TECHNICAL COOPERATION PROJECT
FOR
AGRICULTURE DEVELOPMENT
IN
PHAN RI - PHAN THIET PHASE 2
(TC-PRPT Phase-2)

INITIAL ENVIRONMENTAL EXAMINATION (IEE) REPORT

August 2015

JICA VIETNAM OFFICE

Table of Contents

1. INTRODUCTION

1.1. Project Title

Technical Cooperation Project for Agriculture Development in Phan Ri – Phan Thiet (Phase-2) (TC-PRPT Phase-2)

1.2. Project Proponent/Owner

Japan International Cooperation Agency (JICA) in Vietnam

Address: 11th Floor, Corner Stone Building, 16 Phan Chu Trinh Street, Hoan Kiem District, Hanoi, Viet Nam

1.3. Type of Project

Type of project: a technical cooperation project for agriculture development

The project shall include improvement of agricultural productivity, modernization of agricultural infrastructure and effective use and preservation of natural resources.

1.4. Categorization and IEE/EIA Requirement

Categorization: Category B.

According to JICA Guidelines for Environmental and Social Considerations (2010), the project is classified as Category B. The project is not likely to have significant adverse impacts on the environment and society in terms of its sectors, characteristics, and areas. Generally, potential adverse impacts of the project are site-specific; and in most cases, normal mitigation measures can be designed more readily.

IEE/EIA requirement: IEE is required in accordance with JICA Guidelines for Environmental and Social Considerations (2010) for projects of Category B.

According to the Vietnam EIA regulation, Decree No 80/2006/ND-CP, PRPTIP was provided the Environmental Approval by Department of Natural Resources and Environment (DONRE) under Binh Thuan PPC. Therefore, in case of on-farm canal development in TC-PRPT Phase-2, it is not necessary to acquire any specific environmental approval.

1.5. Implementation of Initial Environmental Examination

The organization in charge of implementation of Initial Environmental Examination (IEE) is Nippon Koei Vietnam International Co., Ltd.. The members of IEE Study team are listed in Table 1-1.

Table 1-1 Member of IEE Study Team

Name of Organization	Name	Position	Background	Year of Experience
JICA Vietnam Office	Mr. Satoshi Yamamoto	Project Formulation Advisor	Professional Engineer (JP) (Environment Engineering) 1st Class of Engineering Operation & Management Engineering M. Sc. (Recycling and Eco-technology) B. Sc. (Civil Engineering)	19 years
Nippon Koei Vietnam International Co., Ltd.	Mr. Bui Xuan Tung	EIA expert	Ph.D. (Environmental Science & Engineering) M.Sc. (Environmental Science & Engineering) B.Sc. (Chemistry)	11 years

1.6. Objectives of IEE study

The main objective of the IEE study is to identify and assess the impacts of the project to the environment (air, water, soil, bottom sediment), natural environment (ecology, hydrology, topography, geology), and social environment within the project area. The specific objectives of the IEE study include:

i) To identify major issues that may arise as a result of proposed works on natural environment and social environment of the project area.
ii) To recommend practical and site specific environment management plan for the project, and
iii) To make sure that IEE is sufficient for the proposed project.

1.7. Methodology

The assessment of environmental and social considerations for construction and operation stages of the project would rely on the following information:

i) The objectives and proposed activities of the project,
ii) Environmental baseline and existing social conditions for the project area,
iii) Practical experience from activities of Phase 1 of the project, and
iv) General Environmental, Health and Safety (EHS) Guidelines of International Finance Corporation (IFC) as a standard of reference for environmental and social considerations.

2. PROJECT DESCRIPTION

2.1. Project outline

2.1.1. Background of previous projects

Dai Ninh hydropower plant, located in Phan Lam commune (Bac Binh district), has been operated from 2008 with dual functions of power generation (300 MW) and water supply for agriculture development. Water is diverted from Dong Nai river basin to supply for barren land in Binh Thuan province. Reservoir of Dai Ninh hydropower plant consists of two reservoirs, one formed in Da Nhim river, another formed in Da Queyon river, which are connected through a channel with a length of 2510 m. Total water volume of the two reservoirs is estimated 320 million m^3. Water from Da Nhim and Da Queyon reservoirs in Lam Dong province flows to the hydropower plant through a tunnel of 11.2 km and a steel-pressurized pipeline of 1.8 km. After used for power generation in the plant, water is discharged to Mac Tin stream, and then join into Da Ka Chu (Ta Mai) river at the upstream of Luy river.

In order to utilize water from Dai Ninh hydropower plant for agriculture irrigation, Phan Ri – Phan Thiet Irrigation Project (PRPTIP), an Yen-loan project, has been planned with Special Assistance for Project Formation by Japan Bank for International Cooperation (SAPROF) from 2000 and formulated in 2006 to construct headwork, main canal, primary canal, secondary canal and a part of large scale tertiary canal (which has more than 150 ha of irrigation coverage) to irrigate newly 10,500 ha, as well as to rehabilitate existing irrigation facilities and rural infrastructure improvement. Song Luy headwork is built at Phan Son commune (Bac Binh district), including a weir on Luy river, intake gates, discharge gates, and headwork management building. The construction of East main canal, primary canals (such as D8, D14 canals), and secondary canals have been completed in 2014.

Although PRPTIP has been completed, water cannot be distributed to all farmlands only with main

canal, primary canals, and secondary canals. Therefore, the construction of tertiary canals (which has less than 150 ha of irrigation coverage) and on-farm canals are required to provide water to all farmlands and maximize the efficiency of PRPTIP. In March 2011, a technical cooperation project has been started by JICA to help Binh Thuan province to make better use of PRPTIP. The project, named as Technical Cooperation Project for Agriculture Development in Phan Ri – Phan Thiet (TC-PRPT Phase-1), has been implemented to improve agriculture productivity, develop capacity of planning and implementation of provincial and district administrative staff. The TC-PRPT Phase-1 has been accomplished in March 2014 with a series of achievement: i) constructing tertiary canals for two pilot sites for paddy field, ii) establishing Water Users Group (WUG), iii) training for operation and maintenance, iv) farming guidance, v) training for counterparts, vi) compiling manuals and guidelines, and so on.

2.1.2. Requirement of TC-PRPT Phase-2

Although TC-PRPT Phase-1 was successfully implemented, there are other issues which need to be solved in PRPTIP area, including:

i) Change of cropping plan (from cotton crop to paddy rice crop) in upland area
ii) Effective and irrigation method for upland area
iii) Modification of irrigation plan of PRPTIP area to meet the changed cropping plan
iv) Capacity of water management for IMC/IME in complicated large-scale irrigation system

According to the cropping plan of PRPTIP, 80% of beneficial area was planned to crop cotton which requires much less water than paddy rice. However, the plan faces two difficulties: i) supporting system for cropping cotton has not been established so far; and ii) farmers in PRPTIP area tend to like cropping paddy rice because of its easiness of growing and existing market demands. Although paddy rice may be cropped on almost all upland crop planned area if tertiary canals are constructed, the change from cotton to paddy rice will cause serious water shortage. Therefore, disseminating upland irrigated agriculture is very important for the development of PRPTIP area.

The change of cropping plan leads to a requirement for changing irrigation method, irrigation plan, as well as water management, as pointed out above. It is also noted that two pilot sites constructed in TC-PRPT Phase-1 are both in paddy planed area. It is necessary to construct pilot sites in upland crop planned area for demonstrating value-added upland farming. Irrigation methods in upland area, for example sprinkler irrigation or drip irrigation, are much different from ponding irrigation in paddy area in view of construction and water management. Therefore, establishing effective upland irrigation methods which fit into PRPTIP area is essential.

For the reasons set forth above, a new technical cooperation project, TC-PRPT Phase-2, is required to address the problems and to find the solutions.

2.1.3. Project objectives

The main purpose of the project is that dissemination approach of efficient water management system in Phan Ri – Phan Thiet area including upland irrigation, which is based on appropriate cropping system, is established.

In order to achieve the project purpose, the following objectives/outputs of the project shall be realized and attained:

1) To develop models of upland irrigated agriculture at tertiary canal and on-farm canal (On-Farm Canal) level
2) To prepare the overall water management plan for PRPTIP area

3) To strengthen capacity of overall water management in PRPTIP area
4) To strengthen capacity in disseminating the Models of upland irrigated agriculture at tertiary canal (On-Farm Canal) level toward whole PRPTIP area.

2.1.4. Location of project

The project is located in Phan Ri–Phan Thiet area, northern part of Binh Thuan province. The project location belongs to Bac Binh district of Binh Thuan province, as shown in Figure 2-2.

Figure 2-1 Administration map of Binh Thuan province.

The project area is almost a triangle confined by Luy river on West and South directions and Ca Giay river on East direction (see Figure 2-2).

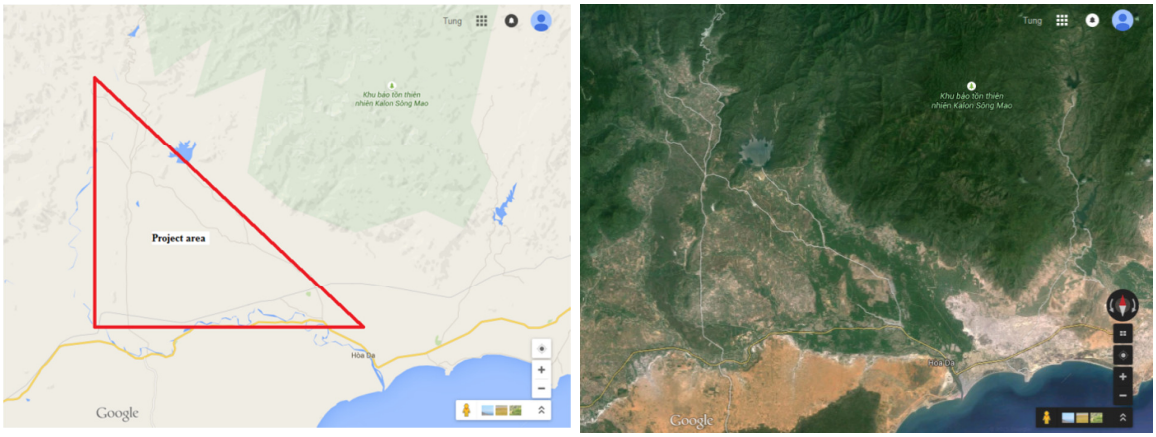

Figure 2-2 Location of the project in Binh Thuan province.

The nearest distance from the project site to Kalon-Mao river natural reserve area is about 5 km.

2.1.5. Proposed project activities

The principal activities to be undertaken within the framework of the project, to achieve the above mentioned objectives, are as follows.

1-1 To select pilot sites.
1-2 To conduct baseline surveys to confirm present situation in pilot sites.

1-3 To establish Water Users Group (WUG) in each pilot site.
1-4 To formulate cropping plans of the pilot sites with participation of WUG.
1-5 To select appropriate upland irrigation method in each pilot site.
1-6 To conduct detailed design and construction of tertiary canals in the pilot sites with support of WUG.
1-7 To supervise the operation and maintenance of the tertiary canals by WUG.
1-8 To conduct upland irrigated farming practices in the pilot sites to WUG/farmers.
1-9 To conduct workshops and seminars for farmers cultivating in PRPTIP area to share the knowledge and skills of water management as well as farming practices.
2-1 To formulate realistic cropping plan for overall upland crop planned area in PRPTIP area.
2-2 To formulate overall irrigation plan in PRPTIP area with consideration of water conservation by adopting appropriate upland irrigation method and utilization of existing reservoirs.
2-3 To formulate the overall plan for operation and maintenance of irrigation facilities in PRPTIP area.
3-1 To establish an organization of water management for overall PRPTIP area, which consists of WUG, IMC (Irrigation Management Company), IME (Irrigation Management Enterprise), CPC (Commune People's Committee), DARD (Department of Agriculture and Rural Development) and so on.
3-2 To prepare training curriculums and materials to share information and skills of water management.
3-3 To conduct workshops and seminars for members of the organization.
3-4 To supervise the operation and maintenance in PRPTIP area based on the irrigation plans which consider water demand of each WUG.
4-1 4-1 To summarize and examine the experience of Activities-1, 2 and 3.
4-2 To formulate technical manuals and reports to develop efficient water management system.
4-3 Formulation of integrated development strategies

Among the series of activities above, several activities which might have potential impacts to the environment and society will be evaluated in detail, including activities 1-6, 1-7, 1-8, and 3-4. In other words, the following activities of the project shall be assessed for their environmental and social impacts:

i) Constructing tertiary and on-farm canals in the pilot sites
ii) Conducting operation and maintenance of the tertiary and on-farm canals by WUG
iii) Conducting upland irrigated farming practices in the pilot sites

2.2. Project implementing agency

The project implementing agency (PIA) is Department of Agriculture and Rural Development (DARD) in Binh Thuan province.

2.3. Project schedule

The project will be implemented from September 2015 to December 2018.

3. ENVIRONMENTAL BASELINE AND EXISTING SOCIAL CONDITIONS

3.1. General and administration information

Bac Binh is a mountainous district of which center is located in Cho Lau town. The district is 68 km from Phan Thiet city on North East direction. The area of the district is 1,825.33 km^2. It is surrounded with Duc Trong district (Lam Dong province) on East direction, Di Linh district (Lam Dong province) and Ham Thuan Bac district (Binh Thuan province) on West and North West directions, Tuy Phong district on East and North East direction, East sea on South East direction, East sea and Phan Thiet city on South and South West directions, as shown in Figure 2-1.

Bac Binh district is composed of 2 towns (Cho Lau and Luong Son) and 16 communes (Phan Lam, Phan Son, Phan Dien, Binh An, Phan Hoa, Hai Ninh, Phan Ri Thanh, Phan Thanh, Hong Thai, Song Binh, Song Luy, Phan Tien, Binh Tan, Hoa Thang, Phan Hiep and Hong Phong). The project covers Phan Son, Phan Lam, Song Binh, Song Luy, Binh An, Hai Ninh, Phan Thanh, Luong Son, and Hong Thai communes.

3.2. Natural environment

3.2.1. Climate

According to official information of Binh Thuan province (http://binhthuan.gov.vn/wps/portal, accessed on July 14, 2015), Binh Thuan province is characterized as tropical monsoon climate with 2 distinctive seasons: rainy season from May to October and dry season from November to April of next year. And the province has 26 - 27°C of average annual temperature, 800 – 1,150 mm of average annual precipitation, 75 - 80% of humidity with an average value of 79%, while total sunny hour is 2,459 hours annually. For Bac Binh district, its annual precipitation is only 818 mm with 77 rainy days. However, annual evaporation amount is estimated as 1,350 – 1,400 mm, which is almost double of annual precipitation. The highest monthly evaporation amount is recorded in March and June with an amount of 139 - 150 mm.

South West wind blows from May to September with a velocity of 2 - 3 m/s and North East wind blows from October to April of next year with an average velocity of 4.7 m/s. Hot wind occurs in March, April, July, and August with the total period of 45 - 48 days. In summary, climate in Bac Binh district is characterized by tropical monsoon climate but with brutal aspects such as dry, hot, long sunny time, and small precipitation.

3.2.2. Topography

Topography of Bac Binh district is quite complex, characterized by small plain lying between mountains in the North and the North West and dunes and hills in the South East. There are 3 main categories of topography, as follows:

- Mountainous area with mountains with elevation from 120 m to 1,000 m, including Phan Lam, Phan Dien, Phan Son, Phan Tien communes and the North of Phan Hoa and Binh An communes. This area covers about 88,790 ha, accounting for 48.64% of the total land area.
- Midland and plain area with elevation from 30 m to 120 m, including communes along 1A National road (Phan Hoa, Phan Ri Thanh, Phan Hiep, Cho Lau, Phan Thanh, Hong Thai, Luong Son, Song Luy, Binh Tan). This area is 58,768 ha, accounting for 32.2% of the total land area.

- Coastal dune area, including Hoa Thang, Hong Phong communes and the South of Binh Tan, Song Luy, Luong Son, Hong Thai, Phan Thanh, Phan Hiep, Cho Lau, and Phan Ri Thanh communes. This area is 34,975 ha, accounting for 19.16% of the total land area.

3.2.3. Rivers and Reservoirs

The main river system in Bac Binh district is Luy river system, including Luy river and its distributaries (Ca Giay, Mao and Ca Tot rivers). The characteristics of rivers flowing through Bac Binh district are shown in Table 3-1.

Table 3-1 Characteristics of Rivers

River	Catchment area (km^2)	Total length (km)	Section flowing through district (km)	Average flow (m^3/s)
Luy	1953	98	78.5	10.43
Mao	234	NA	40.5	2.06
Ca Giay	190	NA	15	3.22
Ca Tot	218	NA	14	3.04

Water from Luy river system and drainage water from Dai Ninh hydropower plant is main water resource for both manufacturing and domestic activities. It is planned that water volume from Luy river is 751 million m^3 and water volume from Dai Ninh hydropower plant is 826 million m^3 (according to Report on planning of irrigation development of Binh Thuan province in 2011-2020) There are also several reservoirs in the district, including Ca Giay and Bau Nui reservoirs.

However, flash floods often occur in rainy season, causing flood of low land area which lead many difficulties for running business and life of local people. In addition, the coastal area near river mouth is influenced by salinity intrusion.

Groundwater resource is limited in the district that can satisfy only a part of domestic demand. Accessibility of groundwater source is diverse according to regions. In some area, groundwater is accessible at the depth of 4-8m, whereas it is found at the depth of 80m in other regions and no groundwater is observed even in some regions.

3.2.4. Soil Type

According to the document of Land Use Plan of Bac Binh district, there are 6 main soil types in the district area, as listed in Table 3-2.

Table 3-2 Main Soil Types in Bac Binh district.

Type of soil	Scientific Name	Area (ha)	Percentage (%)	Characteristics
Grey soil	Acrisols	105,923.0	58.03	Acidic (pH = 4.6 – 5.5), poor-nutrient soil
Sandy soil	Arenosols	45,492.2	24.92	Relatively acidic, low humus, low agricultural potential; renovation is needed
Red soil	Ferralsols	11,287.2	6.18	Rich in nitrogen and phosphorus, appropriate for perennial crop (rubber, coffee, fruit)
Alluvial soil	Fluvisols	16,571.3	9.08	Appropriate to all type of trees
Newly changed soil	Cambisols	1,441.6	0.79	Located in Phan Son commune, appropriate for paddy rice
Abrasive soil with gravel and stone	Leptosols	496.0	0.26	Poor fertility; forest planting and improvement is required

3.3. Social Conditions

3.3.1. Population

According to Division of Statistics of Bac Binh district, total population of the district was 117,654 in 2010, consisting of 58,219 (49.5%) female and 59,426 (50.5%) male. The average population growth rate and population density were respectively 1.3%/year and 64.5 people/km^2; the highest density was found in Phan Ri Thanh commune with 513 people/km^2, whereas the lowest density was 4 people/km^2 in Phan Lam commune. Detail information on the population, population density, and area of each commune in Bac Binh district in 2010 is presented in Table 3-3.

Table 3-3 Population, Population Density and Area of Communes in Bac Binh district in 2010

No.	Administrative agency (Town/commune)	Population (people)	Density (people/km^2)	Area (km^2)
	Total	**117,645**	**64.45**	**1,825.33**
1	Cho Lau town	12,819	393.82	32.55
2	Phan Son	3,324	18.62	178.50
3	Phan Lam	1,658	4.22	392.70
4	Binh An	4,617	36.53	126.40
5	Phan Dien	1,128	10.02	112.55
6	Hai Ninh	8,872	192.24	46.15
7	Song Luy	8,211	98.55	83.32
8	Phan Tiến	1,422	18.81	75.61
9	Sông Binh	4,088	63.19	64.69
10	Luong Son town	12,924	92.27	140.06
11	Phan Hoa	8,653	116.85	74.05
12	Phan Thanh	6,961	240.20	28.98
13	Hong Thai	11,323	160.13	70.71
14	Phan Hiep	4,957	248.22	19.97
15	Binh Tan	6,415	88.84	72.21
16	Phan Ri Thanh	11,730	512.67	22.88
17	Hoa Thang	7,223	37.19	194.21
18	Hong Phong	1,320	14.70	89.79

According to the statistic data, more than 78% of the total population lived in rural area, as detailed in Table 3-4.

Table 3-4 Population classified in gender and area in Bac Binh district.

Year	Total (people)	Gender		Area	
		Male	Female	Urban	Rural
2008	116,160	58,747	57,413	25,487	90,673
2009	117,128	59,585	57,543	25,699	91,429
2010	117,645	59,426	58,219	25,743	91,902

3.3.2. Labor

Total amount of labor of the district accounted for 51.6% of the total population (60,717 people) in 2010. However, the proficiency of labor was uneven distributed. Labor working in primary industry such as agriculture, forestry and aquaculture sector accounted for 64.0% of total amount of labor while labor working in non-agriculture sector occupied 36.0%. Labor working in agriculture sector has sufficient unconstraint time by its work which can be utilized for other business activities to increase their income.

3.3.3. Ethnic Minorities

There are 34 ethnic minorities living in Binh Thuan province, including Kinh, Cham, Ra Glai, Hoa, Co Ho, Tay, Cho Ro, Nung, Muong tribes, etc. according to official information of Binh Thuan province (http://binhthuan.gov.vn/wps/portal, accessed on July 14, 2015). And there are 5 main ethnic minorities such as Kinh, Cham, Nung Hoa, K'Ho, Rac Lay, and Tay of total 15 ethnic minorities in Bac Binh district. However, it is not well recognized the living distribution of ethnic minorities in the district, nor more specifically in the project area.

3.3.4. Tourism Potential

Bac Binh has a long beach (> 15 km) in Hoa Thang and Hong Phong communes. The beach is characterized with diverse natural landscape, such as dunes, white lake, etc., appropriate for establishing tourism area. However, it is found that there is no important natural landscape and cultural heritage located in the project site.

3.3.5. Land Use

Total agricultural land area of Bac Binh district in 2010 was 167,627.5 ha, accounting for 91.8% of the total land area which consists of 74,317 ha of Cropping land accounting for 40.7% and 92,872 ha of Forestry land accounting for 50.8% of the total agriculture land. This contributes to the fact that the district had the largest area of forest land in the province. Detail area for each type of land is presented in Table 3-5 below.

Table 3-5 Land Use based on categories in 2010, Bac Binh district.

No.	Type of land	Area (ha)	Percentage (%)
	Total land area	182,533.20	
1.	***Agricultural land***	***167,627.51***	***91.8%***
1.1	Cropping land	74,317.16	40.7%
1.1.1	Land under temporary crops	54,884.03	30.1%
1.1.1.1	Land under paddy crop	10,677.23	5.8%
1.1.1.2	Land under grass crop	31.11	0.02%
1.1.1.3	Land under other temporary crops	44,175.69	24.2%
1.1.2	Land under long-term crops	19,433.13	10.6%
1.2	Forestry land	92,871.82	50.8%
1.2.1	Land under planted forests	34,231.00	18.8%
1.2.2	Land under protection forests	58,640.82	32.1%
1.3	Aquaculture land	418.92	0.2%
1.4	Other agricultural land	19.61	0.01%
2	***Non-agricultural land***	***8,589.41***	***4.7%***
2.1	Residential land	1,072.15	0.6%
2.2	Specialized land	5,307.79	2.9%
2.3-6	Other non-agricultural land	2,209.47	1.2%
3	***Unused land***	***6,316.28***	***3.5%***

Source: Report no. 165/BC-UBND dated 03/11/2010 on land inventory result in Binh Thuan province 2010.

3.3.6. Local Economy

In 2010, GDP per capita of Bac Binh district was 730 USD. Contribution of sectors to local economy in 2010 was 56.8% from primary industry (agriculture, forestry, and aquaculture), 19.3% from secondary industry (manufacturing and construction) and 23.9% from tertiary industry (service).

Considering agriculture, according to "Natural and Social Conditions of Bac Binh 2012", paddy rice was planted on 20,300 ha (yield of 102,750 ton) and maize was planted on 3,600 ha (yield of 19,250 ton). Temporary industrial crops were planted on 6,120 ha while land for long-term crop was 19,433 ha. Area for planting rubber and dragon fruit was increasing, whereas area for cashew was decreasing.

4. RELEVANT ACTS, REGULATIONS AND GUIDELINES

The IEE study for TC-PRPT Phase-2 was prepared in accordance with JICA Guidelines for Environmental and Social Considerations (2010).

Accordingly, the process of environmental and social conditions, such as categorization, impact items to be assessed, consultation, and so on, complies with the guideline. In addition, the IEE study complies with laws, regulations, and standards related to the environment and local communities in the central and local governments of Vietnam, as guided in the JICA guidelines. The study also follows the guidelines and standards from World Bank and International Finance Corporation (IFC) where suitable.

Specifically, assessment and proposed mitigation and consideration measures in the study basically followed General Guidelines on Environmental, Health, and Safety (2007) of IFC. Standard of reference for water quality monitoring will follow National Technical Regulation on Surface Water Quality of Ministry of Natural Resources and Environment (QCVN 08:2008/BTNMT).

5. COMPARISON OF ALTERNATIVES

Alternative analysis involves an examination of alternative ways of achieving objectives of the proposed project. The aim of alternative analysis is to find out a development option, which maximizes the benefits while minimizing the adverse impacts. The alternatives to achieve the project objectives with minimum environmental degradation are discussed as follows.

5.1. No Action Option

This alternative does not allow the implementation of the project. This alternative has both beneficial and adverse impacts on the environment and society. If the project is not implemented, the present shortage of water and low development of agriculture in the area will continue to suppress the life and living standard of local people, resulting into prevalence of poverty. The no action option will conserve some of the environmental adverse impacts at the cost of poverty and hardship of the people.

5.2. Project Alternatives

Although the proposed activities of the project can be determined at this stage, many alternatives will be considered for a selection during the implementation of the project. The project will select pilot sites in PRPTIP area to conduct its study and experiment with criteria such as cost, soil condition, enthusiastic of farmer's participation, operation & maintenance, technical aspects, environmental impact, social impact etc.

The appropriate upland irrigation method will be selected in each pilot site during the project implementation. Based on information collected, realistic cropping plan for overall upland crop planned area and then overall irrigation plan in PRPTIP area will be formulated. The project finally will result in the best approach for upland irrigated agriculture and effective water management plan for PRPTIP area.

6. SCOPING AND TERMS OF REFERENCCE

6.1. Scoping for Environmental and Social Considerations

In order to assess likely significant environmental and social impacts, conceivable adverse

environmental and social impacts by the project were preliminary identified based on the project description and overall environmental and social conditions in the surrounding area. The impacts of pollution, natural environment, social environment, and other concerned issues were classified as A to D in accordance with the following criteria:

A+/-: Significant positive/negative impact is expected

B+/-: Positive/negative impact is expected to some extent

C+/-: Extent of positive/negative impact is unknown (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impacts is expected

The environmental and social impact assessments were examined and conducted, in accordance with the scoping matrix below, for the impacts classified as A to D. The project was divided into two stages: i) construction stage (corresponds to construction of tertiary and on-farm canals in the pilot sites) and ii) operation stage (corresponds to: 1) conducting operation and maintenance of the tertiary and on-farm canals by WUG and 2) conducting upland irrigated farming practices in the pilot sites). Table 6-1 shows preliminary results of scoping for pollution, natural environment, social environment, accident, and transboundary impacts/climate change in construction and operation stages.

Table 6-1 Results of scoping for environmental and social assessments

Category	No.	Impact items	Evaluation		Evaluation reason
			Before/Under Construction (BC/UC)	Operation Stage (OS)	
Pollution	1	Air pollution	B-	D	**BC/UC:** Emission gas from construction equipment and vehicles and dust from construction activities are anticipated to rise during construction phase. **OS:** Emission gas and dust from operation and maintenance (O&M) of tertiary and on-farm canals and upland irrigated farming practices can be considered as negligible.
	2	Water pollution	B-	C-	**BC/UC:** Muddy water inflows to environment from bare land of construction site and drainage from the lodging of construction may occur. **OS:** Drainage water or storm water from upland used for farming practices may be polluted by fertilizers and pesticides if the use of such materials will not be well controlled during farming practices.
	3	Waste	B-	B-	**BC/UC:** Solid waste from land excavation and building materials is anticipated to rise somewhat. **OS:** Agriculture waste from farming practices is anticipated to be produced and is of concern.
	4	Soil pollution	D	C-	**BC/UC:** Soil contamination during construction stage is not expected. **OS:** Soil contamination may occur if pesticides used for farming practices will not be well controlled.
	5	Noise & Vibration	B-	D	**BC/UC:** Increase of noise levels due to construction machines and vehicles may temporarily occur during construction stage. **OS:** Increase of noise and vibration due to O&M and farming practices can be neglected.
	6	Ground subsidence	D	D	Impact on ground subsidence will be negligible as intake of groundwater is not planned.
	7	Offensive odor	D	D	Offensive odor from construction work and activities in operation stage is not expected.
	8	Bottom	D	C-	**BC/UC:** Impact on bottom sediment is not expected

Category	No.	Impact items	Evaluation		Evaluation reason
			Before/Under Construction (BC/UC)	Operation Stage (OS)	
		sediment			during construction stage. **OS:** It is not clear at the moment whether drainage water or storm water from upland used for farming practices will be polluted or not, and whether polluted water (if any) will be further discharged to water bodies and will cause pollution for bottom sediment.
Natural Environment	9	Protected area	D	D	The nearest protected area is several kilometers from the project site, thus the impact is not anticipated with the type and magnitude of the project's activities.
	10	Ecology	D	D	Impact of the project's activities on flora, fauna and ecosystem is not anticipated because the project site belongs to PRPTIP area which is planned for agriculture development.
	11	Hydrology	D	D	**BC/UC:** No impact on hydrology is anticipated as the project does not make any changes to natural surface water and groundwater flows. **OS:** Water volume used for pilot sites is not big enough to cause a significant change in water distribution of the whole PRPTIP system.
	12	Topography, geology	D	D	No impact on topography & geography is anticipated as large scale excavation work is not planned during the project implementation.
Social Environment	13	Involuntary resettlement & land acquisition	C	D	**BC/UC:** Land acquisition is anticipated for making canals during construction stage of the project. **OS:** No resettlement and land acquisition is required during operation stage of the project.
	14	Poor people	D	C+	**BC/UC:** The project will not cause any negative impacts to poor people. In contrast, some job opportunity for construction of tertiary canals will be provided to local people. **OS:** Outcomes and output from the project will benefit local people by providing water for more sustainable agriculture, and thus will reduce poverty.
	15	Minority ethnic & indigenous people	D	C	**BC/UC:** It is not anticipated that the project's activities during construction stage may cause any negative impacts to minority ethnic and indigenous people. **OS:** It is not clear at the moment. However, enough considerations need to be paid.
	16	Local economy (employment & livelihood, etc.)	D	B+	**BC/UC: BC/UC:** Although some job opportunity as workers will be provided for local people during construction stage, the impact on local economy would not be considered as significant. **OS:** Local economy will be boosted to some extent in operation stage of the project.
	17	Land use and local resource use	C-	D	**BC/UC:** A part of land will be used for making canals. **OS:** Although crop on land is likely to be changed during/after the project, most of land is still used for agriculture development. As a matter of fact, the project site belongs to PRPTIP area which is designated for agriculture development. Therefore, the project will not make any significant change in land use and cause any negative impact.
	18	Water use	D	C-	**BC/UC:** Impact on daily life water use of local people around the project site is not expected during construction stage. **OS:** Water volume used for pilot sites may cause a change in water distribution of the whole PRPTIP system.
	19	Existing social infrastructure & social services	D	D	No impact on social infrastructures & services is anticipated.

Category	No.	Impact items	Evaluation		Evaluation reason
			Before/Under Construction (BC/UC)	Operation Stage (OS)	
	20	Social institutions (social capital & local decision-making institutions)	D	D	No impact on social institution is anticipated during the implementation of the project.
	21	Uneven distribution of damage & benefits	D	D	It is not expected that the project's activities may cause uneven distribution of benefit and damage to local people.
	22	Conflicts of interest in the region	C-	C-	It is not clear at the moment that the project site and the project's activities will cause any conflict of interests within the region. However, enough considerations need to be paid.
	23	Cultural heritage	D	D	It was confirmed that there is no cultural heritage in and around the project site.
	24	Landscape	D	D	It was confirmed that there is no important landscape resources and scenic spots in and around the project site
	25	Gender	C	C	It is not clear at the moment. Considerations have to be paid that no gender discrimination will be taken place during the project implementation.
	26	Children's rights	C	C	It is not clear at the moment. However, considerations have to be paid that no children will be involved as workforce during construction and operation stages.
	27	Infectious diseases (HIV/AIDS, etc.)	D	D	It is not anticipated that the project's activities will cause any increase in risk of disease transmission (such as HIV/AIDS), because no large-scale work is required during both construction and operations stages.
	28	Working conditions (including occupational safety)	B-	B-	Negative impact on health and safety of workers and farmers may occur if appropriate measures to ensure occupational health and safety will not be taken.
Other	29	Accident	B-	D	**BC/UC:** Accident may occur if occupational safety will not be taken carefully during construction stage. **OS:** It is not anticipated that there is any increase in accident during operation stage of the project.
	30	Transboundary impacts, climate change	D	D	The activities of the project are not expected to cause any significant transboundary impacts or climate change.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

6.2. Terms of reference for environmental and social considerations

The survey items and their methods for investigation of environmental and social consideration, of which impact items were rated as A, B or C by the scoping described in Section 6.1, are shown in Table 6-2.

Table 6-2 Terms of Reference for Environmental and Social Considerations

No.	Impact Item	Survey Item	Survey method
1	Air pollution	Environmental management control	Document analysis
2	Water Pollution	1) Environmental management control 2) Usage manners (fertilizer & pesticides)	Document analysis
3	Waste	Environmental management control	Document analysis
4	Soil pollution	Usage manners (pesticides)	Document analysis
5	Noise & vibration	1) Environmental management control 2) Characteristics of project site	Document analysis
6	Bottom sediment	1) Usage manners (pesticides) 2) Characteristics of project site	Document analysis
7	Involuntary resettlement & land acquisition	Land acquisition approach	Document analysis
8	Poor people	Characteristics of project activities	Document analysis
9	Minority ethnic & indigenous people	Agriculture approach of minority ethnic & indigenous people	Document analysis
10	Local economy	Characteristics of project activities	Document analysis
11	Land use & local resource use	Situation of land use	Document analysis
12	Water use	Situation of water use	Document analysis
13	Conflict of interest	Situation of conflict of interest	
14	Gender	Project approach for women participation	Document analysis
15	Children's rights	Project approach for inhibiting children involvement	Document analysis
16	Working condition	Health and safety control	Document analysis
17	Accident	Safety control	Document analysis

7. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

7.1. Impact Assessment and Proposed at-hand Mitigation Measures

7.1.1. Air Pollution

Impact of air pollution was assessed only for construction stage of the project, as specified in scoping result. Construction of tertiary and on-farm canals during construction stage will mainly accompany with dust forming by the following activities:

i) Transport and open storage of construction materials and construction waste by vehicles
ii) Mixing, cutting, and handling construction materials
iii) Excavation of land and building activities
iv) Dust formed from exposed soil surface and unpaved roads

Besides, emission gas from vehicles and construction machineries may have some impact to air quality.

Taking a consideration into the project activities, construction of few kilometers of tertiary canals and on-farm canals in the project is not a large-scale work in terms of construction. The work will not require a large volume of construction materials (e.g., bricks, sand, cement) and then not many transportation vehicles will be employed. A few construction machines (e.g. small excavator, concrete mixer) will be used as well. Instead, local workers can manually construct tertiary canals and especially on-farm canals. As a result, the impact of project activities to air quality can be considered as minimal.

Such minimal impacts can be well controlled by the application of simple mitigation measures. Covering vehicles used for transporting construction materials and open storage of materials will be

implemented to prevent dust scattering out. Unpaved roads and construction roads should be sprayed and cleaned regularly with water. For reducing exhaust gases from vehicles and construction machines, all vehicles and machines used in construction should be maintained in best working conditions by regular inspection and maintenance. All vehicles should be completely stopped when not working and intensive operation of construction machineries should be avoided.

It can be judged that the impact of canal construction to air quality would be considered less than significant if simple mitigation measures above mentioned will be taken.

7.1.2. Water pollution

Construction stage

If construction of canals is implemented during rainy season (May to October), muddy water could be formed from exposed soil surface and then discharged to the environment. Such high turbid water may have affected to nearby water bodies. However, the impact of muddy water from construction site to the environment will not be sufficiently significant since the scale of land excavation is not large. In addition, the adverse impact of turbid water can be reduced significantly by the installation of simple retention ponds. The construction schedule will be optimized to minimize the generation of bare land, excavation, filling and founding embankment as well. The best approach for minimizing the formation of turbid water is to implement and finish the construction work in dry season.

Operation stage

It is not clear at the moment what kind of crop will be grown for farming practices and what kind of irrigation method (e.g. ponding, furrow, sprinkler, or drip) will be adopted for the project site. The type of crop and irrigation method adopted will have substantial influence to the formation of drainage water and the quantity of fertilizers and pesticides which can be washed out. In any case, farmers should follow strict rules on using fertilizers and pesticides for farming practices to not create exceeding chemical substances in environmental water. It is recommended that a consideration on guiding WUG/farmers on proper storage, handling and use of fertilizers and pesticides will be incorporated during upland irrigated farming practices. In addition, use of fertilizers and pesticides by farmers will be inspected regularly by the project proponent to ensure that local farmers will follow the rules.

Based on above discussions, it can be judged that the project proponent will implement sufficient measures to deal with water pollution during construction and operation stages. Accordingly, the impact of the project on water pollution would be considered less than significant during the implementation of the project.

7.1.3. Waste

Construction stage

Solid waste resulted from the construction activities could be excess and useless building materials (e.g. broken bricks, sand, cement) and excavated land. Excavated land can be used directly for embankment or filling low land in the project site due to small volume of excavated land formed in construction work. The excess and useless building materials will be collected and disposed properly after construction.

Operation stage

Agriculture waste will be formed with a large amount after each cropping, such as rice straw, maize straw, cassava tree, etc. However, agriculture waste can be easily managed to form useful products for

next agriculture crop. Rice straw, maize straw, or tree leaves can be fermented/ degraded to make compost which will be later applied to improve soil conditions. Agriculture waste can be used as burning fuel for local people and feeds for livestock as well.

Another type of solid waste which can be formed during farming practices is used pesticides bottles and fertilizer bags. The used bottles and bags should be collected and disposed properly to not cause environmental pollution.

Based on above discussions, it can be judged that the project proponent and local farmers can control well solid waste formed during construction and operation stages. Accordingly, the impact of solid waste would be considered less than significant during the implementation of the project.

7.1.4. Soil Pollution

Possibility of soil contamination was examined only for operation stage of the project, as specified in scoping result. Soil contamination may occur if pesticides used for farming practices will not be well controlled. As above discussed on the section of water pollution, it is believed that proper storage, handling and use of pesticides will be guided to WUG/farmers and implemented seriously during farming practices. In addition, used pesticides bottles and bags will be collected and disposed properly so that no possibility of soil contaminant will be taken place.

It is also not expected to have salt accumulation in this project area considering with natural conditions such as amount of rain fall, height above sea level, and level of ground water. Furthermore, during the environmental review of PRPTIP, it was confirmed that no report of salt accumulation in this district.

With above mentioned considerations, it can be judged that the possibility of soil contamination would be considered less than significant during the implementation of the project.

7.1.5. Noise and Vibration

Impact of noise and vibration was assessed only for construction stage of the project, as specified in scoping result. Noise will be mainly originated from transporting vehicles, and operation of construction machineries (such as excavator, cutting machine, and compactor). As discussed previously, the construction of tertiary canals and on-farm canals will require few transportation vehicles and construction machines. It can be expected that noise produced from the construction activities will not be significant. In addition, the project site is located far from residential houses, usually more than several hundreds of meter. Therefore, it can be judged that the impact of noise and vibration would be considered less than significant and no more mitigation measures will be taken.

7.1.6. Bottom Sediment

Possibility of bottom sediment contamination was examined only for operation stage of the project, as specified in scoping result. Since the pilot sites of the project are not determined yet, it is not known whether drainage water or storm water from upland used for farming practices will be discharged to natural water bodies. However, drainage water or storm water from the upland area will be polluted if pesticides used for farming practices will not be well controlled. Proper storage, handling and use of pesticides during farming practices, as aforementioned, will eliminate the possibility of pollution of bottom sediment, regardless of the characteristics of water body system.

With the above considerations, it can be judged that the impact on bottom sediment would be considered less than significant during the implementation of the project.

7.1.7. Involuntary Resettlement & Land Acquisition

Involuntary resettlement and land acquisition were evaluated for construction stage of the project, as specified in scoping result. It was confirmed that the construction of tertiary and on-farm canals would not require resettlement because the project site belongs to a designated agriculture area. Land for making canals will be required and but the pilot project will be conducted only if farmers agree with voluntary land donations, as experienced in Phase 1 of the project. Land contribution from farmers to the project is not compulsory. Before construction, benefits, and land plan, and construction plan on making canals will be informed widely to all related farmers. Farmers will be gathered to raise their opinions on design and construction of canals as well as land acquisition plan. The adjustment, if necessary, will be conducted to find the best approach for all farmers. As a result, the consent on voluntary land donation and construction of making canals will be achieved for all related farmers. Finally, land contribution will be done voluntarily by all related farmers. It is emphasized that the construction of canals would be started only after receiving the consent of all farmers on related matters including design, construction, and land contribution. Farmers also will construct on-farm canals by themselves.

Since voluntary land donation will be implemented with the agreement of all farmers, it can be judged that the involuntary land acquisition would be eliminated during the implementation of the project.

7.1.8. Poor People

Impact to poor people was assessed for operation stage of the project, as specified in scoping result. The implementation of the project will result in the formation of tertiary and on-farm canals, which, in turn, provide sufficient water for agriculture development at the pilot sites of the project. The project will also bring knowledge and skills to local people on: i) operation and maintenance of canals, ii) farming practices, ii) water management and so on. It is believed that the project activities will improve benefit of farming and attain more sustainable agriculture to local farmers. The project activities will help poor people to have a better life. It can be judged that the impact of the project on poor people would be considered positive.

7.1.9. Ethnic Minority & Indigenous People

Impact to minority ethnic and indigenous people was assessed for operation stage of the project, as specified in scoping result. At the moment, we do not have information of the distribution of minority ethnic and indigenous people in PRPTIP area. However, the pilot sites of the project are not selected at this stage. It is recommended that selection of pilot sites will be done carefully so that no potential impact on minority ethnic and indigenous people (land use, cropping type, cropping method, irrigation method) will be raised in the project site in the later period of the project. The activities of the project will be designed to bring benefit to all local farmers and to meet desire of local people. It can be guaranteed that the project activities will not be designed to harm or result any negative impact to indigenous people and their life. In addition, the activities of the project will be implemented carefully with the agreement of all related farmers, so that no negative result will have an effect on minority ethnic and indigenous people. It can be judged that the impact of the project on minority ethnic and indigenous people would be considered less than significant by selecting pilot sites and designing project activities carefully.

7.1.10. Local Economy

Impact to local economy was assessed for operation stage of the project, as specified in scoping result. As discussed previously in the section of poor people, the project will provide precious chance to

develop agriculture and diversify a number of crops to be grown in pilot sites of the project. As a result, productivity and value from agriculture sector of the region will be boosted with the project implementation. It is expected that local economy will be improved significantly and the living standard of all people will be enhanced as well.

As a conclusion, it can be judged that the project will have positive impact on local economy during operation stage of the project.

7.1.11. Land Use and Local Resource Use

Impact to land use and local resource use was assessed for construction stage of the project, as specified in scoping result. As aforementioned, land acquisition will be done for making tertiary and on-farm canals. Apparently, usage purpose of a part of land will be permanently changed for making canals. However, the area of land used for canals will be little in comparison with the total land area. In addition, the change of land use from agriculture/barren land to canal would receive the agreement of all land owners. As a conclusion, it can be judged that the change of land use in the project would be considered less than significant and then no more mitigation measures will be taken.

7.1.12. Water Use

Impact to water use was assessed for operation stage of the project, as specified in scoping result. The pilot sites selected in the project will have an area of more or less than 100 ha. The area of pilot sites accounts for only less than 1% of total irrigation land (10,500 ha) of PRPTIP. Water volume used for irrigation of pilot sites, therefore, is so little that it cannot cause any significant change in water distribution of the whole PRPTIP system. However, irrigation method and cropping plan must be carefully selected during the project implementation so that water irrigation for all upland area in PRPTIP area in the future will not exceed the planned volume. As a conclusion, it can be judged that the implication of the project on water use would be considered less than significant and then no more mitigation measures will be taken.

7.1.13. Conflicts of Interest in the Region

Taking considerations into the type of activities which will be implemented in the project, conflicts of interest in the region, if any, will originate from the following matters:

i) Change of land use for constructing canals
ii) Change of land use for growing other types of crop
iii) Change of cropping method
iv) Adopting new irrigation method

As discussed previously in the other sections (land acquisition, minority ethnic and indigenous people, and land use), selection of pilot sites, construction of canals, application of irrigation method, and farming practices would be conducted carefully so that all activities of the project will receive the agreement of all local people and will not result in any negative influence to them. Accordingly, it is believed that the project will not result any conflicts of interest within the region. It can be judged that conflict of interest within the region would be considered less than significant during construction and operation stages of the project.

7.1.14. Gender

The project activities are not likely to make any negative impact on gender discrimination. However, the project should be implemented in a manner so that participation of women the project's meetings, workshops, and seminars will be encouraged and promoted. In addition, raising women's opinions on

any issues of the project will be encouraged by the project proponent.

7.1.15. Children's Rights

It must be assured that no children will be involved as workforce in all project activities, during construction and operation stages. The supervision and inspection of project activities will be conducted seriously to inhibit the use of children in any activities of the project, which are not allowed by related law and by-law.

7.1.16. Working Conditions (including occupational safety)

It is expected that working conditions for construction workers during construction stage and occupational health and safety of farmers during farming practices during operation stage will be controlled carefully. The following considerations for working conditions shall be followed seriously by construction contractors and farmers.

All construction workers from the contractors and farmers will undergo basic training and instructions on working rules and time, healthcare issues, and work safety.

The safety warning signage and boards will be introduced to workers in general. Traffic safety rules at the construction site and on roads will be noticed regularly to drivers and workers. In the construction area, adequate measures will be taken for fall prevention and protection. Safety tapes will be installed around boundary of working areas whenever construction activities are running. In addition, warning sign boards will be installed to notice workers for dangers (e.g. falling into water or open canal).

Workers and farmers will be equipped with hard hats, rubber gloves, safety shoes and boots, if necessary. Other personal protective equipment, such as mask shall be also provided for workers and farmers for appropriate cases; for example, farmers should wear mask when spraying pesticides.

Ergonomic factors which might cause ergonomic injuries and illness for workers and farmers, such as over-exertion, repetitive motion, and manual handling, will be paid attention as well. Workers and farmers will be provided timely rest and stretch breaks during work processes. Job rotation will be also conducted frequently for workers to mitigate over-exertion and repetitive motion. Working in high-temperature conditions or working in outdoor areas in hot weather days, workers/farmers should be equipped with hard hats and provided adequate hydration (water, electrolyte drinks). Job rotation and timely rest and stretch breaks will be applied in the cases as well.

As of above considerations, it can be judged that the implication of working conditions to workers and farmers would be considered less than significant during construction and operation stages of the project.

7.1.17. Accident

Accident may occur to workers during construction stage of the project. Accident can be due to traffic accident and occupational accident. Accidents can be minimized with careful management on working conditions and occupational health and safety, as above mentioned.

As a conclusion, it can be judged that the accident can be minimized with the application of careful management from contractors.

7.2. Summary of Impact Assessment Results

Assessment on environmental and social considerations has been implemented based on the project description and surrounding environmental and social conditions of the project site, in accordance with IFC General Guidelines on Environmental, Health, and Safety (2007).

The impacts of pollution, natural environment, social environment, and other concerned issues were classified as A to D in accordance with the following criteria:

A+/-: Significant positive/negative impact is expected

B+/-: Positive/negative impact is expected to some extent

C+/-: Extent of positive/negative impact is unknown (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impacts is expected

The following table summarizes assessment results on different aspects, including pollution, natural environment, social environment, accident and transboundary/climate change in construction and operation stages. Assessment results in the table are presented for different periods of studies: i) scoping and ii) IEE evaluation.

Table 7-1 Results of Environmental and Social Impact Assessments in Construction and Operation Stages.

Category	No.	Impact items	Evaluation during Scoping		IEE evaluation		Reason for IEE evaluation
			Before/ Under Construction (BC/UC)	Operation Stage (OS)	Before/ Under Construction (BC/UC)	Operation Stage (OS)	
Pollution	1	Air pollution	B-	D	B-	D	**BC/UC:** Emission gas from construction equipment and vehicles and dust from construction activities would be well controlled and thus expected to have negligible impacts during construction stage. **OS:** Emission gas and dust from operation and maintenance (O&M) of tertiary and on-farm canals and upland irrigated farming practices can be considered as negligible.
	2	Water pollution	B-	C-	B-	B-	**BC/UC:** Impact of wastewater generated from construction site would not be significant because construction schedule will be optimized to either take place in dry season or reduce the generation of turbid water. Muddy water, if any, would be collected in simple retention ponds. **OS:** If proper use of fertilizers and pesticides will not be done by farmers with the instruction and guidance from project experts, drainage water or storm water from upland used for farming practices might be polluted by chemical substances.
	3	Waste	B-	B-	B-	B-	**BC/UC:** Solid waste from construction site would be well managed and properly disposed so that the impact of solid waste during construction stages would be less than significant. **OS:** Agriculture waste generated from farming practices would be treated and used as compost in agriculture development as much as possible. The used pesticides bottles and fertilizer bags should be collected and disposed properly. Therefore, the impacts of solid waste generated from the project would be considered as less than significant during operation stage.
	4	Soil pollution	D	C-	D	B-	**BC/UC:** Soil contamination during construction stage is not expected. **OS:** If proper use of pesticides will not be conducted by farmers during farming practices, there might be the possibility of soil contamination.
	5	Noise & Vibration	B-	D	D	D	**BC/UC:** Noise and vibration emitted from construction equipment and vehicles would be considered less than significant because the construction site is far from residential place. **OS:** Increase of noise and vibration due to O&M and farming practices can be neglected.
	6	Ground subsidence	D	D	D	D	Impact on ground subsidence will be negligible as intake of groundwater is not planned.
	7	Offensive odor	D	D	D	D	Offensive odor from construction work and activities in operation stage is not expected.
	8	Bottom	D	C-	D	B-	**BC/UC:** Impact on bottom sediment is not expected during construction stage.

Category	No.	Impact items	Evaluation during Scoping		IEE evaluation		Reason for IEE evaluation
			Before/ Under Construction (BC/UC)	Operation Stage (OS)	Before/ Under Construction (BC/UC)	Operation Stage (OS)	
		sediment					**OS:** If proper use of pesticides will not be conducted by farmers, there might be the possibility of water polluted by the chemicals. And, it might be a cause of the pollution of bottom sediment.
Natural Environment	9	Protected area	D	D	D	D	The nearest protected area is several kilometers from the project site, thus the impact is not anticipated with the type and magnitude of the project's activities.
	10	Ecology	D	D	D	D	Impact of the project's activities on flora, fauna and ecosystem is not anticipated because the project site belongs to PRPTIP area which is planned for agriculture development.
	11	Hydrology	D	D	D	D	**BC/UC:** No impact on hydrology is anticipated as the project does not make any changes to natural surface water and groundwater flows. **OS:** Water volume used for pilot sites is not big enough to cause a significant change in water distribution of the whole PRPTIP system.
	12	Topography, geology	D	D	D	D	No impact on topography & geography is anticipated as large scale excavation work is not planned during the project implementation.
Social Environment	13	Involuntary resettlement & land acquisition	C	D	D	D	**BC/UC:** Land acquisition would be done voluntarily by land owners. Therefore, no involuntary land acquisition will be taken place during construction stage of the project. **OS:** No resettlement and land acquisition is required during operation stage of the project.
	14	Poor people	D	C+	D	B+	**BC/UC:** The project will not cause any negative impacts to poor people. In contrast, job opportunity for construction of tertiary canals will be provided to local people. **OS:** The project activities will improve benefit of local people by more sustainable and productive agriculture, and thus will benefit poor people.
	15	Minority ethnic & indigenous people	D	C	D	D	**BC/UC:** It is not anticipated that the project's activities during construction stage may cause any negative impacts to minority ethnic and indigenous people. **OS:** Impact on minority ethnic and indigenous people would be considered less than significant because pilot sites of the project and its activities will be selected and designed in order to bring benefit to all local people.
	16	Local economy (employment & livelihood, etc.)	D	B+	D	B+	**BC/UC:** Although some job opportunity as workers will be provided for local people during construction stage, the impact on local economy would not be considered as significant. **OS:** Local economy will be boosted owing to the development of agriculture, in terms of both volume and value, in operation stage of the project.
	17	Land use and local resource use	C-	D	D	D	**BC/UC:** Change of land use for making canals would be considered less than significant because the changing area is little and the change is agreed by farmers. **OS:** Although land use is likely to be changed during/after the project, most of land is still used for agriculture development. Since the project site belongs to PRPTIP area

Category	No.	Impact items	Evaluation during Scoping		IEE evaluation		Reason for IEE evaluation
			Before/ Under Construction (BC/UC)	Operation Stage (OS)	Before/ Under Construction (BC/UC)	Operation Stage (OS)	
							which is designated for agriculture development, the project will not make any significant change in land use and cause any negative impact.
	18	Water use	D	C-	D	D	**BC/UC:** Impact on daily life water use of local people around the project site is not expected during construction stage. **OS:** Water volume used for irrigation of pilot sites is less than 1% of total water used for the whole PRPTIP system. Therefore, impact of the project on water use would be considered less than significant.
	19	Existing social infrastructure & social services	D	D	D	D	No impact on social infrastructures & services is anticipated.
	20	Social institutions (social capital & local decision-making institutions)	D	D	D	D	No impact on social institution is anticipated during the implementation of the project.
	21	Uneven distribution of damage & benefits	D	D	D	D	It is not expected that the project's activities may cause uneven distribution of benefit and damage to local people.
	22	Conflicts of interest in the region	C-	C-	D	D	Conflict of interest within the region would be considered less than significant during construction and operation stages of the project because all the project's activities would be conducted with the consent of all related local people.
	23	Cultural heritage	D	D	D	D	It was confirmed that there is no cultural heritage in and around the project site.
	24	Landscape	D	D	D	D	It was confirmed that there is no important landscape resources and scenic spots in and around the project site
	25	Gender	C	C	D	D	The project is not likely to make any negative impact on gender discrimination. However, participation of women is necessary at the project's meetings, workshops, and seminars.
	26	Children's rights	C	C	D	D	Impact on children's rights would be considered less than significant owing to sufficient supervision and inspection from the project management body and contractors in order to ensure that no children will be involved as workforce during construction and operation activities of the project.

Category	No.	Impact items	Evaluation during Scoping		IEE evaluation		Reason for IEE evaluation
			Before/ Under Construction (BC/UC)	Operation Stage (OS)	Before/ Under Construction (BC/UC)	Operation Stage (OS)	
	27	Infectious diseases (HIV/AIDS, etc.)	D	D	D	D	It is not anticipated that the project's activities will cause any increase in risk of disease transmission (such as HIV/AIDS), because no large-scale work is required during both construction and operations stages.
	28	Working conditions (including occupational safety)	B-	B-	B-	B-	The Project proponent would request construction contractors to fulfill adequately measures regarding to working conditions (including occupational health and safety), in accordance to related IFC guidelines. The measures would account on basic training, physical hazards, and personal protective equipment. As a result, the impact on working conditions and health and safety of workers and farmers would not be significant during construction and operation stages of the project.
Other	29	Accident	B-	D	B-	D	**BC/UC:** Traffic and occupational accidents would not be significant because the necessary controls related to working conditions (including occupational health and safety) would be conducted seriously. **OS:** It is not anticipated that there is any increase in accident during operation stage of the project.
	30	Transboundary impacts, climate change	D	D	D	D	The activities of the project are not expected to cause any significant transboundary impacts or climate change.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

8. ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan for the project will consist of two components:

1) Environmental mitigation and consideration measures which shall be taken in the course of the project implementation in construction and operation stages. The measures were examined based on project description and assessment results of environmental and social impacts.

2) Environmental monitoring plan to supervise/examine the implementation of proposed environmental mitigation and consideration measures and to investigate the surrounding environment under the influence of the project activities during construction and operation stages.

8.1. Environmental mitigation and consideration measures

8.1.1. Construction stage

Environmental mitigation and consideration measures in construction stage for different aspects including pollution, natural environment, social environment, and accident are summarized in the following table. Most of environmental management controls will be implemented by the Contractor of construction work under management of the project implementing agency (PIA).

Table 8-1 Environmental Mitigation and Consideration Measures in construction stage.

Category	Item	Environmental mitigation and consideration measures	Person in charge of
Pollution	Air pollution	○ Covering transportation vehicles and open storage of materials will be implemented ○ Spraying water for unpaved and construction roads will be adopted. ○ Prohibition of idling will be implemented. ○ Intensive operating of the construction machinery will be avoided. ○ Construction equipment, machines and vehicle will be inspected and maintained regularly.	Contractor
	Water pollution	○ Construction will be tentatively conducted in dry season. ○ The construction schedule will be optimized to minimize the generation of bare land, excavation, filling, and founding embankment. ○ Simple settling ponds will be installed as necessary.	Contractor
	Solid Waste	○ Excavated land will be utilized to embankment work and filling for low land as much as possible. ○ Exceeding and non-utilized waste will be collected and disposed properly.	Contractor
Social environment	land preparation	○ Benefits, land plan, and construction plan on making canals will be informed to all related farmers. ○ Contribution and sharing opinions on the above issues from all related farmers will be asked for and adjustment will be conducted as necessary. ○ The consent on land plan and construction of making canals from all related farmers will be achieved. ○ Land contribution will be done voluntarily by all related farmers.	PIA, contractor
	Minority ethnic & indigenous people	○ Selection of pilot sites will be done carefully so that no potential impact on minority ethnic and indigenous people (land use, cropping type, cropping method, irrigation method) will be raised in the project site in the later period of the project. ○ In case indigenous people are observed as affected people in the pilot sites, Indigenous People Plan will be developed following JICA Guidelines for Environmental and Social Considerations (2010)	PIA
	Land use and local resource use	○ Land use change for making canals will be asked for agreement from all related farmers and will be conducted only with the consent.	PIA, contractor
	Conflicts of interest in the region	○ Selection of pilot sites will be done carefully so that no potential conflicts of interest (cropping type, cropping method, irrigation method) will be raised in the project site in the later period of the project. ○ Land plan and construction of canals will be done only with voluntary agreement from all related farmers.	PIA, contractor

Category	Item	Environmental mitigation and consideration measures	Person in charge of
	Gender	○ Participation of women in meeting, workshop, seminar and all activities of the project will be encouraged and promoted. ○ Raising opinions of women on any issues of the project will be encouraged.	PIA, contractor
	Children's rights	○ Regular supervision and inspection will be conducted to inhibit the involvement of children as workforce in the construction activities.	Contractor
	Working conditions (including occupational health and safety)	○ Providing training on task (e.g. working rule and time), healthcare issues and work safety for all workers/farmers. ○ Installation of warning signage and boards, safety tapes at construction site. ○ Providing instructions and trainings on traffic safety rules for all workers, especially ones driving construction vehicles. ○ Timely rest, stretch breaks, job rotation will be provided to mitigate over-exertion and repetitive motion. ○ Providing adequate hydration and taking rest/break frequently for workers/farmers at hot weather conditions. ○ Appropriate PPE (glove, hard hat, safety boots, mask) will be equipped for workers/farmers as necessary.	Contractor
Other	Accident	○ Traffic safety and work safety will be conducted in accordance with IFC guidelines. ○ Inspection on compliment with safety rules will be implemented regularly.	Contractor

8.1.2. Operation Stage

Environmental mitigation and consideration measures in operation stage for different aspects including pollution, natural environment, social environment, and accident are summarized in the following table. Most of environmental management controls will be implemented by the project implementing agency (PIA).

Table 8-2 Environmental Mitigation and Consideration Measures in operation stage.

Category	Item	Environmental mitigation and consideration measures	Person in charge of
Pollution	Water pollution	○ Proper use of fertilizers and pesticides (types, volume, time, etc.) in farming practices will be guided to WUG/farmers. ○ Proper use of fertilizers and pesticides will be inspected regularly.	PIA
	Solid Waste	○ Agriculture waste will be treated to make compost and used for agriculture development. ○ Agriculture waste can be used as burning fuel for local people as well. ○ Used chemical bottles and bags will be properly collected and disposed.	Farmers, PIA
	Soil pollution Bottom sediment	○ Proper storage, handling, and use of pesticides and proper disposal of used chemical container will be implemented and inspected regularly.	Farmers, PIA
Social environment	Minority ethnic & indigenous people	○ Activities of the project will be designed to meet desire of local people and will not harm the life of indigenous people. ○ Activities of the project will be implemented carefully with the agreement of all related farmers, so that no impact on minority ethnic and indigenous people will be taken place.	PIA
	Local economy	○ Irrigation method and cropping plan will be experimented and implemented to achieve the best productivity and sustainability for agriculture development of the project area.	PIA
	Water use	○ Irrigation method and cropping plan will be carefully selected during the project implementation so that water irrigation for all upland area in PRPTIP area in the future will not exceed the planned volume.	PIA
	Conflicts of interest in the region	○ Selection of pilot sites will be done carefully so that no potential conflicts of interest (cropping type, cropping method, irrigation method) will be raised in the project site in the later period of the project. ○ Irrigation method and farming practices will be done only with the consent of all related farmers.	PIA
	Gender	○ Participation of women in meeting, workshop, seminar and all activities	PIA

Category	Item	Environmental mitigation and consideration measures	Person in charge of
		of the project will be encouraged and promoted. o Raising opinions of women on any issues of the project will be encouraged.	
	Children's rights	o Regular supervision and inspection will be conducted to inhibit the involvement of children as workforce in the project activities.	PIA
	Working conditions (including occupational health and safety)	o Providing training on task (e.g. working rule and time), healthcare issues and work safety for all farmers. o Timely rest, stretch breaks, job rotation will be provided to mitigate over-exertion and repetitive motion. o Providing adequate hydration and taking rest/break frequently for farmers at hot weather conditions. o Appropriate PPE (glove, hard hat, safety boots, mask) will be equipped for farmers as necessary.	PIA

8.2. Environmental monitoring plan

8.2.1. Construction stage

Environmental monitoring plan including monitoring items, location in construction stage is shown in the following table. Contractor and the project implementing agency (PIA) will be in charge of monitoring and preparation of its results and will submit the monitoring report at each phase.

Table 8-3 Environmental Monitoring Plan in construction stage.

Category	Object of monitoring	Monitoring item	Monitoring Means	Location	Frequency	Responsible Organizations
Common	Monitoring of mitigation measures			Project site	Once/ month	Contractor(s)
Air Pollution	Air quality at construction site	Status of dust	Visual Inspection	Project site	Once/ month	Contractor(s)
Water Pollution	Wastewater quality from construction site	Status for muddy water formed from construction site	Visual Inspection	Project site	Once/ month	Contractor(s)
Solid Waste	Status of construction waste management	Amount of solid waste generated, reused, and disposed	Visual Inspection, Interview	Project site	Once/ month	Contractor(s)
Noise and Vibration	Noise and vibration level	Status of noise and vibration	Interview	Residential area around the Project site (1 point)	Once/month (peak period)	PIA / Contractor(s)
Involuntary resettlement and land preparation	Status of involuntary resettlement and land acquisition	Record of involuntary resettlement and land acquisition	Interview	Project site	Once/3 months	PIA / Contractor(s)
Minority ethnic & indigenous people	Status of impact to minority ethnic and indigenous people	Record of minority ethnic and indigenous people influenced from the project	Interview	Project site	Once/3 months	PIA
Land use and local resource use	Status of land use change	Record of voluntary land donation process	Interview, measurement	Project site	Once/3 months	PIA / Contractor(s)
Conflicts of interest in the region	Status of conflicts of interest	Record of conflicts of interest	Interview	Project site	Once/3 months	PIA / Contractor(s)
Gender	Status of gender discrimination	Record of women involvement in the project activities	Interview	Project site	Once/3 months	Contractor(s)/ PIA
Children's rights	Status of children's rights	Record of violation of children's rights	Interview	Project site	Once/3 months	Contractor(s)/ PIA
Working conditions	Status of safety conditions	Record of safety conditions	Interview	Project site	Once/3 months	Contractor(s)
Accident	Status of accident	Record of traffic and working accident	Interview	Project site	Once/3 months	Contractor(s)

8.2.2. Operation Stage

Environmental monitoring plan including monitoring items, location in operation stage is shown in the following table. The project implementing agency (PIA) will be in charge of monitoring and preparation of its results and will submit the monitoring report at each phase.

Table 8-4 Environmental Monitoring Plan in operation stage.

Category	Object of monitoring	Monitoring item	Monitoring Means	Location	Frequency	Responsible organization
Common	Monitoring of mitigation measures	-		Project site	Once/ month	PIA
Water Pollution	Water quality of nearby natural water bodies receiving drainage water/storm water from farming practices	pH, NH_4, PO_4, pesticides	Testing	Nearby natural water body (1 point)	Once/crop	PIA
	Status of potential contaminants used for farming practices	Record of fertilizers and pesticides used for farming practices	Visual Inspection	Project site	Once/crop	PIA
Solid waste	Status of agriculture waste management	Amount of waste generated, recycled, and disposed	Visual Inspection, Interview	Project site	Once/crop	PIA
	Status of used pesticides bottles and fertilizer bags	Amount of Collected and disposed properly	Visual Inspection, Interview	Project site	Once/ month	
Soil pollution	Status of potential contaminants used for farming practices	Record of fertilizers and pesticides used for farming practices	Visual Inspection, Interview	Project site	Once/crop	PIA
Bottom sediment	Status of potential contaminants used for farming practices		Visual Inspection, Interview	Project site	Once/crop	PIA
Poor people	Status of poor people	Record of poor people benefited from the project	Interview	Project site	Once/3 months	PIA
Minority ethnic & indigenous people	Status of impact to minority ethnic and indigenous people	Record of minority ethnic and indigenous people influenced from the project	Interview	Project site	Once/3 months	PIA
Local economy	Status of local economy	Record of local economy	Interview	Project site	Once/6 months	PIA
Water usage	Status of water consumption	Amount of water consumed	Interview	Project site	Once/3 months	PIA
Conflicts of interest in the region	Status of conflicts of interest	Record of conflicts of interest	Interview	Project site	Once/3 months	PIA
Gender	Status of gender discrimination	Record of women involvement in the project activities	Interview	Project site	Once/3 months	PIA
Children's rights	Status of children's rights	Record of violation of children's rights	Interview	Project site	Once/3 months	PIA
Working conditions	Status of safety conditions and accident	Record of safety conditions, Record of working accident	Interview	Project site	Once/3 months	PIA

8.3. Institutional Arrangement

The organization structure for pre-construction/construction and operation stages are proposed in Figure 8-1 and Figure 8-2. Herein, DARD stands for Department of Agriculture and Rural Development in Binh Thuan province, while PPC, DPC, and CPC stands for Provincial People's Committee, District People's Committee, and Commune People's Committee, respectively.

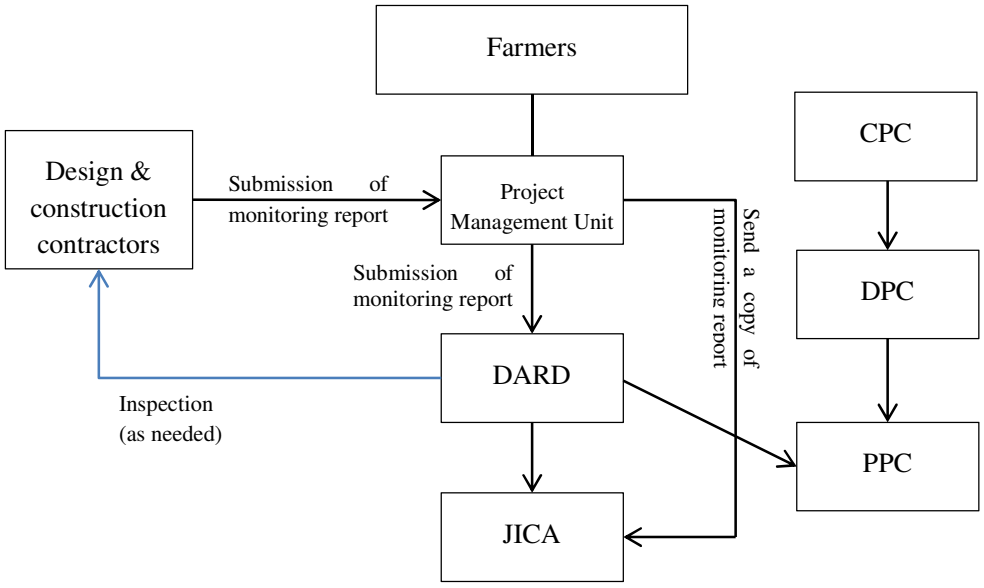

Figure 8-1 Proposed Organization Structure for Environmental Management of the Project in Pre-Construction and Construction stages.

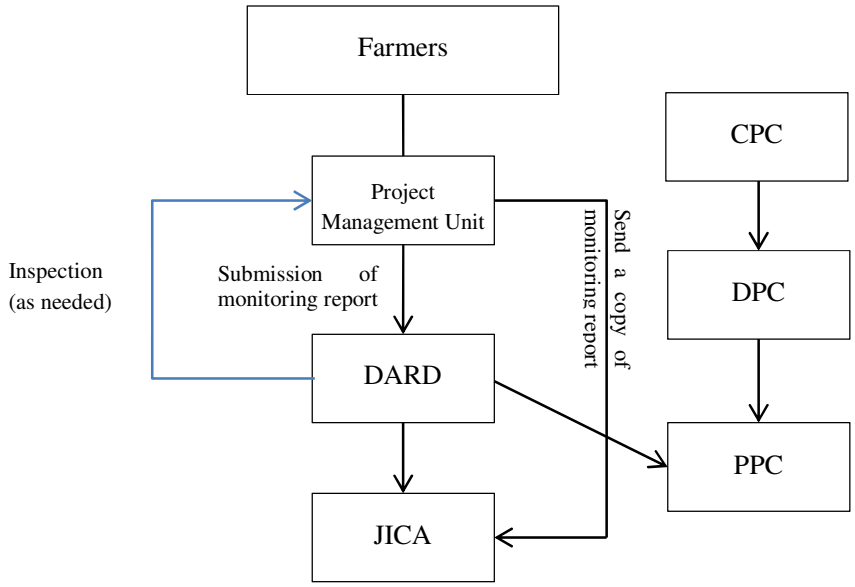

Figure 8-2 Proposed Organization Structure for Environmental Management of the Project in operation stage.

ANNEXES

Monitoring Form

Draft monitoring form below shall be submitted to Project Implementing Agency (PIA).

Construction Stage

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period
Responses/Actions to Comments and Guidance from Government Authorities	[Please write down detail of survey results]

2. Pollution

Monitoring item	Monitoring results during report period	Measures to be taken
Status of dust	[Please write down detail of survey results]	Visual Inspection
Status for muddy water formed from construction site	[Please write down detail of survey results]	Visual Inspection
Status of noise and vibration	[Please write down detail of survey results]	Interview for residents/ farmers

Solid Waste: Visual Inspection & Interview

Item	Unit	Generated amount	Disposal amount	Disposal method
Excavated land	m^3			
Bricks	Kg			
Sand	Kg			
Cement	Kg			

3. Social Environment

Monitoring item	Monitoring results during report period	Measures to be taken
Involuntary resettlement and land preparation	[Please write down number of cases and detail of survey results]	Interview for residents/ farmers
Minority ethnic & indigenous people	[Please write down detail of survey results]	Interview for them
Area of land use for making tertiary and on-farm canals	[Please write down total land preparation area and completion of land acquisition (%)]	Visual Inspection
Record of conflicts of interest	[Please write down detail of survey results]	Interview for residents/ farmers, measurement
Record of women involvement in the project activities	[Please write down detail of survey results]	Interview for them
Record of violation of children's rights	[Please write down detail of survey results]	Interview for them
Record of safety conditions	[Please write down detail of survey results]	Interview for contractor

4. Accident

Monitoring item	Monitoring results during report period	Measures to be taken
Traffic accident	[Please write down number of incidences]	Interview for contractor
Working accident	[Please write down number of incidences]	Interview for contractor

Operation Stage

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period
Responses/Actions to Comments and Guidance from Government Authorities	[Please write down detail of survey results]

2. Pollution

Water Quality: Testing

Item	Unit	Measured value (Mean)	Measured value (Max)	QCVN 08:2008/BTNMT (B1 class)	Measurement point	Frequency
pH	-			**5.5 – 9**		
NH_4	mgN/L			**0.5**		
PO_4	mgP/L			**0.3**		
Pesticides	µg/L					

Fertilizers and Pesticides used for Farming Practices: Visual Inspection & Interview

Item	Unit	Area applied	Calculated ratio (Kg/ha)	Recommended values	Record site	Frequency
Urea	Kg	ha				
NPK	Kg	ha				
K	Kg	ha				
Pesticides	Kg	ha				

Solid Waste

Monitoring item	Monitoring results during report period	Measures to be taken
Amount of waste generated, recycled, and disposed	[Please write down weight of solid waste, type of solid waste, type of management]	Visual Inspection, Interview for contractor
Amount of Collected and disposed properly	[Please write down weight of solid waste, type of solid waste, type of management]	Visual Inspection, Interview for contractor

3. Social Environment

Monitoring item	Monitoring results during report period	Measures to be taken

Monitoring item	**Monitoring results during report period**	**Measures to be taken**
Record of poor people benefited from the project	[Please write down number of cases, detail of survey results]	Interview for them
Record of minority ethnic and indigenous people influenced from the project	[Please write down detail of survey results]	Interview for them
Record of local economy	[Please write down detail of survey results]	Interview for residents/ farmers
Amount of water consumed	[Please write down Water volume (m^3) used for irrigation]	Interview for residents/ farmers
Record of conflicts of interest	[Please write down detail of survey results]	Interview for residents/ farmers
Record of women involvement in the project activities	[Please write down detail of survey results]	Interview for residents/ farmers
Record of violation of children's rights	[Please write down detail of survey results]	Interview for residents/ farmers
Record of safety conditions, Record of working accident	[Please write down detail of survey results]	Interview for residents/ farmers

Environmental Checklist

Environmental Checklist for TC-PRPT Phase-2.

Category	Item	Main check items	Answer (Y/N)	Confirmation of environmental considerations (reasons, mitigation measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N/A (b) N/A (c) N/A (d) Y	(a)(b)(c) This project is not required to prepare EIA reports. (d) Registration for an environmental protection plan to the district's environmental division is required.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) Project design and activities must be agreed by all stakeholders (b) All comments to be reflected
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) N	(a) Alternatives or selection of sites, approaches to be considered carefully.
2 Pollution Control	(1) Water Quality	(a) Are considerations given to water pollution of the surrounding water bodies, such as rivers and groundwater by effluents or leachates from agricultural lands? Are adequate use/disposal standards for fertilizers, agrochemicals, and livestock wastes established? Is a framework established to increase awareness of the standards among farmers? (b) Is a monitoring framework established for water pollution of rivers and groundwater?	(a) Y (b) Y	(a) To provide guide for proper storage, handling and use of pesticides to WUG/farmers (b) Water quality monitoring will be conducted.
	(2) Wastes	(a) Are wastes properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) To provide guide for proper storage, handling and use of pesticides to WUG/farmers
	(3) Soil Contamination	(a) Is there a possibility that impacts in irrigated lands, such as salinization of soils will result? (b) Are adequate measures taken to prevent soil contamination of irrigated lands by agrochemicals, heavy metals and other hazardous substances? (c) Are any agrochemicals management plans prepared? Are any usages or any implementation structures organized for proper use of the plans?	(a) N (b) Y (c) Y	(a) Salt accumulation will not be expected in this area. (b)(c) To provide guide to WUG/farmers
	(4) Subsiden	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the	(a) N/A	(a) Intake of groundwater is not

Category	Item	Main check items	Answer (Y/N)	Confirmation of environmental considerations (reasons, mitigation measures)
	ce	extraction of groundwater will cause subsidence?		planned.
	(5) Odor	(a) Are there any odor sources? Is there a possibility that odor problems will occur to the inhabitants?	(a) N	(a) Offensive odor is not expected.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The nearest protected area is several kilometers from the project site, thus the impact is not anticipated with the type and magnitude of the project's activities.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site or discharge area encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) Is there a possibility that the project will result in the loss of breeding and feeding grounds for valuable wildlife? If they are lost, are there substitutes for the grounds near the original locations? (d) Is there a possibility that overgrazing will cause ecological degradation, such as impacts on wildlife habitats and desertification? (e) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	(a) N (b) N (c) N	(a)(b) This project site does not encompass these types of area. (c) No habitat for protected species are not observed in this area. (d)(e) Impacts on ecosystem and desertification are not expected.
4 Social environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement?	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a)(b)(c)(d)(e)(f)(g)(h)(i)(j) No involuntary resettlement will require for this project. However, careful selection of site and sufficient explanation to farmers should be conducted before voluntary land donation under farmer's agreement will be conducted.

Category	Item	Main check items	Answer (Y/N)	Confirmation of environmental considerations (reasons, mitigation measures)
		(j) Is the grievance redress mechanism established?		
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is proper allotment made for rights to agricultural land use? Is there a possibility that the allotment will result in inequitable distribution or usurpation of land and available resources? (c) Are proper allotments, such as water rights allotment in the project area made? Is there a possibility that the allotments will result in inequitable distribution or usurpation of water rights and available resources? (d) Is there a possibility that the amount of water used (surface water, groundwater) by the project will adversely the downstream fisheries and water uses? (e) Is there a possibility that water-borne or water-related diseases (e.g., schistosomiasis, malaria, filariasis) will be introduced? Is adequate consideration given to public health education, if necessary?	(a) N (b) N/A (c) Y (d) N (e) N	(a) Project provides benefits to farmers. (b) Distribution of land has already properly conducted. (c) Water Users Group will be established in each pilot site. (d) Intake of water will be from the existing irrigation facility. (e) Wide spread of water related diseases was not observed around the project area.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) It was confirmed that there is no cultural heritage in and around the project site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) It was confirmed that there is no important landscape resources and scenic spots in and around the project site
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) Y (b) Y	(a)(b) Pilot sites of the project and its activities will be selected and designed in order to bring benefit to all local people.
	(6) Working conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or	(a) Y (b) Y (c) Y (d) N/A	(a) (b) (c) It is expected that occupational health and safety of farmers during farming practices will be controlled carefully. (d) Security guards will not be required during the operation phase.

Category	Item	Main check items	Answer (Y/N)	Confirmation of environmental considerations (reasons, mitigation measures)
		local residents?		
5 Others	(1) Impacts during Construction	(a) Are adequate measures taken to reduce impacts during construction (e.g., dust, exhaust gases, turbid water, solid wastes, noise and vibration)? (b) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? (c) Are adequate measures taken to minimize accident?	(a) Y (b) N/A (c) Y	(a) Spraying water, simple settling ponds, filling excavated land, etc are planned. (b) No adverse social impact will be expected. (c) Conduct traffic safety and work safety strictly
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) Y	a) An environmental monitoring plan is implemented (b) see section 8.2 of IEE report. (c) see section 8.3 of IEE report. (d) Monitoring form and frequency of report are identified
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry checklist should also be checked. (b) For the projects including construction of large-scale weirs, reservoirs, and dams, where necessary, pertinent items described in the Hydropower, Dams and Reservoirs checklist should also be checked.	(a) N/A (b) N/A	(a) No activities related Forestry sector. (b) No weirs, reservoirs and dams will be constructed.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) The activities of the project are not expected to cause any significant transboundary impacts or climate change.

Note: 1) The target standard: implies the host-country's standard (Vietnam), where available, internationally recognized standard (e.g. WHO, IFC), or the target values set by the Project Proponent.

2) Suggested environmental considerations in the last-right column of this table should be verified, modified, and supplemented in detail by the Project Proponent.