traffic/warning signs like “safety first” at the construction area including fences or enclosures • Orient drivers to drive at low speeds, especially in market, school, hospital, urban areas. • Keep the roadway or bypass accessible to commuters to avoid traffic jam • park at designated area • Detour road should be provided and accessible to commuters • Temporary access of equipment and trucks must be established and approved by the sub-district officials. • Provide flag men on the crossing road esp. NR 48. 	Contractor	MOE/PIU/PPIU	Construction cost
	Cultural resources	<ul style="list-style-type: none"> • Actions defined in event of chance find 	Contractor	MOE/PIU/PPIU	Construction cost
	Removing 2,950 melaleuca trees	<ul style="list-style-type: none"> • Limited tree cut based on good design practice and environmental implication. • Replanting program to complement the loss of the melaleuca trees. 3,000 mangrove trees will be restored/replanted at along the Kandoal dike to compensate the loss of the melaleuca trees, while the BCC subproject also has other replanting program with area of 103.6 ha for enhancing natural habitat and biodiversity (Figure 11). 	Contractor/ MOE/PIU/PPIU	MOE/PIU/PPIU	Project cost

Project Activity	Potential Environmental Impacts	Proposed Mitigation/enhancement Measures	Institutional Responsibilities		Cost Estimates (USD)
			Implementing	Supervising	
Construction of concrete structure	Generation of waste such as wooden from works, cement packaging water from transit mixers materials, excess concrete from transit mixers, and wash	<ul style="list-style-type: none"> • Collect from works or disposal and keep in approved disposal sites or give to community for reuse as firewood. • Gather waste cement packaging materials for recycling or disposal in approved disposal areas. • Prohibit burning of wastes. • Prohibit the washing of cement transit mixer at the construction site including the disposal of excess concrete into water bodies, canals or sewers. • Ensure compliance with the effluent standards under sub-decree on water pollution control No. 27 ANRK.BK 1999 prior to disposal of liquid wastes. 	Contractor	MOE/PIU/PPIU	Construction cost
Workers' Camp	Solid and liquid waste	<p>The CEMP will include the following:</p> <ul style="list-style-type: none"> • Ensure a safe place and good living environment... • Ensure adequate housing and waste disposal facilities including pit latrines and garbage cans. • A solid waste collection program must be established and implemented that maintains a clean worker camps. • The site where solid waste will be deposited must be agreed by DoE. If the working site has waste collection Company, the contractor should use this service. • Separate pit latrines for male and female workers away from worker living and eating area. • A clean-out or infill schedule for pit latrines must be established and implemented to ensure working latrines are available at all times. • Worker camps must have adequate drainage. • Local food should be provided to worker camps. Guns and weapons not allowed in camps. 	Contractor	MOE/PIU/PPIU	Construction cost
Operation of Borrow area and spoil disposal	Dust, noise, soil runoff	<ul style="list-style-type: none"> • Use spoil disposal and borrow areas that are approved by Government 	Contractor	MOE/PIU/PPIU	Construction cost

Project Activity	Potential Environmental Impacts	Proposed Mitigation/enhancement Measures	Institutional Responsibilities		Cost Estimates (USD)
			Implementing	Supervising	
		<ul style="list-style-type: none"> Locate borrow areas at least 300m from human settlement areas with a maximum depth of 2 meters. Avoid quarries & spoil disposal sites that are susceptible to soil erosion such as long and steep slopes and restore the spoil disposal sites within one month after closure. The contractor should submit borrow area plan to MOE/PIU together with CEMP for approval 			
Cleaning and replanting the borrow areas	Replanting trees	<ul style="list-style-type: none"> Contractor needs to clean and replant the same trees in the borrow areas where have been used as worker camp and then return it back to the community or local authorities. 	Contractor	MOE/PIU/PPIU	Construction cost
Operation					
	Degraded water quality if agrochemicals (pesticides and fertilizers) are used	<ul style="list-style-type: none"> Avoidance of chemical fertilizers and pesticides as part of SRI protocols. Implement community awareness programs on the detrimental effects of agrochemicals on the environment. Encourage community to aware or apply organic fertilizers through pest management training. 	Village/ Commune		Operation costs
	Solid wastes may become entrapped near the sea dikes.	<ul style="list-style-type: none"> Implement community awareness program on proper solid waste management. 	Village/ Commune		Operation costs
	Health and safety of community members	<ul style="list-style-type: none"> Health and safety management plan 	Village/ Commune		Operation costs
	Over use and application of chemical fertilizers and pesticides.	<ul style="list-style-type: none"> Implement capacity building on pest management 	Village/ Commune		Operation costs
	Hunting wild animal and encroachment on forest/conservation area	<ul style="list-style-type: none"> Public awareness and patrol Install signs indicating zones of protected areas and permitted uses. 	Village/ Commune		Operation costs

Table 9: EMOp for Kandoal sea barrier subproject

Environmental Indicators	Location	Method & Frequency	Responsibility		Estimated Costs (USD)
			Verification	Implementation	
Pre-construction					
Setting up construction camp	Camp site	Checking against mitigation measures specified in this EMP and CEMP	MOE/PPIU/PIU	Contractor	Included in construction cost
CEMP		Prior to commencement of construction works	MOE/PIU	Contractor	
Construction Phase					
Surface water quality	Construction sites	Monthly checking against mitigation measures specified in this EMP, bi-annual surface water quality analyses	PPIU/PIU/NESS	Contractor	Included in construction cost = 388.00
Air quality and noise levels	Construction sites	Monthly checking against mitigation measures specified in this EMP, bi annual measurement of air pollution and noise levels	PPIU/PIU/NESS	Contractor	Included in construction cost = 3,540.00
Traffic	Construction sites	Weekly checking against mitigation measures specified in this EMP	PPIU/PIU/NESS	Contractor	Included in construction cost
Solid and liquid waste	Construction sites	Monthly checking against mitigation measures specified in this EMP	PPIU/PIU/NESS	Contractor	Included in construction cost
Biodiversity effects	Construction sites	Monthly checking against mitigation measures specified in this EMP	PPIU/PIU/NESS	Contractor	Included in construction cost
Worker and community health and safety	Implementation of Community and Occupational Health and Safety	Monthly checking against mitigation measures specified in this EMP	PPIU/PIU/NESS	Contractor	Included in construction cost

Environmental Indicators	Location	Method & Frequency	Responsibility		Estimated Costs (USD)
			Verification	Implementation	
Contamination of water, soil, waste production and social issues	Worker camp	Monthly checking against mitigation measures specified in this EMP	PPIU/PIU/NESS	Contractor	Included in construction cost
Damage on tree and hunting wild animal by workers/contractor	Construction sites	Weekly checking against mitigation measures specified in this EMP	PPIU/PIU/NESS	Contractor	Included in construction cost
Operation Phase					
Over use and application of chemical fertilizers and pesticides	Paddy and garden fields	Application of SIR methods and integrated pest management, bi-annual surface water quality analyses during the first year only	PPIU/PIU/MoE/Village/Commune	Contractor/DoE	Included in the implementation of the SIR, Water quality analyses = 388.00
Deterioration of the dike	Dike and associated structures/facilities	Monitoring and management of the dike and associated facilities	PPIU/Village/Commune	Subproject beneficiaries	Included in the subproject operation

G. COST ESTIMATES

102. Costs of environmental mitigation/enhancement measures and monitoring activities proposed for the pre-construction/construction phase will form part of the contractor's costs in his/her bid to undertake the construction of the subproject. Measures proposed in the operation and maintenance phase will be undertaken as part of the broader Project and be borne by the costs of implementation activities.

103. The estimated costs for staffing and mitigation/enhancement measures and monitoring activities during construction and operation presented in Table 16 below. The mitigation measures to be implemented during the construction and operation phase will be included in the construction contract of the contractor. Implementation of mitigation measures will be part of the construction costs and will be included in the Bill of Quantities (BOQ) as a monthly item for the implementation of the CEMP (see Table 16 below).

Table 10: Cost Estimates for EMP and EMoP Implementation

Description	Frequency	Amount (USD)	Lab Cost (USD)	Total (USD)
Pre-construction				
Baseline surface water quality	one time	200	200	200
Baseline air quality and noise levels	one time	1,770	1,770	1,770
Sub-Total				1,970
Construction				
Monitoring surface water quality	Bi-annual (every 6 months)	200	200	400
Monitoring air quality and noise level	Bi-annual (every 6 months)	1,770	1,770	3,540
Check to ensure that all safety prevention measures and traffic signage are installed	Monthly	Monitoring Fees for inspector (1,800\$/month x 9 persons)	0	16,200
Visual inspection and check all kind of material storage at construction sites and worker camps.	Monthly		0	
Visual inspection the solid waste disposal and waste management status, biodiversity and forest effects, workers health.	Monthly		0	
Sub-Total				20,140
Operation				
Monitoring water quality (ground and surface)	2 times/within first year only	200	200	400
Sub-Total				400
TOTAL				22,510

H. INSTITUTIONAL ARRANGEMENT AND RESPONSIBILITIES

104. The MoE delegates day-to-day BCCP implementation responsibilities to the General Directorate of Local Community (GDLC). The MoE has established a PIU, led by a Project Director and Project Manager responsible for the day-to-day implementation of project activities. The PIU is responsible for project management in target communes within the CPAs through the provincial Projected Area (PA) division in the MoE/PPIU. The PIU's responsibilities of works include financial management, technical advice on implementing project activities, monitoring and reporting, and procurement of goods, works, and recruitment of consultants, and general coordination in order to achieve project outputs. The PIU in GDLC will be responsible for project management in target communes with CPAs through the GDLC Cantonment offices in each PPIU. The MoE/PIU areas of work include financial management on implementing project activities, monitoring and reporting, and procurement of goods, works, and recruitment of consultants in order to achieve project.

105. A National Steering Committee is established for the GMS BCCP and meets twice a year to:

- (i) review project implementation progress;
- (ii) endorse project annual work plans and budgets; and
- (iii) provide overall policy and strategy guidance on the implementation of the Project.

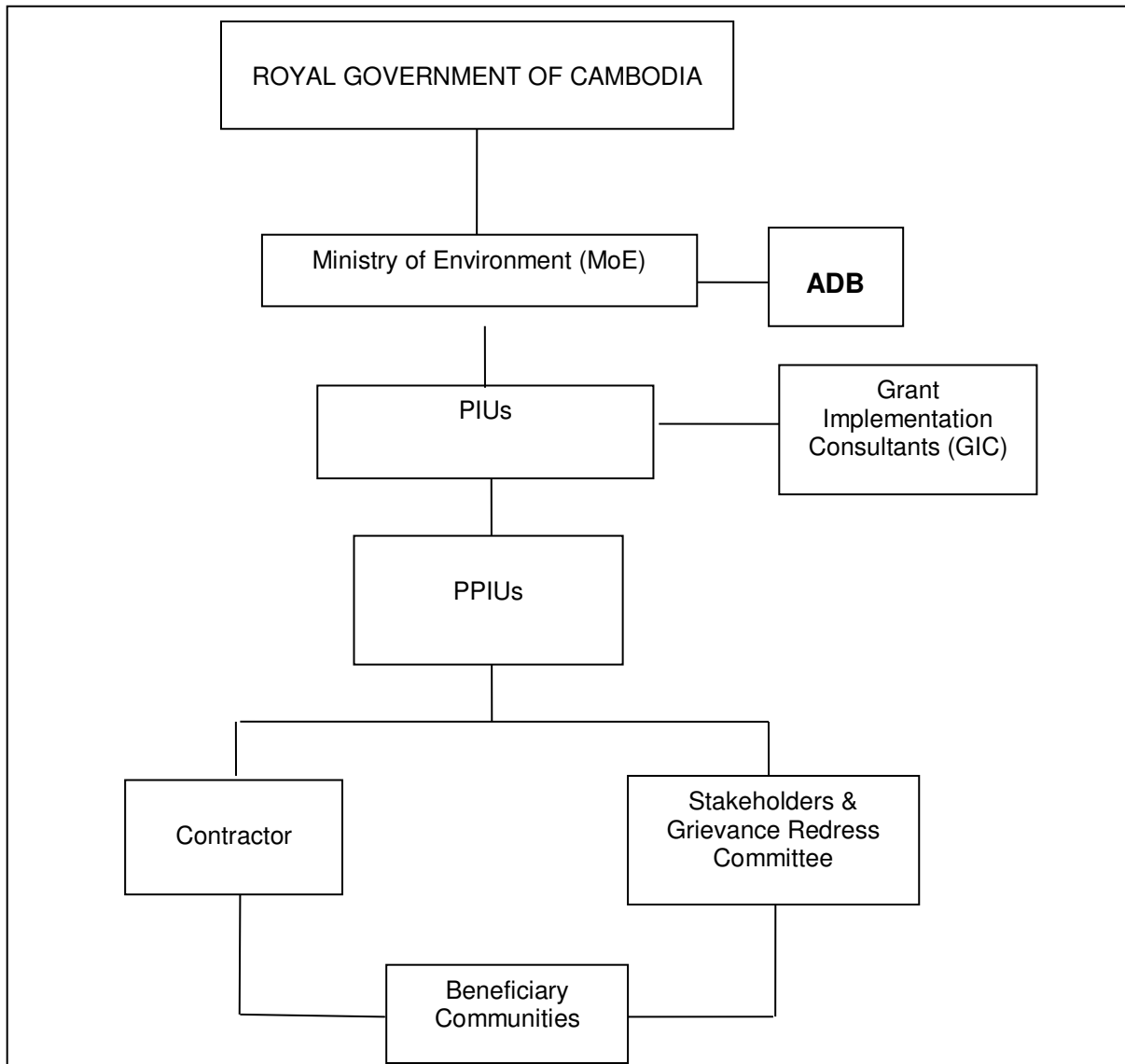
106. Technical implementation in the field is under the supervision of the assigned Project officers and consultants support the project officers to advise and assist in technical matters. The following Table summarizes organizations that will implement the BCCP, including the activities to be done under the Additional Financing (PPCR).

Table 11: Assigned authorities and responsibilities

Executing Agency	Responsibility
Ministry of Environment (MoE)	MoE will delegate its responsibility for day to day implementation to the GDLC. A PIU will be established under the GDLC, which will be responsible for: (i) technical oversight and policy guidance on implementation of project interventions in target communes with CPAs under its jurisdiction in Koh Kong province; (ii) administration of funds it receives for project activities at national level; (iii) technical guidance to provinces on implementing the activities in CPAs and communes with CPAs; (iv) submitting technical and financial reports on project interventions that are implemented directly by GDLC establish and manage first generation imprest accounts; (v) jointly recruit GIC consultants with the GDLC. (vi) procure required contracts for subproject
MoE Project Implementation Unit (PIU)	Management Roles and Responsibilities (i) Procure training services; (ii) Procure office equipment and vehicles; and (iii) Provide secretariat services to the NSC. GDLC will support the PPMUs in implementing GDLC activities in target communes and CPAs.

Implementing Agency	Responsibilities
Provincial Project Implementation Units - PPIU	<p>The PPIU consists of three teams: the provincial GDLC Cantonment, provincial Protected Area (PA) and PPMU director's team. The PPIU implements project activities at provincial level through the GDLC Cantonment, provincial PA, and PPMU director's team. These include:</p> <ul style="list-style-type: none"> ➤ community consultation and development activities; ➤ surveys/reports; ➤ community contracts ➤ CPA boundary marking ➤ CPA management plans ➤ CPA legal approvals ➤ CPA community patrols ➤ CPA nursery establishment ➤ CPA forest enhancement ➤ commune livelihood activities ➤ community CDFs ➤ small scale infrastructure ➤ environment safeguard activities ➤ social safeguard, gender, and indigenous person activities ➤ monitor implementation of project activities ➤ report on progress of implementation; and ➤ liaise with the District Coordinators
District Coordinators	<p>District Coordinators will be established within each participating district. The District Coordinators will assist in implementation at the district level.</p>
National Steering Committee (NSC)	<p>FA and MOE will appoint the two Co-Chairs of the NSC which will meet twice a year. The NSC will:</p> <ul style="list-style-type: none"> ➤ review Project implementation progress; ➤ endorse Project annual work plans and budgets ➤ provide overall policy guidance on the implementation of the Project
Financiers <ul style="list-style-type: none"> • Asian Development Bank 	<ul style="list-style-type: none"> ➤ Provides financing for the Project cost through an ADF Grant; ➤ Monitors project implementation arrangements, disbursement, procurement, consultant selection, and reporting; ➤ Monitors schedules of activities, including funds flow ➤ Reviews compliance with agreed procurement procedures; ➤ Reviews compliance with Grant covenants; ➤ Monitors effectiveness of safeguard procedures.
Project Implementation Organizations	Management Roles and Responsibilities
	<ul style="list-style-type: none"> ➤ monitor project conformity with ADB anti-corruption policies; ➤ undertake a periodic review mission; and ➤ undertake midterm project review jointly with the Government.

Figure 12: Organisational structure for environmental management



I. REPORTING ARRANGEMENTS

107. The schedule for submission and review of environmental management and monitoring reports are:

- (i) During pre-construction/construction, there will be submission of weekly reports by contractor to the Provincial Project Management Unit (PPIU) safeguard monitoring entity, monthly reports from the PPMU monitoring entity to the PIU with the assistance of the Project NESS and semi-annual reports from the PIU to ADB.
- (ii) During operation and maintenance, the submission of annual monitoring reports by the commune to the PPMU and CPCU safeguard monitoring entity with assistance of the NESS will continue and will focus on wildlife mortalities and health and safety incidences and outcomes.

108. Subproject monitoring results will be included in Project semi-annual reports for submission to ADB.

J. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

109. Public meetings and consultations were carried out at the provincial level and at the commune level with participation of the subproject beneficiaries of Andoung Tuek, and Kandaol communes. The 1st meeting was arranged by PIU/MOE and the second meeting was by the KECC Consultant. The first public meeting was conducted on 4 July 2017 at the provincial level was participated by the provincial officials, community leaders and Village Chief. A total of 41 stakeholders and beneficiaries attended the meeting including seven women.

110. The 2nd meeting was arranged as a focus group discussion (FGD) with Commune councils (CC) and APs on 2 August 2017 at Kandaol Commune Center. The purpose of the meeting was to ensure that the implementation of the proposed dike will not have adverse environmental impacts and no voluntary or involuntary settlements.

111. The 3rd meeting was arranged with CC and APs on 6th June 2018 at Community house in Prolean village. A series of public meetings with local authorities and people living within the subproject area were also conducted during the subproject design relating to resettlement, environment and social impacts in September 2017. The list of participants during the public meeting is attached in Annex 6.

112. Furthermore, the preparation of local community consultation should be continued for every stage of project design and implementation. Realistic impacts and issues will be updated and all impacts will be expediently mitigated. All such meetings encourage the full participation of the local communities.

113. The name lists people met in line agencies, stakeholders and local authorities during the public meeting/consultation is attached as Appendix B.

114. The public consultation was conducted to inform the subproject beneficiaries and other stakeholders about the proposed subproject, detailed engineering design and the potential environmental and social impacts and issues during construction and during the operation and maintenance of the subproject. The consultation process was undertaken with recommendations, suggestions, and issues were gathered and incorporated into the EMP. The subproject beneficiaries were happy and welcome the project implementation. The results of the consultation/meeting activities are summarized in the table below. The detailed issues raised and approach to addressing these issues is summarized in below.

Table 12: Summary of outcome of consultations

Issues raised including real and perceived environmental issues	Approach to addressing the issue as suggestion
<ul style="list-style-type: none">- Strongly supports and very welcome the project and would like to see it implemented as soon as possible.- Have been disseminated the Land Law, the right of registered land ownership and land owner license around the project area (rice field),- Willingness to contribution and closely co-operation with authorities and relevant stakeholders on providing land and trees along the project route within the project area,- At district and commune levels, they believe that the impact on the social and environmental resources are small,- There will be impact on water quality at work sites going downstream to the coastal area.- Safety Plan will be developed by the contractor to avoid potential traffic accidents at road crossing with National Road (NR) 48 and other	<ul style="list-style-type: none">- Provide all relevant data and information related to rice production, land uses and water uses within the project area.- They are to minimize the impacts as much as possible within and nearby residential areas (mostly in and nearby markets, and if possible, there is need to access road for transporting the construction material on existing roads because there is have less than of paddy rice fields and crops, etc.- Request to have enough of box culverts, pipe culverts and drainage structures due to in the past, there flooded existing in some places in this area,- Closely cooperate with DOE on environmental pollution control and replanting of trees along the alignment,- No cutting of sugar palm trees and other nationally protected species of trees,

Issues raised including real and perceived environmental issues	Approach to addressing the issue as suggestion
road intersections to be used to transport construction materials and construction wastes before commencement of works.	<ul style="list-style-type: none"> - Contractor should closely cooperate with the local authorities to provide information about working place, project site and dike alignment, workers' camp and works schedule before commencement of works to ensure the safety and security of the work area. - Regular watering to suppress dust dispersion during the dry periods.

115. On 10 September of 2018, a public consultation meeting was conducted on the Kandoal sea barrier sub-project, to provide information on its benefits, to conduct field validation including challenges and suggestions from beneficiaries in Prolean village of Kandaol commune located in Dong Peng Multiple Use Area. The public consultation meeting has been jointly organized and facilitated by the KECC deputy team leader, GIC environmental and social safeguard specialists with the assistance of the BCCP/MoE/PIU Project Manager and KKG/PPIU Provincial Project Coordinator, and KKG/PPIU livelihood officer together with the local authorities (village and commune) and project beneficiaries (see the attached list).

116. The consultation meeting included 53 participants (with 12 women) namely: four BCC/CPA/PIU/PPIU officers, one KECC staff, one Commune Chief, one CC representative, one Village Chief and the remaining participants were villagers who are beneficiaries of the subproject (list of consultation participants in the attachment).

117. The BCCP KKG/PPIU Provincial Coordinator of the Public Consultation welcomed and informed the participants the objective of the consultation/meeting. The meeting objective is mainly to discuss benefits of the construction of the Kandaol sea barrier, rights of villagers and community people in terms of having access to water in the proposed dike for their agricultural areas, the challenges including the actual socio-economic situation. As a result, the public consultation meeting has understood and agreed on the following points as below:

- 1) **Understanding the Kandaol sea barrier subproject:** The consultation participants understood the proposed subproject (the length of the dyke, its top and bottom widths, number of water gates and its culvers together with the land acquisition) and its potential benefits to their agricultural areas after proposed subproject description and detailed design explanation by the GIC social safeguards specialist and KECC deputy team leader. However, 30% of participants were still not clear about it, then they requested to see the demarcation.
- 2) **No impact on the individual farming land:** according to the map and its detailed design shown, the consultation participants together with local authorities (village and commune chiefs) confirmed that the proposed subproject will have no impact to the individual farm-land. Only two of consultation participants indicated that their farm-lands are located about 30m from the proposed subproject. However, they wish to see the demarcation.
- 3) **Field validation by the specialists and villagers:** In the afternoon session, the project specialists together with local authorities and villagers conducted field validation based on the demarcation. As a result, all confirmed that there is no impact on the individual farm-land due to the proposed subproject. Therefore, they also confirmed that they are happy with the subproject and then they hope they will get benefits from the proposed subproject such as the yield of agricultural production and yield of fresh water fish. The following pictures shown the activities of public consultation and field validation in the Kandaol sea barrier subproject.
- 4) **Some challenges related to rice production:** villagers and community people indicated that rice crops have been damaged by sea water influence in most years, so they wonder how the proposed dike can prevent the salinity.
- 5) **Specific norm or internal regulation for the Kandaol sea barrier:** Representatives of national and provincial BCC project, KECC and GIC team were able to confirm that the internal regulations are definitely required in order to operate and maintain the proposed subproject in

the long-term. This regulation shall be issued by the CPA together with the local authorities in line with the regulation of MOWRAM to allow the community and villagers to operate and maintain the dike in an effective and sustainable manner. The community consultation meeting has agreed that the specific norm or internal regulation shall establish, mainly for community people and villagers who normally have their farm land around the proposed subproject and furthermore this specific norm or internal regulation will accept by all stakeholders.

- 6) **Management of the proposed subproject:** The BCCP national manager, provincial coordinator, KECC staff and the GIC team members together with the local authorities including commune and village level confirmed that the proposed subproject shall be managed by CPA in collaboration with the local authority in line with the specific norm towards avoiding clashes among beneficiaries. In this regard, the BCCP and local authorities together with the BCCP specialist will assist in setting up the Farmer Water User Group (FWUG) to manage the dike. In addition, the BCCP also need to provide the training on FWUG roles and responsibilities to members and villagers. This group will be set up prior to the construction of the dike.

K. GRIEVANCE REDRESS MECHANISMS

118. A subproject grievance can be defined as an actual or perceived Project-related problem that gives ground for complaint by an affected person (AP). As a general policy, all of the PPCR subprojects will work proactively toward preventing grievances through the implementation of impact mitigation measures and community liaison activities that anticipate and address potential issues before they become grievances. Nevertheless, during construction and operation it is possible that unanticipated impacts may occur if the mitigation measures are not properly implemented, or unforeseen issues occur. In order to address complaints if or when they arise, a project Grievance Redress Mechanism (GRM) has been developed in accordance with ADB requirements and RGC practices. The GRM is a systematic process for receiving, evaluating and addressing Project-related grievances voiced by APs.

119. Any person affected by the Kandaol subproject will be able to submit a grievance if they believe a subproject activity is having a detrimental impact on the community, the environment, or on their quality of life. The GRM will be made public throughout the public consultation process and will be maintained during operation and maintenance.

120. **Informal Approach.** Informally, an AP can lodge a complaint directly to the Contractor, during pre-construction and construction or the affected person can lodge complaint to village and commune authorities. Then the village and commune authorities organize the public meeting to resolve the complaints within the same day. The contractor will also immediately inform the MoE/PPIU of the complaint. If possible, the contractor will rectify the problem within one day of the complaint. If not, the AP can go to the district level or BCCP/PPIU. The MoE/PPIU/district will screen the complaint within one day of receipt. If the screening reveals the complaint as Project-related and valid, the Contractor will act within three days from confirmation that the complaint is valid, by PPIU, if the problem was not rectified immediately. For at least one week after confirmation of completion, the MoE/PPIU must monitor the effectiveness of the action/resolution taken. After which, MoE/PPIU will secure a written confirmation of satisfaction from the AP.

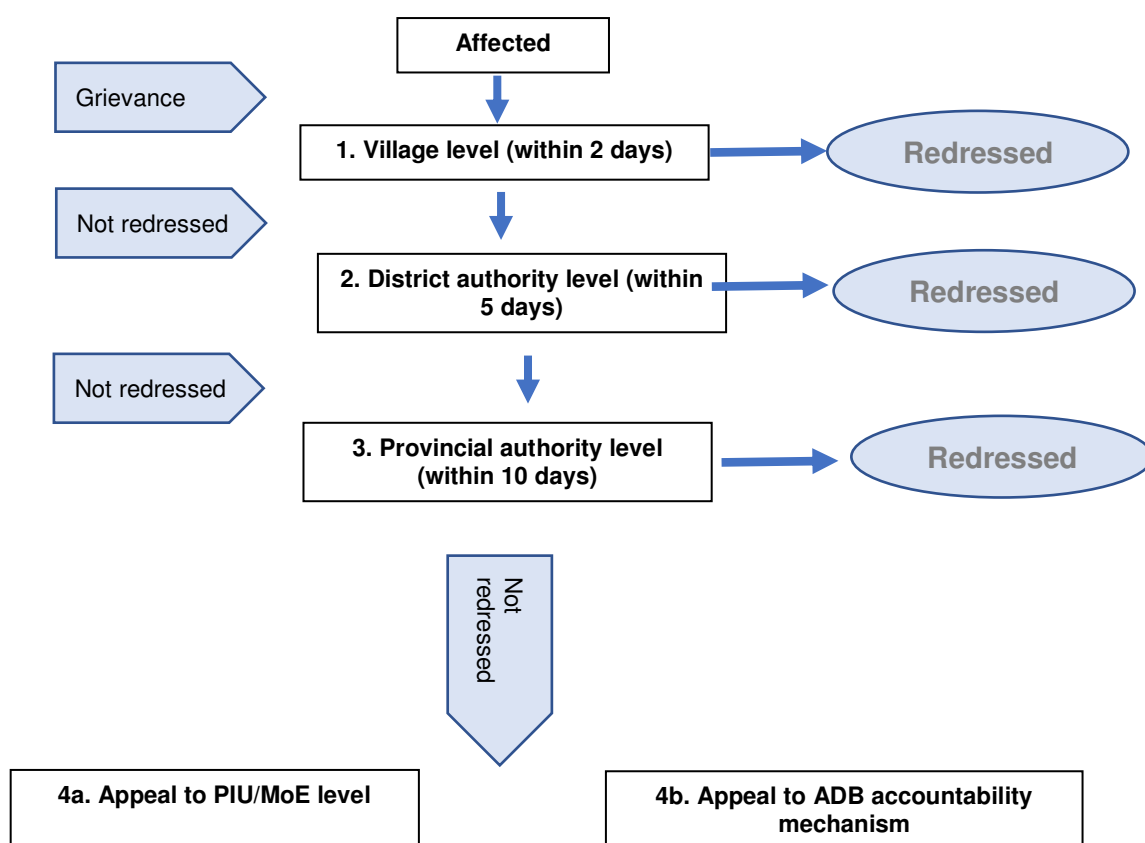
121. **Formal Approach.** In this case the GRM consists of four escalating levels, as shown below:

- **Village Level:** A grievance is submitted by the AP to the relevant Village Head or Commune Head. The Village Head and Commune Head forwards the grievance to the relevant MoE/PPIU. The PPIU Coordinator records it in writing, investigates the validity of the complaint, identifies potential solutions with the relevant District Team, and informs the MoE/PPIU. The Village Head and Commune Head also investigates the complaint and then invites the AP and District Team to a meeting to attempt to resolve the grievance. In case of the complaint cannot address within 2 days, the AP can submit the complaint to the district level.
- **District Level:** The District Administration investigates the complaint and then invites

the AP, PPIU Coordinator and the District team to a meeting to attempt to resolve the grievance. If the complaint cannot be addressed within five days, the AP can lodge a complaint to the responsible provincial government agency which will generally be the MoE/PPIU.

- **Provincial Level:** The MoE/PPIU will investigate the complaint and then invite the AP, National Project Director and Manager and PPIU Coordinator to a meeting to attempt to resolve the grievance. In any case that the complaint addressing is not accepted by the AP within 10 working days, then the AP can lodge the complaint to the national project management team called MoE/PIU.
- **National Level:** The MoE/PIU investigates the complaint and then invites the AP, MoE/PPIU and contractors together with local authorities to a meeting to attempt to address the complaints within 15 working days. If the complaint cannot address within that time, the AP can submit the complaint to the judicial level.
- **Judicial Level:** If the grievance remains unresolved the AP may advance the grievance to the judicial level for final resolution and settlement. All court fees will be borne by the Project. The AP may also choose to approach ADB under the Accountability Mechanism.¹

Figure 13: Grievance Redress Mechanism - Formal Approach



122. **Grievance follow up:** The relevant PPIU or PIU coordinators may contact the AP at a later stage to ensure that the activities continue to pose no further problems. IF there are remaining problems, the issue will be treated as a new grievance and re-enter the process.

123. **Accountability mechanism of ADB:** In addition, APs may always contact the

¹ The ADB Accountability Mechanism provides a forum where people adversely affected by ADB- assisted projects can voice and seek solutions to their problems and report alleged noncompliance of ADB's operational policies and procedures. It consists of two separate but complementary functions: consultation phase and compliance review phase. For more information see: <https://www.adb.org/site/accountability-mechanism/main>

Complaints Receiving Officer of ADB via the following address which will be included in the subproject signboard:

Complaints Receiving Officer, Accountability Mechanism Asian
Development Bank
ADB Headquarters, 6 ADB Avenue, Mandaluyong City 1550, Metro Manila,
Philippines
(+632) 632-4444 loc. 70309/(+632) 636 2086
amcro@adb.org

124. **Confidentiality and Anonymity:** An AP submitting a grievance may wish to Raise a concern in confidence. If the complainant asks the relevant PPIU or the PIU to protect his identity, it should not be disclosed without his/her consent.

L. FINDINGS AND RECOMMENDATIONS

125. The **IEE** has identified potential impacts and determined suitable mitigation measures together with a monitoring program. The timely and appropriate implementation of the proposed mitigation measures and the monitoring activities will avoid/reduce and eliminate the impacts. Hence no detailed EIA study is required for this project.

126. The overall assessment of the proposed Kandoal sea barrier Subproject poses no significant adverse impact to the environment and to the target beneficiaries. It would resolve existing environmental and socio-economic issues associated with the present condition and construction to improve the dike making it more resilient to climate change. It is anticipated that the proposed subproject will bring more benefits to the local people.

127. Two alternatives have been examined: anticipated conditions without the subproject; and, anticipated conditions with the subproject.

- **Without subproject:** Pressure on Melaleuca/mangrove forest resources, and fisheries are likely to remain under pressure in the Kandaol area due to a relatively low income derived from agricultural production and exacerbated by cumulative effects of other human activities in the area, notably by improved access provided by the rehabilitated highway (NR 48), immigration to the area and increased forest resource harvesting activities.
- **With subproject:** It is likely to reduce the pressure on Melaleuca trees and mangrove resources and promote fresh water fishery activities. This is anticipated due to increased income derived from agricultural and sustainable fish production. External pressures will continue to exist but assistance to the subproject provides an opportunity to increase community awareness in natural resources utilization through community-based mechanisms. Additional budgetary support will be required to enable these capacity building activities to be completed.

128. Based on the study, the subproject will provide many benefits directly in terms of improved livelihood and health, with reduced risk to life and properties. During the construction phase, a number of temporary negative impacts (e.g. dust, noise, vibration, reduced air quality, road safety, worker's safety, wastewater, solid waste, water contamination and traffic jam) will occur. However, those impacts can be minimized by the implementation of the recommended mitigation measures of the EMP.

129. To ensure the subproject impacts reduced to its minimum level the following must also be followed:

- The environmental mitigation measures and environmental monitoring and management plan, as presented in the IEE report and the EMP enclosed in the bid documents must be implemented properly.
- Good cooperation between all stakeholders, especially IA, EA and local authorities should be undertaken.
- Consultation with the local community should be implemented so that IAs can update concerns and issues during project construction and operation.
- Capacity building and public awareness program (related to pest management and natural resource conservation for local livelihood)

M. REFERENCES

- ADB (2009). Safeguard Policy Statement.
- ADB (2013). GMS Biodiversity Conservation Corridors Project, ADB TA 7459-REG: Initial Environmental Examination; Mangrove Restoration and Bioengineering Model Andoung Tuek Subproject.
- ADB (2017). Inception report for Grant No. 0426: GMS-BCC Project.
- ADB (2017). Aide Memoire Grant 0241-CAM and Grant 0426-CAM: GMS BCCP, Review Mission 16 – 27 October 2017
- RGC (2011). Statistical Yearbook of Cambodia
- Kandaol CC(2017). Statistical Data

Annex 1: Kandaol Sea Barrier Subproject Rapid Environmental Assessment Checklist

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

CAMBODIA-GMS Biodiversity Conservation Corridors Project-G0426-CAM-(SF)

Subproject Title:

Kandaol Sea Barrier Subproject. Koh Kong Province

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		√	The sub-project is located within the community development zone, no wetlands and special area for protecting biodiversity. The proposed dike alignment runs parallel along the estuarine and small (<10cm to 20cm) to medium (20+cm) and big (30+cm) <i>Melaleuca</i> trees were noted.
▪ Legally protected Area (core zone or buffer zone)	√		
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine	√		Control of turbidity, silt and sediment deposition included in the EMP of the subproject
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts Will the Project cause...			
▪ impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		√	
▪ disturbance to precious ecology (e.g. sensitive or protected areas)?		√	
▪ alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?	√		Mitigation measures are provided in the EMP of the subproject
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		Mitigation measures are provided in the EMP of the subproject

Screening Questions	Yes	No	Remarks
▪ increased air pollution due to project construction and operation?	✓		During the construction mitigation measures are provided in the EMP of the subproject
▪ noise and vibration due to project construction or operation?	✓		During the construction, Mitigation measures are provided in the EMP of the subproject
▪ involuntary resettlement of people? (physical displacement and/or economic displacement)		✓	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?	✓		Mitigation measures are provided in the EMP of the subproject
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	✓		Mitigation measures are provided in the EMP of the subproject
▪ social conflicts if workers from other regions or countries are hired?	✓		Contractor shall prioritize hiring of workers from the local commune
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Contractor shall prepare the risks and vulnerabilities related to occupational health and safety plan and will be included in the CEMP
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		Contractor shall prepare the community health and safety plan and will be included in the CEMP
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		Contractor shall prepare the community health and safety plan will be included in the CEMP
▪ generation of solid waste and/or hazardous waste?	✓		Contractor shall prepare a solid waste and hazardous waste management plan will be included in the CEMP
▪ use of chemicals?	✓		Mitigation measures are provided in the EMP of the subproject
▪ generation of wastewater during construction or operation?	✓		Mitigation measures are provided in the EMP of the subproject

Annex 2: Checklist for Preliminary Climate Risk Screening

Country/Project Title: CAMBODIA-GMS Biodiversity Conservation Corridors Project-G0426-CAM-(SF)

Subproject Title: Kandaol Sea Barrier Subproject. Koh Kong Province

Sector:

Subsector:

Division/Department:

Screening Questions		Score	Remarks ¹
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	0	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	1	The projected climate change in Koh Kong Province include increase in rainfall events and flooding as well as prolonged periods of droughts.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high-risk project.

Result of Initial Screening (Low, Medium, High): Low

Other Comments: _____

Prepared by:

¹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Annex 3: Sub-Decree No 72 ANRK. BK. Date 11 August 1999

No.	Type and activities of the projects	Size / Capacity
A	Industrial	
I	Foods, Drinks, Tobacco	
1.	Food processing and caned	≥ 500 Tones/year
2.	All fruit drinks manufacturing	≥ 1,500 Litres / day
3.	Fruit manufacturing	≥ 500 ones/year
4.	Orange Juice manufacturing	All sizes
5.	Wine manufacturing	All sizes
6.	Alcohol and Beer brewery	All sizes
7.	Water supply	≥ 10,000 Users
8.	Tobacco manufacturing	≥ 10,000 Boxes/day
9.	Tobacco leave processing	≥ 350 Tones/ year
10.	Sugar refinery	≥ 3,000 Tones / year
11.	Rice mill and cereal grains	≥ 3,000 Tones / year
12.	Fish, soy bean, chili, tomato sources	≥ 500,000 Litres/ year
II.	Leather tanning, Garment and Textile	
1.	Textile and dyeing factory	All sizes
2.	Garments, washing, printing, dyeing	All sizes
3.	Leather tanning, and glue	All sizes
4.	Sponge- rubber factory	All sizes
III.	Wooden production	
1.	Plywood	≥ 100,000m ³ /year(log)
2.	Artificial wood	≥ 1,000 m ³ /year (log)
3.	Saw mill	≥ 50,000m ³ /year (log)
IV.	Paper	
1.	Paper factory	All sizes
2.	Pulp and paper processing	All sizes
V.	Plastic, Rubber and Chemical	
1.	Plastic factory	All sizes
2.	Tire factory	≥ 500 Tones /year
3.	Rubber factory	≥ 1,000 Tones /year
4.	Battery industry	All sizes
5.	Chemical production industries	All sizes
6.	Chemical fertilizer plants	≥ 10,000 Tones /year
7.	Pesticide industry	All sizes
8.	Painting manufacturing	All sizes
9.	Fuel chemical	All sizes
10.	Liquid, powder, solid soaps manufacturing	All sizes
VI	<i>Mining production other than metal</i>	
1.	Cement industry	All sizes
2.	Oil refinery	All sizes
3.	Gas factory	All sizes
4.	Construction of oil and gas pipeline	≥ 2 Kilometres
5.	Oil and gas separation and storage facilities	≥ 1,000,000 Litres
6.	Fuel stations	≥ 20,000 Litres
7.	Mining	All sizes
8.	Glass and bottle factory	All sizes
9.	Bricks, roofing tile manufacturing	150,000 piece /month
10.	Flooring tile manufacturing	90,000 piece /month
11.	Calcium carbide plants	All sizes
12.	Producing of construction materials(Cement)	900 tones/month
13.	Cow oil and motor oil manufacturing	All sizes
14.	Petroleum study research	All sizes
VII	<i>Metal industries</i>	

No.	Type and activities of the projects	Size / Capacity
1.	Mechanical industries	All sizes
2.	Mechanical storage factory	All sizes
3.	Mechanical and shipyard enterprise	All sizes
VIII	<i>Metal Processing Industrials</i>	
1.	Manufacturing of harms, barbed wires, nets	≥ 300 Tones/month
2.	Steel mill, Irons, Aluminum	All sizes
3.	All kind of smelting	All sizes
IX	<i>Other Industries</i>	
1.	Waste processing, burning	All sizes
2.	Waste water treatment plants	All sizes
3.	Power plants	≥ 5 MW
4.	Hydropower	≥ 1 MW
5.	Cotton manufacturing	≥ 15 Tones/month
6.	Animal's food processing	≥ 10,000 Tones/year
B.	AGRICULTURE	
1.	Concession forest	≥ 10,000 Hectares
2.	Logging	≥ 500 Hectares
3.	Land covered by forest	≥ 500 Hectares
4.	Agriculture and agro-industrial land	≥ 10,000 Hectares
5.	Flooded and coastal forests	All sizes
6.	Irrigation systems	≥ 5,000 Hectares
7.	Drainage systems	≥ 5,000 Hectares
8.	Fishing ports	All sizes
C.	TOURISM	
1.	Tourism areas	≥ 50 Hectares
2.	Goal field	≥ 18 Holes
D.	INFRASTRUCTURE	
1.	Urbanization development	All sizes
2.	Industrial zones	All sizes
3.	Construction of bridge-roads	≥ 30 Tones weight
4.	Buildings	Height ≥ 12 m or floor ≥ 8,000 m ²
5.	Restaurants	≥ 500 Seats
6.	Hotels	≥ 60 Rooms
7.	Hotel adjacent to coastal area	≥ 40 Rooms
8.	National road construction	≥ 100 Kilometres
9.	Railway construction	All sizes
10.	Port construction	All sizes
11.	Airport construction	All sizes
12.	Dredging	≥ 50,000 m ³
13.	Damping site	≥ 200,000 people

Note: List of the Projects Require an IEIA or EIA

Annex 4: Field Photos for Kandaol Sea Barrier Subproject (July - Dec 2017)



Photo 1: Public Consultation Meeting with Local Authorities, relevant departments in KK, July 2017



Photo 2: Public Consultation Meeting with Local Authorities, relevant departments in KK, July 2017



Photo 3: Discussion Meeting with Commune Councils of in Kandaol commune, on July 2017



Photo 4: Public Consultation Meeting with Villagers and Village Chief at Prolean village, date: 15/12/2017



Photo 5: Starting point of Kandaol Sea Barrier at PK 0+000 from existing Kandaol Sea Barrier



Photo 6: The existing Sea Barrier of Kandaol is available for traverse by motorizes



Photo 7: Within the catchment area of Kandaol Sea Barrier Subproject, 390ha, Dec. 2017



Photo 8: Within the catchment area of Kandaol Sea Barrier Subproject, 390ha, Dec. 2017

Photos for Public Consultation in Prolean Village, Kandaol Sea Barrier Subproject (07 June 2018)



Annex 5: Cambodian standards for water quality, noise and air quality

Surface water quality

No.	Parameters	Unit	MIME DWQS
1	pH	-	6.5 – 8.5
2	Temperature	°C	-
3	Total Suspended Solid (TSS)	mg/l	25 - 100
4	Total Dissolved Solid (TDS)	mg/l	800
5	Dissolved Oxygen (DO)	mg/l	2.0 – 7.5
6	Turbidity	NTU	5
7	Alkalinity	mg/l	-
8	Total Hardness	mg/l	300*
9	Nitrite (NO ₂)	mg/l	3
10	Nitrate (NO ₃)	mg/l	50
11	Sulphate (SO ₄)	mg/l	-
12	Fluoride (F)	mg/l	-
13	Chloride (Cl)	mg/l	250
14	Ammonium (NH ₄)	mg/l	-
15	Sulphide (S)	mg/l	-
16	Color	TCU	5
17	Biochemical Oxygen Demand(BOD)	mg/l	1.0 – 10.0
18	Chemical Oxygen Demand (COD)	mg/l	-
19	Total Phosphorus (TP)	mg/l	-
20	Cyanide (CN)	mg/l	0.07
21	Aluminum (Al)	mg/l	-
22	Arsenic (As)	mg/l	0.05
23	Cadmium (Cd)	mg/l	0.003
24	Chromium (Cr)	mg/l	0.05
25	Copper (Cu)	mg/l	1
26	Iron (Fe)	mg/l	0.3
27	Lead (Pb)	mg/l	0.01
28	Manganese (Mn)	mg/l	0.1
29	Mercury (Hg)	mg/l	0.001
30	Selenium (Se)	mg/l	0.01
31	Zinc (Zn)	mg/l	3
32	Total Coliform	Count/100 ml	0
33	E-Coli	MPN/100 ml	0

MIME DWQS – Ministry of Industry Mines and Energy, Drinking Water Quality Standard, January 2004

* Hardness is expressed as mg/L CaCO₃

Water Quality Standards in public water areas for bio-diversity conservation

No.	Parameter	Unit	Standard Value
River			
1	pH	mg/l	6.5 – 8.5
2	BOD ₅	mg/l	1 – 10
3	Suspended Solid	mg/l	25 – 100
4	Dissolved Oxygen	mg/l	2.0 – 7.5
5	Coli-form	MPN/100ml	< 5000
River			
1	pH	mg/l	6.5 – 8.5
2	COD	mg/l	1 – 8
3	Suspended Solid	mg/l	1 – 75
4	Dissolved Oxygen	mg/l	2.0 – 7.5
5	Coliform	MPN/100ml	< 1000
6	Total Nitrogen	mg/l	0.1 – 0.6
7	Total Phosphorus	mg/l	0.005 – 0.05
River			
1	pH	mg/l	7.0 – 8.3
2	COD	mg/l	2 – 8
3	Dissolved Oxygen	mg/l	2 – 7.5
4	Coliform	MPN/100ml	< 1000
5	Oil Content	mg/l	0
6	Total Nitrogen	mg/l	0.2 – 1.0
7	Total Phosphorus	mg/l	0.02 – 0.09

Source: Sub-degree on Water Pollution Control, 1999

Maximum permitted noise levels in public and residential area (dB (A))

No.	Place	Period		
		06:00 to 18:00	18:00 to 22:00	22:00 to 06:00
1	Silence Area Hospital Library School Nursery	45	40	35
2	Resident Area Hotel Administration place House	60	50	45
3	Commercial, Services Areas and mix	70	65	50
4	Small Industrial factories intermingling in residential areas	75	70	50

Source: Sub-degree on Air Pollution Control and Noise Disturbance, 2000

Remarks: This standard is applied to control of noise level of any source of activity that emitted noise into the public and residential areas.

Vehicle noise in public and residential area maximum permitted noise level

No.	Category of vehicle	Maximum noise level permitted (dB(A))
1	Motorcycles, cylinder capacity (CC) of the engine does not exceed 125cm ³	85
2	Motorcycles, CC of the engine exceed 125cm ³	90
3	Motorize tricycles	90
4	Cars, taxi, passenger vehicle for the carriage of not more than 12 passengers	80
5	Passenger vehicle constructed for carriage of more than 12 passengers	85
6	Truck permitted maximum weight does not exceed 3.5 tones	85
7	Truck permitted maximum weight does not exceed 3.5 tones	88
8	Truck engine is more than 150 KW	89
9	Tractor or any other truck not elsewhere classified of described in this column of the table	91

Source: Air Pollution Control and Noise Disturbance, 2000

Remark: This standard is applied to control of noise emission standard for all kind of vehicle when operating on the public road.

Ambient Air Quality Standard

No.	Parameters	Period Average mg/m ³ 1h	Period Average mg/m ³ 8h	Period Average mg/m ³ 24h	Period Average mg/m ³ 1year
1	Carbon monoxide (CO)	40	20	-	-
2	Nitrogen dioxide (NO ₂)	0.3	-	0.1	-
3	Sulfur dioxide (SO ₂)	0.5	-	0.3	0.1
4	O zone (O ₃)	0.2	-	-	-
5	Lend (Pb)	-	-	0.005	-
6	Total Suspended Particulate (TSP)	-	-	0.33	0.1

Annex 6: list of participants

បទដ្ឋានអភិវឌ្ឍន៍ស្តីពីជំនួយបច្ចេកទេស លេខ ០៤២៦

គម្រោង ប្រកបដោយអភិវឌ្ឍន៍បច្ចេកទេស

ប្រព័ន្ធប្រតិបត្តិការទឹកស្រោច-ទំនប់ទឹកប្រែ

រៀបចំដោយ៖ ក្រសួងបរិស្ថាន

ថ្ងៃទី០២ ខែ០៤ ឆ្នាំ ២០១៧

បញ្ជីអ្នកចូលរួម

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	អាសយដ្ឋានទំនាក់ទំនង			ហត្ថលេខា
					ទូរស័ព្ទ	ឃ្លី	ទូរស័ព្ទ	
១	ហ៊ុក ឈឹម	ប	ប្រធានគម្រោង	KEC/KCC			012753561	
២	លុះ ប៊ុលសារី	ប	អគ្គនាយក	KECC/KCC			09632130	
៣	គឹម សំបូរ	ប	អគ្គនាយកប្រចាំ	KECC/KCC			077516626	
៤	គឹម សំ	ប	អគ្គនាយក	ក្រសួងបរិស្ថាន	ភ្នំពេញ	កណ្តាល	0965073737	
៥	ស៊ុន គុណា	ប	ប្រធានគម្រោង	ក្រសួងបរិស្ថាន			05595822	
៦	គាត់ ឈឹម	ប	—	—	—	—	093332131	
៧	ស៊ុន ឈ	ប	ប្រធានគម្រោង	KECC/KCC			012754156	
៨	គឹម ឈឹម	ប	គម្រោង	ក្រសួង			081579026	
៩	—	—	—	—	—	—	—	—
១០	គាត់ ឈឹម	ប	ប្រធានគម្រោង	ក្រសួងបរិស្ថាន	ក្រសួងបរិស្ថាន	កណ្តាល	0839348553	
១១	គាត់ ឈឹម	ប	ប្រធានគម្រោង	ក្រសួងបរិស្ថាន	ក្រសួងបរិស្ថាន	កណ្តាល	0979820016	
១២	គឹម សំ	ប	អគ្គនាយកប្រចាំ	ក្រសួងបរិស្ថាន	ក្រសួងបរិស្ថាន	កណ្តាល	0977093377	
១៣	គឹម សំ	ប	ប្រធានគម្រោង	ក្រសួងបរិស្ថាន	ក្រសួងបរិស្ថាន	—	—	
១៤	គាត់ ឈឹម	ប	—	—	—	—	—	
១៥	គាត់ ឈឹម	ប	—	—	—	—	—	
១៦	—	—	—	—	—	—	—	—

Field Environmental Assessment for project design (07 June 2018), (24 female, 12 male)

No.	Khmer Name	English Name	Sex	Position/ Role	Village	Phone
1	ទីកង់	Ty Kong	F	Farmer	Prolean	
2	ហាន់ អឹម	Han Im	F	Farmer	Prolean	
3	មាស ហៀង	Meas Heang	F	Farmer	Prolean	
4	សំ រឹម	Sam Reum	F	Farmer	Prolean	
5	សំ មន	Sam Morn	F	Farmer	Prolean	
6	ម៉ឿង គឹមអ៊ុំ	Moeung Kim Y	F	Farmer	Prolean	
7	កៅ ឡាំង	Kao Laing	F	Farmer	Prolean	
8	ហេង លី	Heng Ly	F	Farmer	Prolean	
9	មាស ផុន	Meas Phon	F	Farmer	Prolean	
10	រុន អែត	Run Aeth	F	Farmer	Prolean	
11	ផៅ សូភ័ណ្ឌ	Phao SoPhorn	F	Farmer	Prolean	
12	តឹក តូច	Tuek Touch	M	Farmer	Prolean	
13	ប្រឹង នាង	Proeung Neang	M	Farmer	Prolean	
14	ទី ឌឿន	Ty Doeun	M	Farmer	Prolean	
15	យុង រុច	Khong Roch	M	Farmer	Prolean	
16	ឡុង សុវណ្ណារិទ្ធ	Long Sovannarith	M	BCC/PPIU	KKG	012551257
17	រ៉េត ឆាក់	Reth Chak	F	Farmer	Prolean	
18	សំ ឆាវ	Sam Chav	F	Village Vice-Chief	Prolean	081980497
19	ឡុង ម៉ឿន	Long Moeun	F	Farmer	Prolean	
20	ជា ស្រីរត្ន	Chea Srey Roth	F	Farmer	Prolean	
21	ម៉ាក់ រឿន	Mak Roeun	F	Farmer	Prolean	
22	មិន កៀន	Min Kean	F	Farmer	Prolean	
23	សៀង មុំ	Soeung Mom	F	Farmer	Prolean	
24	ម៉ាក់ រួន	Mak Run	F	Farmer	Prolean	
25	ហៀវ ហុន	Heav Hun	F	Village Vice-Chief	Prolean	0964514512
26	បិន យឹង	Bin Yoeung	M	Farmer	Prolean	
27	យិន ហឿន	Yin Hean	F	Farmer	Prolean	
28	ចិន សុភាក់	Chin Sopheak	M	Farmer	Prolean	
29	យូត ស្មាច់	Yuth Smach	F	Farmer	Prolean	
30	សាញ់ ស្រី	Sanh Srey	F	Farmer	Prolean	

31	ឡុង ស៊ីម	Long Sim	M	Community Chief	Prolean	0977493389
32	ឆីង ង៉េ	Choeung Nge	M	Commune Chief	Prolean	0965073737
33	ម៉ឿន ស្រីណុច	Moeun Sreynoch	F	Admin/Secretary	PNH	012858967
34	ហៀក ព្រីង	Heak Pring	M	Sociologist	PNH	012753561
35	ឈរ រដ្ឋា	Chhor Ratha	M	Site Inspector	PNH	099612944
36	ឈុន ប៊ុណ្ណារិន	Chhun Bunnarinn	M	DTL/BCCP	PNH	017432130

ថ្ងៃទី៧ មិថុនា ឆ្នាំ ២០១៨

បង្កើនអ្នកចូលរួម

ល.រ	ឈ្មោះ	ភេទ	គូនាមី	ស្ថាប័ន	អាសយដ្ឋានទំនាក់ទំនង			ហត្ថលេខា
					ទូរស័ព្ទ	លេខ	ទូរស័ព្ទ	
១	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
២	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
៣	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
៤	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
៥	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
៦	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
៧	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
៨	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
៩	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ
១០	ឈ្មោះ	ស្រី	ឈ្មោះ		១២៣៤	៥៦៧៨		ឈ្មោះ

[illegible]

List of Participant During the Kandaol Sea Barrier Subproject Public Consultation (Sept. 10, 2018)

12	23	3	5.11	1-5000	
13	24	3	11	11	
14	25	3	11	11	
15	26	3	11	11	
16	27	3	11	11	
17	28	3	11	11	
18	29	3	11	11	
19	30	3	11	11	
20	31	3	11	11	
21	32	3	11	11	
22	33	3	11	11	
23	34	3	11	11	
24	35	3	11	11	
25	36	3	11	11	
26	37	3	11	11	
27	38	3	11	11	
28	39	3	11	11	

12	22 30	23	5.11	1-5000	
13	22 30	23	-11-	-11-	
14	22 30	23	-11-	-11-	
15	22 30	23	-11-	-11-	
16	22 30	23	-11-	-11-	
17	22 30	23	-11-	-11-	
18	22 30	23	-11-	-11-	
19	22 30	23	-11-	-11-	
20	22 30	23	-11-	-11-	
21	22 30	23	-11-	-11-	
22	22 30	23	-11-	-11-	
23	22 30	23	-11-	-11-	
24	22 30	23	-11-	-11-	
25	22 30	23	-11-	-11-	
26	22 30	23	-11-	-11-	
27	22 30	23	-11-	-11-	
28	22 30	23	-11-	-11-	

29	ក្រុង បា	ប		ក្រុង	
30	ក្រុង បា	ប		- 11 -	
31	ក្រុង បា	ប		- 11 -	
32	ក្រុង បា	ប		- 11 -	
33	ក្រុង បា	ប		- 11 -	
34	ក្រុង បា	ប		ក្រុង	
35	ក្រុង បា	ប		- 11 -	
36	ក្រុង បា	ប		- 11 -	
37	ក្រុង បា	ប		- 11 -	
38	ក្រុង បា	ប		- 11 -	
38	ក្រុង បា	ប		- 11 -	
		សរុប	38		

សាក្សី និងអ្នកទទួលខុសត្រូវ
ឈ្មោះ និងហត្ថលេខាប្រធានក្រុម

[Signature]
៩០៥០៣៦

ឈ្មោះ ហត្ថលេខា និងត្រាមេរៀន




និង ថ្ងៃ

ហត្ថលេខាអ្នករៀបចំកិច្ចពិគ្រោះយោបល់

[Signature]
៩០៥០៣៦

Annex 7: Letter of Approval from MoE for Kandoal sub-project



ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

អគ្គនាយកដ្ឋានគាំពារបរិស្ថាន

លេខ: ១៦៤ គណបស្ថ

ជម្រាបជូន

លោកនាយកគម្រោងរៀបចំអភិវឌ្ឍន៍វារៈចម្រុះមហាអនុតំបន់មេគង្គ

កម្មវត្ថុ : ករណីសំណើសុំផ្តល់លិខិតគាំទ្រ និងផ្តល់យោបល់លើរបាយការណ៍វាយតម្លៃហេតុប៉ះពាល់បរិស្ថាន និងសង្គម (IEE) និងផែនការគ្រប់គ្រងបរិស្ថាននៃទំនប់ការពារទឹកប្រៃ ប្រព័ន្ធធារាសាស្ត្រ និង ស្រះទឹកនៅខេត្តកោះកុង និងខេត្តមណ្ឌលគីរី

យោង :

- ព្រះរាជក្រមលេខ នស/រកម/១២៩៦/៣៦ ចុះថ្ងៃទី២៤ ខែធ្នូ ឆ្នាំ១៩៩៦ ដែលប្រកាសឱ្យប្រើច្បាប់ស្តីពីកិច្ចការពារបរិស្ថាន និងការគ្រប់គ្រងធនធានធម្មជាតិ
- អនុក្រឹត្យលេខ ៧២ អនក្រ.បក ចុះថ្ងៃទី១១ ខែសីហា ឆ្នាំ១៩៩៩ ស្តីពីកិច្ចដំណើរការវាយតម្លៃហេតុប៉ះពាល់បរិស្ថាន
- លិខិតលេខ ០៥៨ PIU-GDLC/MoE ចុះថ្ងៃទី១៩ ខែមីនា ឆ្នាំ២០១៨ របស់គម្រោងរៀបចំអភិវឌ្ឍន៍វារៈចម្រុះមហាអនុតំបន់មេគង្គ

សេចក្តីជូនដំណឹងត្រូវបានផ្តល់ជូនដោយលោកនាយក គម្រោងសាងសង់ និងជួសជុល (ក) ទំនប់ការពារទឹកប្រៃប្រវែង ៥,៨០៣គីឡូម៉ែត្រ ស្ថិតនៅឃុំអណ្តូងទឹក និងប្រវែង ៥,២៩៥គីឡូម៉ែត្រ ស្ថិតនៅឃុំកណ្តាលនៃខេត្តកោះកុង (ខ) ប្រព័ន្ធធារាសាស្ត្រស្រោចស្រពលើផ្ទៃដីទំហំ ១២១ហិកតា ស្ថិតនៅស្រែជ្រៃ ស្រុកកោះញែក ខេត្តមណ្ឌលគីរី និង (គ) ស្រះទឹកចំនួន ១១ ស្ថិតនៅខេត្តកោះកុង និងខេត្តមណ្ឌលគីរី មិនស្ថិតក្នុងតារាងឧបសម្ព័ន្ធនៃអនុក្រឹត្យលេខ ៧២ អនក្រ.បក ចុះថ្ងៃទី១១ ខែសីហា ឆ្នាំ១៩៩៩ ស្តីពីកិច្ចដំណើរការវាយតម្លៃហេតុប៉ះពាល់បរិស្ថាន។ ដូច្នេះ គម្រោងខាងលើមិនតម្រូវឱ្យមានការរៀបចំរបាយការណ៍វាយតម្លៃហេតុប៉ះពាល់បរិស្ថានទេ។


អាស្រ័យដ្ឋានជម្រាបជូនខាងលើ សូម លោកនាយក គម្រោងជាព័ត៌មាន។

សូម លោកនាយក ទទួលនូវសេចក្តីរាប់អានដ៏ស្មោះពីខ្ញុំ។


ថ្ងៃទី ៩ ខែ កក្កដា ឆ្នាំ ២០១៨ ល.ស.ប.៥៦១

រាជធានីភ្នំពេញ ថ្ងៃទី ២៣ ខែ កក្កដា ឆ្នាំ ២០១៨

អគ្គនាយក



សហ-លោក



អគ្គនាយកដ្ឋានគាំពារបរិស្ថាន អគ្គនាយកដ្ឋានគាំពារបរិស្ថាន អគ្គនាយកដ្ឋានគាំពារបរិស្ថាន អគ្គនាយកដ្ឋានគាំពារបរិស្ថាន

កូដលេខ: ០២៣-២១៣ ៩០៨