Kingdom of Cambodia: Climate-Resilient Rice Commercialization Sector Development Program

Prepared by Fraser Thomas Partners Ltd. for the Asian Development Bank.

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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>CLAC</td>
<td>commune land acquisition committee</td>
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<tr>
<td>EIA</td>
<td>environmental impact assessment</td>
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<tr>
<td>EMP</td>
<td>environmental management plan</td>
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<tr>
<td>IA</td>
<td>implementing agency</td>
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<tr>
<td>IEE</td>
<td>initial environmental examination</td>
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<tr>
<td>IEIA</td>
<td>initial environmental impact assessment</td>
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<tr>
<td>IRC</td>
<td>Inter-ministerial resettlement committee</td>
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<tr>
<td>MAFF</td>
<td>Ministry of Agriculture, Forestry and Fishery</td>
</tr>
<tr>
<td>MEF</td>
<td>Ministry of Economy and Finance</td>
</tr>
<tr>
<td>MLMUPC</td>
<td>Ministry of Land Management, Urban Planning and Construction</td>
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<tr>
<td>MOE</td>
<td>Ministry of Environment</td>
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<tr>
<td>NGO</td>
<td>nongovernment organization</td>
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<tr>
<td>PGRC</td>
<td>provincial grievance redress committee</td>
</tr>
<tr>
<td>PIO</td>
<td>Provincial Implementation Office</td>
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<tr>
<td>PMO</td>
<td>Program Management Office</td>
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<tr>
<td>RGC</td>
<td>Royal Government of Cambodia</td>
</tr>
<tr>
<td>Rice-SDP</td>
<td>Climate Resilient Rice Commercialization Sector Development Program</td>
</tr>
<tr>
<td>RWG</td>
<td>resettlement working group</td>
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ANNEX 6: INITIAL ENVIRONMENTAL EXAMINATION

I. INTRODUCTION

1. The Climate Resilient Rice Commercialization Sector Development Program (Rice-SDP) will finance policy support, infrastructure, information management and capacity development investments to enhance the production of quality rice, consistent with the Royal Government of Cambodia’s (RGC) ‘Strategy on Agriculture and Water 2010-2013’ and its ‘Policy on the Promotion of Paddy Production and Rice Export’ (the Rice Policy). The Program will support infrastructure development through subprojects in the participating provinces of Battambang, Kampong Thom and Prey Veng. Infrastructure subprojects will include the construction or rehabilitation of irrigation systems, on-farm water conservation structures, paddy drying and storage facilities, or other types of infrastructure that are likely to contribute to the Program impact and outcome, based on selection criteria agreed with key stakeholders (Supplementary Appendix I). Infrastructure improvement will be complemented by soft interventions such as targeted agricultural extension, land leveling, farmer water user community (FWUC) support and other initiatives that add benefit to the investment in civil works under the subproject.

2. The proposed construction of a grain drying and handling facility at Svay Antor, Prey Veng Province, is one of the three representative subprojects selected for preparation during the design phase. The feasibility study for this subproject includes social and environmental safeguards assessment and management plans. This initial environmental examination (IEE) is prepared according to the ADB’s Safeguard Policy Statement of June 2009 and the RGC Law on Environmental Protection and Natural Resource Management (December 1996), further guidance is provided in the Sub-decree on Environmental Impact Assessment (1999).

II. DESCRIPTION OF THE SUBPROJECT

A. Subproject Scope

3. The Subproject involves the establishment of a significant paddy drying and storage facility in a strategic location in Svay Antor District of Prey Veng. The facility will consist of a modern paddy handling complex where the transfer and movement of paddy are carried out mechanically in bulk to minimize the labor requirement of its operation. The facility will comprise: (i) a weighbridge and sampling station to receive and sample the quality of moist paddy, (ii) a covered receival and unloading station with short term storage facilities where bagged paddy is removed from trucks and prepared for bulk handling, (iii) a bulk intake hopper with elevators to deliver moist paddy to the dryers, (iv) the construction of two fluidized bed dryers to bring the moisture content of paddy down from 30% to 19-21% within 3-5 minutes (Stage I dryers), (v) the construction of eight buffer storage bins to hold the paddy flowing from Stage I dryers before passing to Stage II dryers, (vi) the installation of four Louisiana State University (LSU) columnar drying units to bring the moisture level down to 14% (Stage II dryers) within a period of 6-8 hours, (vii) the construction of four storage silos with a combined capacity of 8,000 tons, and (ix) the establishment of bulk loading facilities for dispatching dried paddy to traders and millers. The concept design considers the option of incorporating a de-husking plant to improve the efficiency of storage and also to provide husk for power generation. The power source proposed is a combination of power from the provincial grid and that generated by the burning of husk to power the generators as a means of reducing operational costs.

4. The facility will be established on land to be identified by the provincial government that will be purchased on the open market thereby avoiding resettlement issues. It will have
administration offices and canteen facilities for staff and those delivering to the facility. It will have a perimeter fence and lockable storage facilities to enable the facility to be used as a bonded warehouse for future financing options. The facility will have an extensive concrete apron with appropriate drainage to allow efficient bulk handling of produce. To accommodate this drying and storage equipment, an iron framed building will be constructed with an estimated floor area of 2,800 m² of sufficient height (25 meters) to house the drying equipment and elevators. Concept drawings of the building and plant are presented in SA IV-A3.

B. Subproject Context

5. The proposed facility will serve 3 districts of Prey Veng province, namely Svay Antor, Kamchay Mear and Me Sang. The three districts have a combined production area of 80,700 ha. During the rainy season the area is producing an estimate 225,000 tons of wet paddy. It is estimated that the proposed facility will attract 25% of this production for drying before being sent to rice mills, some of which exist in the district.

6. The shortage of rice drying facilities within ready reach of farm enterprises is a constraint on the production of quality rice for production, forcing many farmers to sell wet paddy direct to buyers from neighboring countries. In 2010, an estimated at 1.87 million tons of wet paddy is exported to Viet Nam and 0.33 million tons to Thailand, where modern facilities are available. Processing facilities in most of the country are rudimentary, featuring significant crop losses, non-uniform drying, higher proportions of cracked grains and higher risks of fungal growth. The development of drying and storage facilities accessible to cooperatives is a given priority by the Ministry of Agriculture and Forestry (MAFF) for the implementation of the rice policy.

III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

7. The primary legislation for environmental assessment in Cambodia is the Law on Environmental Protection and Natural Resource Management (December 1996), further guidance is provided in the Sub-decree on Environmental Impact Assessment No. 72.ANRK.BK of August 1999.

8. Article 6 of the Law on Environmental Protection and Natural Resource Management states that an environmental impact assessment (EIA) shall be done on every project and activity, private or public, and shall be reviewed and evaluated by the Ministry of Environment (MOE) or its provincial departments before being submitted to RGC for approval. General provisions for each EIA, the institutional responsibilities, requirements for EIA procedures and conditions for approvals are covered in that Sub-decree. A two stage process is specified for environmental assessment, similar to that required by the ADB, whereby an Initial Environmental Impact Assessment (IEA) is prepared for most projects. The IEA may either suffice for environmental clearance, or form the basis for a more substantial EIA. An Annex of the Sub-decree specifies the types of project that require an IEIA and if appropriate, EIA. The required scope and format of the IEIA resembles that of the IEE required under ADB requirements (ADB Safeguards Policy Statement, 2009).

9. Under the Sub-decree, MOE is responsible for review of IEIAs and EIAs and to collaborate with the line ministries. The MOE has the authority to approve or reject a project. The Council for the Development of Cambodia has overall jurisdiction over projects and also has the power to comment and require amendments or additions to IEIAs and EIAs. The MOE has further responsibility in the monitoring of project implementation. The MOE implements these responsibilities through its Department of Environmental Impact Assessment and Monitoring. Besides the MOE, other ministries with responsibility for the
project have the right to examine and approve projects, following MOE review. Provincial and Urban authorities with responsibility for the project are required to ensure that Project Owners prepare EIAs and submit them to the Provincial Environment Office.

10. The primary responsibility for undertaking environmental assessment of projects lies with the Project Owner, and the assessment work is carried out by the Project Owner or consultants retained for the purpose.

11. The specified IEIA/EIA process consists of the identification of environmental impacts, review and examination of alternatives to the proposed project and the communication of information to stakeholders. A report format is also specified in Annex 7 of the Sub-decree. In the case of both IEIAs and EIAs, MOE is required to respond, providing findings and recommendations to the Project Owner, within thirty working days of submission.

12. Article 1 of the Sub-decree states that public participation is to be encouraged in the implementation of the IEIA process so that the conceptual inputs and suggestions of the public are to be taken into account for consideration prior to the implementation of any project.

13. Of further relevance to grain drying and handling facilities is the Sub-decree on Air Pollution and Noise Disturbance (2000), which provides air pollution and noise quality standards.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Topography, Geology and Soils

14. The subproject is situated on flat land, characteristic of much of the floodplain of the lower Mekong Basin. The land has been formed by sedimentation during the Pleistocene epoch (between 10,000 and 2.5 million years ago), causing a layer of deposits in the order of 100 m deep, over the largely sandstone parent rock beneath. Soils in the area are primarily brown alluvial soils and are generally suitable for rice production.

B. Climate

15. Cambodia has a moist tropical climate, classified as equatorial monsoonal, consistent with its location 10-13 degrees North of the equator. The climate features warm to hot temperatures throughout the year and an annual monsoon cycle of alternating wet and dry seasons. The main wet season, the southwest monsoon, occurs between June and October, when reduced air pressures over Central Asia cause air to be drawn landward from the Indian Ocean. Approximately 80% of all rainfall occurs during this season. Conversely, during the cooler months between November and May, air flows over Cambodia originate from Central Asia and are drier, resulting in cooler and less rainy weather.

16. The average annual rainfall, determined from rain gauge data in the vicinity, is 1,356 mm, with a distinct dry season between December and March. The onset of wet-season rains typically occurs in late March, but can be as early as the beginning of March or as late as mid-April.

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2 Peel, M. C., Finlayson, B. L., and McMahon, T. A. (2007), Updated world map of the Köppen-Geiger climate classification. Hydrology and Earth System Sciences, University of Melbourne
C. Water Resources

17. No significant river or stream flows through or near Svay Antor township. Farmers in the surrounding area grow mainly rain-fed rice. Within Svan Antor District, 9% of wet season rice land has access to irrigation water, mostly to the southeast of Svay Antor township where some land is reached via a canal system. Around a quarter of the wet season rice land receives some irrigation water from groundwater sources. Groundwater reserves are however, of greater significance for domestic supply and the integrity of shallow and deep reserves is important.

18. The subproject area, and much of Cambodia, is within the Lower Mekong Basin where flooding takes place regularly. People and farming systems are vulnerable to variability in flood levels and this vulnerability is heightened by the effects of climate change. The Inter-governmental Panel on Climate Change predicts increasing difficulties to lives and livelihoods caused by more frequent storm events and extreme weather conditions in the Mekong subregion. The lower Mekong Basin has suffered successions and combinations of droughts and floods over the last two decades as well as in the more distant past. Flooding that occurred in 2000 is believed to be the most severe in Cambodia in 70 years, while severe flooding also occurred in 1996, 2001, 2002 and 2011.

D. Land Use

19. Land-use in Svay Antor District remains predominantly agricultural, despite the shortage of irrigation water. Land surrounding Svay Antor township consists of non-irrigated fields, on which a single, wet season crop of rice is grown each year. Svay Antor township is situated on National Route No.11, at a junction with a provincial road serving the east of Prey Veng. Developing as a market town at this significant junction location, it also has the potential to expand into industrial activity, and already has a modern rice mill. The district center has assumed greater economic significance with the upgrading of National Route No.11 that provides an excellent transport route with low population densities to disrupt traffic between Phnom Penh and Viet Nam.

E. Ecological Resources

20. The tradition of rice growing over much of the lower Mekong flood-plain is long established, and the landscape is dominated by rice fields and the myriad of roads that serve them. Clusters of trees, mainly round villages and individual home complexes, are scattered among the fields, comprising fruit trees. Sugar palms grow more widely throughout the rice growing area.

21. There are no protected areas in the southeastern provinces of Cambodia - Prey Veng, Svay Rieng, Kandal and Takeo.

22. The seasonally flooded fields and small streams are important habitats to fish, aquatic reptiles and amphibians. Around 850 species have been recorded in the Mekong River Basin. Fish form an important part of the rural diet and economy. Some 35 species are commonly caught from paddy fields and streams. A large number of species are migratory, crossing the rivers to the floodplains to spawn, or longer distance from floodplains of the lower Mekong to the Mekong mainstream.

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F. Items of Historical and Archaeological Significance

23. Ancient structures, mainly temples and shrines but sometimes bridges and water storage or control structures are common over the Cambodian landscape, with the major cluster in the Angkor temple complex within Siem Reap. However, no temples or shrines are located in Svay Angkor. There is a small, though very limited, possibility that artifacts, or other items of historical or archaeological significance, are found during excavation work.

G. Human and Economic Development

1. Livelihoods

24. Livelihoods in Prey Veng are based almost entirely on agriculture. Migration out of the province is high, as young people search for work in larger urban centers or elsewhere. Prey Veng and Kg. Cham have the highest rates of outward youth migration in the country. The situation is epitomized in Svay Antor, which is heavily reliant on rice production for its economy, with livestock and poultry offering secondary sources of income. The National Committee for Sub-National Democratic Development reports no significant production other than rice for 2009, 21% of families raise cattle or buffalo, 32% raise pigs, 80% keep chickens and 15% raise ducks. The province is not a significant contributor to the inshore fish catch, and only 3% of families in Svay Antor District are involved fish raising or fishing at any level. Many rural families do not have regular cash incomes, either because of access constraints, lack of landholdings and shortage of employment opportunities and are often dependent on remittances by non-resident family members working away from home, most often in the construction and garment industries.

2. Poverty Levels

25. While the findings of some recent surveys suggest that there has been a decline in levels of poverty in Cambodia in recent years, this has not occurred evenly around the country. The incidence of poverty remains high. Globally induced factors along with domestic ones that influence inflation not only threaten rate of decline in poverty but could cause the recent encouraging trends to actually recede. The most recent estimate of poverty in rural Cambodia suggests a poverty level of 28% while poverty rates identified in the socio-economic baseline survey for the subproject suggest a figure of approximately xx% (further socio-economic details are presented in Annex SA IV-A2). Within Svay Antor, the incidence of poverty is declining under the improved connectivity through National Route No.11 and the consequent economic activity that has attracted. The Ministry of Planning reports poverty levels in the three Svay Antor communes.

Table SA IV-A6.1: Poverty Levels in Impacted Communes of the Subproject

<table>
<thead>
<tr>
<th>Commune</th>
<th>Incidence of Poverty (%)</th>
<th>2004</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baray</td>
<td>32.3</td>
<td></td>
<td>27.1</td>
</tr>
<tr>
<td>Cheung Tuek</td>
<td>27.1</td>
<td></td>
<td>19.3</td>
</tr>
<tr>
<td>Kampong Leav</td>
<td>28.9</td>
<td></td>
<td>4.3</td>
</tr>
</tbody>
</table>

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5 NCDD (2009) Svay Antor Krong Data Book
6 Ministry of Planning / GIZ IDPoor project, in Svay Antor Krong Data Book (2009) produced by NCDD.
3. Health

26. Access to water supply and sanitation in the district is high, most homes having a water supply at the home. The District has four clinics, and there is access to hospitals in Prey Veng township. The incidence of infant mortality in 2008 was 13 for every 1,000 live births. Pesticides pose a severe health risk if they are applied incorrectly and without the use of protective clothing and members of one co-operative interviewed by the design team reported a recent death following handling of pesticides. Part of the problem has been a lack of instruction on how to handle and use pesticides. The law now requires that pesticides are packaged and sold with clear instructions in Khmer and this is enforced by staff of the Provincial Department of Agriculture.

4. Unexploded Ordnance

27. Unexploded ordnance from the recent civil conflict is evident in the Province and specialist investigation and bomb disposal has been practiced in road development projects in the past. While the subproject site is in an area that is largely built-up, and previously regularly cultivated, there is some chance that unexploded ordnance exists within the depth that has to be excavated for building foundations. However sites proposed will require some fill to elevate the areas above extreme flood levels and the likelihood of exposure to unexploded ordnance is extremely small.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Method of Assessment

28. Potential impacts have been assessed through a site visit to Svay Antor, discussions with stakeholders, review of experience of other construction and agro-industrial development projects\(^7\) and a review of secondary sources of information.

B. Environmental Impacts Related to Location

29. The facility will be located in a commercial area that is expanding as a market center following improvements to the national road network. The site has good road access for both the construction and operation phases. The scope of the Subproject will involve raising the surface level of the ground and construction within the land allocated to the grain drying and storage facility. A Land Acquisition and Resettlement Plan for the Subproject is not relevant as the land will be purchased on the open market at prevailing prices by the Government from a willing seller and there will be no need for any compensation.

30. The area is on a floodplain, susceptible to severe floods. Flooding causes risks of release of waste from the grain handling process and from toilets within the facility. These can be mitigated by the construction of treatment ponds on raised platforms, and the installation of valves on onsite sewage treatment plant.

31. There are no protected areas in, or around the proposed site, as described in Section IV.F. There are no buildings, temples or items of cultural significance that will be affected by the works. The area required for the subproject is estimated between 6-10 ha in a discrete parcel to allow for expansion if the pilot is demonstrated to be successful.

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\(^7\) JICA financed a pilot Open Paddy Market in this district within the area suggested for the drying and storage facility that has since been converted into a garment factory.
C. Environmental Impacts Related to Construction

32. Construction activities will cause environmental impacts that are potentially significant, although in most cases they can be mitigated. In all cases, effects are temporary. Mitigation measures are stipulated in an Environmental Management Plan (EMP) which is to be included in bid documents, allowing bidding contractors to include the cost of mitigation in their pricing.

33. Fill will be required to construct a raised building platform, and platform for the siting of water treatment ponds. The Contractor must submit to the supervising consultants the proposed location or locations for obtaining the fill, demonstrating that (i) an agreement has been made with the landowner(s) and including any details of the agreement, such as site remediation after excavation, (ii) that excavation of the fill at the proposed site(s) will not cause risk of erosion, public safety hazard, or potential damage to a public asset such as a road or building.

34. The preparation of foundations for the building that will house the facilities will involve excavation (albeit upon a filled area). Excavation operations may result in the release of silt and dust. Some or all of the material produced by the excavations will be used on site to create a raised platform for treatment ponds. Silt will be used wherever there is scope for run-off water from the site to carry silt to surrounding land. When excavation takes place during dry conditions, excavated surfaces and stockpiled material shall be sprayed with water to prevent the release of dust.

35. All plant and vehicles used for construction shall be in good repair, fitted with exhaust and noise baffles to ensure that the release of exhaust fumes are kept to acceptable levels. To avoid noise nuisance, construction operations will be confined to working hours, between 7 am and 6 pm. Advance notice of construction will be publicized by displaying notices at the site prior to construction and via commune council offices.

36. All plant and vehicles shall be operated by trained and, where appropriate, licensed operators.

37. Much of the labor and some of the skilled labor required for the work will be obtained locally, however contractors are likely to bring staff from other parts of Cambodia, who will be accommodated locally during construction, either in rented accommodation or in temporary housing. Interactions with local residents can potentially lead to the spread of communicable diseases, social disturbance and the release of raw sewage from temporary toilets. Potential effects will be mitigated by (i) maximizing employment form local residents, to the extent practicable, (ii) construction of suitable toilets such as pit latrines on sites identified by local communities, and arrangements for grey water treatment and discharge, such as soakage pits, to minimize the release of pollutants into waterways, (iii) arrangements for collection of solid waste, (iv) information to workers and villagers on potential risks of infection and social problems, including advice on avoidance of such problems, and (v) allocation of responsibility to an on-site member of the contractor’s staff to ensure that these measures are observed continuously.

38. Construction work will involve the erection of the main building and installation of structures and machinery. The work may pose potential hazards to workers, for example from falling objects and local residents, for example from the movement of large vehicles in and out of the work site. Protective clothing shall be issued to workers wherever appropriate including steel toe-capped boots and hand protection when working on excavations, and dust masks when working in dusty conditions. Provision shall be made for safe storage and use of hazardous materials such as fuels and lubricants. Each contractor shall prepare a site safety plan and obtain approval for it from the supervising agency prior to the start of works.
An on-site member of the contractor’s staff shall be responsible for the implementation of the safety plan.

D. **Environmental Impacts Related to Operation**

39. The facility will be housed in a large industrial scale building constructed for the purpose and will contain storage and transfer bays and specially designed high capacity machinery for processing functions. Potential health and safety hazards to workers include accidental contact with moving parts, noise nuisance and respiratory problems from dusty conditions. These risks are mitigated by the inclusion of safety railings, and by training and instruction to workers.

40. Power generation, by means of a gasifier fed by rice husk or diesel generation, or a combination, will produce exhaust gas. The gasification process causes the organic material of which the husk is formed to be converted to a producer gas, which is a clean fuel which is then burned to produce electrical power. Gasification results in more complete breakdown of the organic material, and minimal release of particulate pollutants. The feasibility of using gasification depends on the quality and volume of husk produced, and availability of skilled technical services for periodical maintenance of the gasifier plant. A small amount of gas is produced by the gasification process, which shall be collected during regular cleaning of the plant and provided to local farmers to make use of its nutrient content.

41. In the event that a gasifier does not prove feasible, a diesel generation plant shall be installed. Any diesel generation plant will conform to Electricity Authority of Cambodia standards, will be fitted with exhaust baffles, exhaust fumes shall be released at a height of not less than 15 m above the ground and at least 20 m away from any raised working platform, and shall be subject to regular routine maintenance.

42. Dust produced by the drying process will be collected by passing dust laden air from the dryer into a chamber where water is introduced by a series of sprayers. The water spray causes the dust to collect and form a slurry which is non-toxic and can be provided to farmers for re-use as a soil conditioner. The schematic design of the dust collection system is shown in Figure SA IV-A6.1. The dust removal system is expected to bring ambient dust levels within the plant to acceptable levels. However, dust masks will be made available for workers, and dust levels will be monitored. Should dust levels within the plant exceed the national standard (less than 0.33 mg/m$^3$ of total suspended particles in ambient air) the use of dust masks by workers will be made mandatory.

43. Water from the dust removal plant will be combined with condensate from the dryer and will be treated in settling ponds, to enable organic matter to be extracted, and provided to farmers as a slurry. The settling ponds shall be on a raised platform, at least 0.5 m above the height of 10 year flood levels.

44. Noise within the facility will be reduced by the inclusion of noise baffles on machinery and ear protection is provided where necessary.

45. To ensure sanitary conditions in and around the facility, an on-site system of treatment of sewerage from workers’ toilets will be included in the design. An assessment of the adequacy of the water supply within Sway Antor will be made to test the water quality and quantity. If water from the supply is not potable or available in adequate quantity, alternative sources of water shall be investigated, which may include the collection and storage of rain water (as a partial supply), or use of groundwater. Provision shall be made for treatment for use to render it safe for washing purposes, while potable water shall be obtained from a supply approved by the Ministry of Industry, Mines and Energy.
46. The site will be prone to periods of intense rainfall during storm events and may be subject to occasional flooding. The design of the building will therefore include provision for drainage of a specification sufficient to handle storm-water flows, and safe draining of receding flood water when this occurs. The drainage system will be sufficient to prevent the formation of ponds and muddy patches within the facility compound. Adequate fill is proposed to raise the ground level to a height that poses little risk from flooding.

**Figure SA IV-A6.1: Schematic Design of the Dust Collection System**

E. Global, Trans-boundary and Cumulative Impacts

47. The Subproject as a pilot, is intended to gather experience in the establishment of further paddy drying and storage facilities around the country, with the cumulative effect of expanding drying and storage capacity in Cambodia, substantially alleviating the current disadvantage to Cambodian farmers whereby they are forced to sell wet paddy to buyers from Viet Nam and Thailand.

48. The successful installation of dust control and worker safety measures will provide examples of good practice in providing replicable examples of healthy working environments in an industrial setting around the country. Similar measures may be taken up by other industries.
49. The wider availability of safe and high standard grain drying facilities will mean fewer farmers have to resort to on-farm drying, which can be problematic when crops are exposed to contamination by vehicle fumes and similar, and drying is often uneven through the crop, creating most pockets where fungus can develop.

50. Reducing dependence on drying and storage facilities in neighboring countries will have an impact on trans-boundary trade. However no trans-boundary environmental impacts are envisaged.

VI. ANALYSIS OF ALTERNATIVES

51. Alternative means of ensuring access by farmers to grain drying and storage facilities are (i) allowing the existing situation, where facilities in neighboring countries are used, (ii) promotion of on farm drying, and (iii) provision of fewer, larger scale facilities. The existing situation would allow current constraints on profitability to remain, where price is controlled by buyers from neighboring countries, and less thorough on-farm and ad hoc drying continues. The promotion of on-farm drying offers little scope to improve current practices, as many farmers have insufficient land to use for drying surfaces and are non-agricultural flat areas such as road verges, where the crop is subject to contamination by vehicle fumes and pathogens on the ground, as well as uneven drying and the potential for fungal infestation to develop.

52. The “no project” alternative would mean either, the substitution of the Subproject with an alternative eligible subproject, or continued reliance on foreign facilities or on-farm facilities. Private companies may take advantage of the opportunity to provide grain drying, but this may develop over a protracted period in the absence of the Subproject which, as a pilot will replicable example of a well designed and constructed facility.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Consultations and Information Disclosure during Design

53. Consultations were conducted during visits to the project site and Prey Veng town during April and May 2012, which took place to undertake subproject screening and design tasks. The subproject was discussed with the Governor’s office, and with the directors of the Provincial Department of Land Management, the Provincial Department of Commerce, the Provincial Department and the deputy directors of the Provincial Department of Water Resources and Meteorology and the Provincial Department of Agriculture.

54. Discussions were held with farmer co-operatives at the villages of Anglong Sar, to the north of Svay Antor, and Kampong Thnal and Kampong Trabek in the southern part of the subproject area of impact. In relation to the proposal to provide improved grain handling facilities accessible to the farmers, respondents did not raise any concern.
### Table SA IV-A6.2: Summary of Consultations

<table>
<thead>
<tr>
<th>Date</th>
<th>Consultee Group</th>
<th>Matters Raised</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| 01.05.2012 | Meeting at the provincial Governor office attended by Provincial Governor, director PDWRAM, director PDA, director of Land Management, Urban Planning and Construction, director of provincial department of Commerce 12 participants | Overall project and background information  
Explanation on progress of subproject preparation, including plans for field data collection.  
Description of issues related to irrigation schemes  
Discussion on capacity development needs for correct use of pesticides and fertilizers | Understanding of the sector project and sub-project ’s goals and objectives. The Governor confirmed his administration’s appreciation for subprojects within the province and readiness for cooperation.  
Other priorities:  
- Training on proper use of pesticides and fertilizer and pesticides  
- Soil quality: much of the soil in the province has a high clay content and can be acidic  
- The main flood risks in the provinces are in Srok Prasat Balang and along the Tonle Sap. Svay Antor is not in a high flood risk area. |
| 02.05.2012 | Consultation with Farmer Cooperative in Anlong Sar village, Rumlech commune Sithor Kandal district.  
Farmer cooperative for agricultural development Kroch, Kansom Ork, Kampong Trabek district (Southern part of the province)  
Farmer Cooperative for agricultural development in Bopea Sen Chey, Kampong Thnal village, Lvea commune, Srok Preah Sdech | Overall project and background information  
Introduction of the subproject investment proposal | Discussion on the sector project and subproject objectives.  
Principal concerns of the farmers are on soil quality and risks from the use of pesticides. Little training has been available to farmers in proper use of agrochemicals.  
Wildlife in the area is depleted, few animals have been seen for many years. |

### B. Further Information Disclosure

55. A summary of this initial environmental examination (IEE) will be presented to district and commune officials and the public, and to the Provincial Department of Agriculture and Provincial Department of Land Management in Prey Veng. Copies will be left for review for a period of 30 days.

56. During construction and operation, communities in and around the subproject area will kept informed of construction activities that are likely to cause noise and dust nuisance.
VIII. GRIEVANCE REDRESS MECHANISM

57. A grievance redress mechanism has been developed for the SDP. This is described in the ensuing paragraphs:

58. People who may be affected by the Subproject or concerned about their environmental impacts are entitled to lodge complaints regarding any aspect of the preparation and implementation of the Subproject.

59. The objective of the grievance redress mechanism is to resolve complaints as quickly as possible and at the local level through a process of conciliation; and, if that is not possible, to provide clear and transparent procedures for appeal.

60. A well-defined grievance redress and resolution mechanism will be established to resolve grievances and complaints in a timely and satisfactory manner. All affected persons will be made fully aware of their rights, and the detailed grievance redress procedures will be publicized through an effective public information campaign. The grievance redress process applies to potential resettlement and land acquisition issues as well as to environmental issues and includes four steps of which three are followed before complaints may be elevated to a court of law as a last resort, as follows:

(i) 1st step: Complaints and grievances will be provided verbally or in writing to the village chief, commune chief, or the commune land acquisition committee (CLAC). The receiving agent will provide immediate written confirmation of receiving the complaint. If after 15 days the complainant does not hear from the village and commune chiefs or if he/she is not satisfied with the decision taken in the first stage, the complaint may be brought to the District Office.

(ii) 2nd step: The District Office in cooperation with the resettlement working group (RWG) has 15 days within which to resolve the complaint to the satisfaction of all concerned. If the complaint cannot be solved at this stage, the District Office will bring the case to the Provincial Grievance Redress Committee (PGRC) and has to inform the complainant.

(iii) 3rd step: The PGRC meets with the aggrieved party and tries to resolve the situation. Within 30 days of the submission of the grievance, the Committee will make a written decision and submit copies to the EA (including Inter-Ministerial Resettlement Committee, IRC) and IAs.

(iv) 4th step: If the aggrieved person does not hear from the Provincial Grievance Redress Committee or is not satisfied, s/he can bring the case to Provincial Court. The Court will make a written decision and submit copies to the EA and IAs. If any party is still unsatisfied with the Provincial Court judgment, he/she can bring the case to a higher-level court.

61. It is recognized that, in many cases, people with a grievance may not have the writing skills or be able to express their grievances verbally, however, complainants are encouraged to seek assistance from the independent monitoring organization (IMO), the nominated local NGOs or other family members, village heads or community chiefs to have their grievances recorded in writing and to have access to project documentation, and to any survey or valuation of assets, to ensure that where disputes do occur all the details have been recorded accurately enabling all parties to be treated fairly.
62. The Program Management Office (PMO) and Provincial Implementation Office (PIO) will shoulder all administrative costs incurred in the resolution of grievances and complaints within the project-level grievance redress mechanism. If the complainant seeks grievance redress through country-level judicial and administrative mechanisms, the requirements and procedures applicable to the relevant jurisdiction shall apply.

63. All complaints and resolutions will be properly documented by the concerned resettlement committee and be available for the public and review for monitoring purposes.

64. Safeguard monitoring reports will include the following aspects pertaining to progress on grievances: (a) number of cases registered with the PGRC, level of jurisdiction (first, second, and third tiers), number of hearings held, decisions made, and the status of pending cases; and (b) lists of cases in process and already decided upon may be prepared with details such as name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e. open, closed, pending).

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Responsibilities for Environmental Management

65. The mitigation measures required for the construction and operation of the improved infrastructure are described in Table SA IV-A6.3 VI-A6.3 where the allocation of responsibility for meeting costs of mitigation are shown. The provincial department of agriculture has overall responsibility for implementing the EMP and during the design and construction phases, will be supported by the PIO. The PIO will be supported by the program implementation consultants. This support will be co-ordinated by the PMO in Phnom Penh.

66. The EMP should form part of the works contract documentation so that the contractor in each case incorporates the cost of mitigation into the bid price, including provision of staff and equipment necessary to carry out all mitigation tasks in full.

67. During facility operation, responsibility for mitigation rests primarily with the entity that will be awarded the public private partnership agreement, supported by relevant government agencies.

<table>
<thead>
<tr>
<th>Potential Environmental Impact</th>
<th>Mitigation measure(s)</th>
<th>Cost Allocation</th>
<th>Responsibility for Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Hazards to workers and local people, and effects of temporary worker populations in the area</td>
<td>Preparation of plans by the Contractor, allocating responsibilities for safety, health and welfare to senior staff; preparation of plans for first aid and emergency procedures; preparation of plans for satisfactory accommodation of workers (if required), and of information and instruction to be disseminated to workers regarding risks of communicable diseases.</td>
<td>Negligible</td>
<td>Contractor</td>
</tr>
<tr>
<td>Potential Environmental Impact</td>
<td>Mitigation measure(s)</td>
<td>Cost Allocation</td>
<td>Responsibility for Implementation</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Potential for waste from the grain drying and treatment processes and from toilets within the facility to be released during severe flooding events</td>
<td>Design provision of raised platform for treatment ponds and suitable design of onsite sewage treatment installation (either inclusion of valves to prevent release of raw or partially treated sewage, or placement of facilities on raised platform. Design of suitable retention of raised platform (retaining wall, and/or engineered slope) to prevent erosion from the platform and release of silt</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Health risks associated with dust produced by the drying and transfer processes</td>
<td>Inclusion in the detailed design of a dust collection, wetting and collection unit</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Health risks associated with noise from the plant</td>
<td>Inclusion in the detailed design of baffles on processing machinery</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Availability of safe drinking water</td>
<td>Investigation of quality and quantity of the water supply within Svay Antor, and if necessary provision of water collection, treatment and storage facilities to ensure that sufficient clean water is available to workers.</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Development of ponds around the facility after wet weather</td>
<td>Provision in the design for adequate site drainage, sufficient to handle storm-water flows and to allow safe drainage of receding flood water.</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Worker safety risks</td>
<td>Inclusion in the detailed design safety rails wherever there is a risk of falling, or contact with moving machinery</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
</tbody>
</table>

**Impacts from Construction**

<table>
<thead>
<tr>
<th>Potential Environmental Impact</th>
<th>Mitigation measure(s)</th>
<th>Cost Allocation</th>
<th>Responsibility for Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release of silt during excavation or from stockpiled material</td>
<td>Adequate supervision of the works and use of silt traps around excavations and stockpiled material.</td>
<td>Construction Cost</td>
<td>Contractor</td>
</tr>
<tr>
<td>Dust, fume and noise emissions from construction operations.</td>
<td>Maintenance of vehicles and plant in good repair, ensuring that exhaust baffles are properly fitted. Wetting of bare soil surfaces and stockpiled material as required to prevent</td>
<td>Construction Cost</td>
<td>Contractor</td>
</tr>
<tr>
<td>Potential Environmental Impact</td>
<td>Mitigation measure(s)</td>
<td>Cost Allocation</td>
<td>Responsibility for Implementation</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Effects of temporary worker populations</td>
<td>(i) maximizing employment of local residents, to the extent practicable, (construction of suitable toilets such as pit latrines on sites identified by local communities, and arrangements for grey water treatment and discharge, such as soakage pits, to minimize release of pollutants into waterways, (iii) arrangements for collection of solid waste, (iv) briefing of workers and awareness raising of the local population on dangers of communicable diseases and (v) assignment of responsibility for worker and local peoples' welfare to a senior member of the Contractor's staff.</td>
<td>Construction Cost</td>
<td>Contractor</td>
</tr>
<tr>
<td>Safety hazards to workers and local people</td>
<td>Allocation of responsibility for site safety to the Contractor's site supervisors staff, who will ensure that all reasonable safety measures, such as use of safety clothing and equipment and placing of hazard warnings are taken.</td>
<td>Construction Cost</td>
<td>Contractor</td>
</tr>
<tr>
<td>Risks of unexploded ordnance</td>
<td>Survey of site by licensed UXO survey contractor, prior to excavation operations</td>
<td>Construction Cost</td>
<td>Contractor</td>
</tr>
<tr>
<td>Impacts from Operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential for waste from the grain drying and treatment processes and from toilets within the facility to be released during severe flooding events</td>
<td>Design provision of raised platform for treatment ponds and suitable design of onsite sewage treatment installation (either inclusion of valves to prevent release of raw or partially treated sewage, or placement of facilities on raised platform. Design of suitable retention of raised platform (retaining wall, and/or engineered slope) to prevent erosion from the platform and release of silt</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Release of pollutants from power generation</td>
<td>If a diesel generation plant is used, it shall conform to all relevant requirements of the Electricity Authority of Cambodia, shall be fitted with exhaust baffles, and located such that exhaust fumes are released at a height of not less than 15m above the ground and at least 20m away from any raised working platform. The plant shall be subject to regular routine maintenance.</td>
<td>Design cost / maintenance cost</td>
<td>Plant operators</td>
</tr>
<tr>
<td>Health risks associated with dust produced by the drying and transfer processes</td>
<td>Inclusion in the detailed design of a dust collection, wetting and collection unit. Availability of dust masks, the use of which will be mandatory if monitoring reveals that dust levels within the plant exceed the national standard of 0.33 mg/m³ of total suspended particles</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Health risks associated with noise from the plant</td>
<td>Inclusion in the detailed design of baffles on processing machinery</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Potential Environmental Impact</td>
<td>Mitigation measure(s)</td>
<td>Cost Allocation</td>
<td>Responsibility for Implementation</td>
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<td>-----------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Availability of safe drinking water</td>
<td>Investigation of quality and quantity of the water supply within Svay Antor, and if necessary provision of water collection, treatment and storage facilities to ensure that sufficient clean water is available to workers.</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Production of dust from drying and handling, and ash from the gasification process</td>
<td>Dust laden water from the dust removal system, as well as condensate form the drying process, will be fed to settlement ponds on site to enable safe collection of particulate organic matter as a slurry to provide to farmers as a soil conditioner.</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Ponding around the facility after wet weather</td>
<td>Provision in the design for adequate site drainage, sufficient to handle storm-water flows and to allow safe drainage of receding flood water.</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
<tr>
<td>Worker safety risks</td>
<td>Inclusion in the detailed design safety rails wherever there is a risk of falling, or contact with moving machinery.</td>
<td>Design cost</td>
<td>PMO consultants / Implementation consultants</td>
</tr>
</tbody>
</table>

B. Environmental Monitoring

68. Environmental issues associated with the subproject that merits monitoring are: (i) compliance with EMPs during construction and operation to ensure that the required monitoring takes place, (ii) noise and dust nuisance during construction, and (iii) noise, dust and safety issues during operation.

69. Construction impacts will be limited, partly because most construction sites will be distant from homes, and also because effects will be short lived and, if EMPs are properly implemented, significantly mitigated. No monitoring other than for compliance with EMPs is recommended.

70. It is therefore recommended that monitoring is confined to monitoring for compliance with EMPs and basic water quality monitoring.

   a. Monitoring for Compliance with EMPs

71. To ensure that potential environmental problems are detected and addressed appropriately, environmental monitoring will take place during construction and operation of each subproject. During construction, the key tasks are monitoring the compliance with environmental mitigation measures in the environmental management plan for each subproject, which shall be done by the construction supervision team. During operation, responsibility for monitoring shall rest with the provincial departments.

   b. Testing for Noise and Dust Levels

72. Ambient air within grain drying and handling plant will be tested to measure total suspended particles. The required standard is less than 0.33 mg/m³ of total suspended particles, given in Annex 1 of the Sub-decree on Air Pollution and Noise Disturbance (2000). Tests will be carried out by an independent laboratory, and undertaken once per year during operation, at each plant.
73. Noise levels will be determined with an integrating noise meter. The maximum noise level in a workshop, specified in Annex 7 of the Sub-decree on Air Pollution and Noise Disturbance (2000) is 85 dB(A). This should be taken as the continuous noise equivalent level of 85 dB(A) Leq, and determined by using an integrating noise meter. Readings and analysis will be taken by an independent laboratory, and will be undertaken once per year during operation, at each plant.

74. The findings from the monitoring will be summarized and included in quarterly progress reports. These will be submitted to the PMO for consolidation and reporting to the ADB and MOE. Any issues that arise that call for further monitoring activities or other investigation will be raised by the PMO in the quarterly progress reports and discussed at review missions.

Table SA IV-A6.4: Environmental Monitoring Plan

<table>
<thead>
<tr>
<th>Impact to be Monitored</th>
<th>Parameters</th>
<th>Location</th>
<th>Measurements</th>
<th>Frequency</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and Preconstruction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and safety and welfare of workers and the public</td>
<td>Compliance with EMP</td>
<td>All work sites / worker accommodation</td>
<td>Compliance</td>
<td>Once</td>
<td>PDA / PIO</td>
</tr>
<tr>
<td>Construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of construction mitigation measures detailed in EMP</td>
<td>Compliance</td>
<td>All work sites</td>
<td>Consultations</td>
<td>To be decided by PDA / PIO at the start of the works</td>
<td>PDA / PIO</td>
</tr>
<tr>
<td>Operation Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure of workers to noise</td>
<td>85 dB(A) Leq</td>
<td>Throughout the facility</td>
<td>Measurements taken by an independent laboratory</td>
<td>Twice a year</td>
<td>PDA / Facility operator</td>
</tr>
<tr>
<td>Exposure of workers to dust</td>
<td>Less than 0.33 mg/m³ of total suspended particles in ambient air within the facility</td>
<td>Throughout the facility</td>
<td>Measurements taken by an independent laboratory</td>
<td>Twice a year</td>
<td>PDA / Facility operator</td>
</tr>
<tr>
<td>Exposure of workers to safety risks</td>
<td>Compliance</td>
<td>Throughout the facility</td>
<td>Inspections</td>
<td>Twice a year</td>
<td>PDA / Facility operator</td>
</tr>
</tbody>
</table>
X. CONCLUSION AND RECOMMENDATIONS

75. This initial environmental examination process has found that the subproject will not cause significant negative environmental impacts. Potential negative impacts relate mainly to the construction phase and can be managed and brought to acceptable levels through the implementation of the EMP. No further environmental assessment is therefore required.

76. The Subproject is therefore be classified as Category B according to the ADB’s classification system. This refers to projects that are judged to have some adverse environmental impacts, but of lesser degree or significance than those for Category A projects.

77. It is recommended that the EMP is included in contract documentation for works contracts.