

**KINGDOM OF CAMBODIA**  
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Early Childhood Development Education for Floating Villages Project  
Save the Children Cambodia  
Project ID: P146085

**ENVIRONMENTAL MANAGEMENT PLAN**

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**Proposed ECCD Projects in Pursat and Kampong Chhnang**

June, 2014

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## Abbreviations

ACM	:	Asbestos Containing Materials
DoE	:	District Office of Education
ECCD	:	Early Childhood Care and Development
ECoP	:	Environmental Code of Practice
EMP	:	Environmental Management Plan
EPA	:	Environmental Protection Agency
ER	:	Environmental Review
ESSSUAP	:	Education Sector Support Scale Up Program
GPE	:	Global Partnership Education
ILO	:	International Labor Organization
LIFE	:	Lien Institute for the Environment
MAFF	:	Ministry of Agriculture, Fishery and Forest
MCFA	:	Ministry of Culture and Fine Arts
MoE	:	Ministry of Environment
MoEYS	:	Ministry of Education, Youth and Sport
NGO	:	Non-Governmental Organization
PoE	:	Provincial Office of Education
PPE	:	Personal Protective Equipment
RGC	:	Royal Government of Cambodia
SC	:	Save the Children
SESSP	:	Second Education Sector Support Program
WB	:	World Bank

# **ENVIRONMENTAL MANAGEMENT PLAN**

## **EARLY CHILDHOOD DEVELOPMENT EDUCATION FOR FLOATING VILLAGES PROJECT**

### **1. Introduction**

“Save the Children Cambodia” is implementing the project on Early Childhood Development Education for floating villages in Pursat and Kampong Chhnang Province. First component of the project finances the construction of 20 Early Childhood Care and Development centers (ECCD) in selected floating communities in the targeted areas.

According to environmental screening of the World Bank operational policies (OP 4.01 on Environmental Assessment) the project is classified as environmental category B given the site-specific limited and known expected project impacts primarily related to small-scale construction of the ECCDs.

During the preparation stage of the project, an Environmental Review (ER) has been conducted in the target areas of the ECCD for floating villages project with specific proposed mitigation measures as part of the Environmental Management Plan (EMP) preparation. The ER documents Cambodia’s environmental laws, regulations, policies and other relevant legislation to ensure that applicable environmental assessment requirements are fully addressed during project implementation. It also provides an overview of the implementation of the SESSP EMP supervision and Client overall compliance with environmental mitigation measures relevant to these project investments.

The ER also assesses potential environmental and human health impacts of this proposed project, particularly with regard to construction of ECCD centers and any impacts by the operation of sanitation facilities. ECCD programs share many water supply and sanitation issues common globally. Recommendations are proposed for appropriate mitigation measures and monitoring programs to be followed with a view to guiding project design and incorporating appropriate management plans during the Project implementation.

### **2. Project Overview**

#### **Project Development Objective**

The higher level objectives of the project are inclusive growth and the reduction of inequality. These will contribute to the Government’s efforts to achieve the MDGs for basic education, health, and poverty reduction goals by making ECCD services available to the disadvantaged population. The Project Development Objective is to improve access to quality Early Childhood Care and Development (ECCD) services through community and home-based programs for 0 to 5-year-olds, particularly for those from disadvantaged background, in the targeted areas.

#### **Project Locations**

Project locations include floating villages on the Tonle Sap Lake in Kampong Chhnang Province (81 villages targeted) and Pursat province (56 villages targeted). Tonle Sap Lake lies in the central floodplain of Cambodia territory, surrounded by six provinces. The water regime is characterized by

high water fluctuation between dry and wet season, which varies from 1 to 9 meters. Similarly, the Lake surface also changes from 2,500 km<sup>2</sup> to about 13,000 km<sup>2</sup>.

Tonle Sap Lake represents one of the richest wetland ecosystems in the world, providing a robust resource base for country economy and people's livelihood for centuries. The unique hydrological regime of the Tonle Sap and the Mekong play a significant role in the perpetuation of productive biodiversity, such as fish, wildlife, and forest, as well as the present land use pattern and diverse cultural landscape. The present farming, fishing, and traditions are closely connected with the rise and fall of the Tonle Sap waters.

The lake is linked to the Mekong River by the Tonlé Sap River. From November until June the lake flows into the Mekong. However, each year during the rainy season (mid June-late October) the Mekong River is inundated with rain waters. Its lower delta becomes flooded and cannot flow into the sea quickly enough to eliminate all the excess water. This causes the Mekong River to rise enough to reverse the flow of the Tonlé Sap River causing it to flow back into the lake. The lake expands from 2500 km<sup>2</sup> to more than 16,000 km<sup>2</sup> creating an enormous wetland area. This wetland area supports a tremendous amount of biodiversity including plants, reptiles, mammals, birds and other animals. Many of these are known to be rare or endangered. These wetlands are also an important breeding area for fish from the lake and Mekong River. The Tonle Sap Lake has a rich biodiversity stock, particularly for fish and waterfowls, which replenishes the Mekong water system. For instance, a dozen of globally threatened bird species can be found within the region, using the lake as transit place for breeding. Both Siamese crocodiles (*Crocodylus siamensis*) and saltwater crocodiles (*Crocodylus porosus*) once occurred side-by-side in the lake, and there is thought to be inter-species breeding amongst the crocodiles found in the floating farms on the western part of the Lake in and around Prek Toal.

At present about half of Cambodia population directly or indirectly benefit from the Lake's resources (see map in Appendix 5). The importance of Tonle Sap Lake goes far beyond the national boundaries in terms of biodiversity significance and flood regulations. During the recent past the number of large fish caught has declined and the poor people who live around the lake are having an even more difficult time providing for themselves and their families. This creates a vicious cycle of increasing poverty, and in turn increasing threats and danger to the lake. This is also why 2 of the functions of the Royal Decree support education and support for the people living around the lake.

The Lake is divided into three zones, namely three core areas (42,300 ha. including the Great Lake.), a buffer zone, and a transition zone. The three core areas are unique ecosystem of high conservation value. The buffer zone is covered by flooded forest, where fishery activities are dominant. The transition zone is the farmland, where rain-fed rice and floating rice are cultivated.

Some schools and households collect rain water during the rainy season. Some communities make a point of going far away from their villages into the lake to collect water where it is cleaner. All community members defecate, urinate, and dispose of waste directly into the lake, either from inside a private latrine cubicle with two simple horizontal planks existent in a few of the households and most schools, or by going directly into the bush. Toilets with just two floor boards to balance over are very dangerous for small children who can fall through. (In Se Slab, the general rule for going into the bush was to go at least 5m from any house.) Some also had a hole in the floor or went from the edge of the house boat. Waste water treatment systems are practically non-existent in the floating community. Among the visited sites in Pursat and Kampong Chhnang, none of the villages were using any of the systems introduced by NGOs, with the exception of Akul School (not a SC ECCD site) which was visited by the team to specifically observe the pilot unit implemented by Wetland Works in the village of Akul, O Sandan commune, Krakor district.

## **Project components**

## **Component 1: Promotion of access to ECCD services**

The objective of this component is to provide low-cost community and home-based ECCD programs for children and parents around the floating communities living on the Tonle Sap River and Lake. The project will have a special focus on disadvantaged and marginalized children. The component includes support for three activities; (i) construction of 20 ECCD centers<sup>1</sup> for Community Based (CB) ECCD programs (10 floating centers and 10 on-shore centers); (ii) establishment of 400 Home Based (HB) ECCD programs; and (iii) creation of commune based networking for supporting and managing ECCD services in the commune.

The Community Based ECCD program will provide center based activities for children ages 3 to 5, while Home Based ECCD programs are led by local “Core Mothers” to organize regular meetings with parents of children ages 0 to 5 from the village. Those ECCD programs have a holistic approach, addressing the mutually inter-dependent domains necessary for the development and nurturing of young children: education, nutrition, protection, care and development. In addition to establishing these ECCD programs, this component will seek to establish village based networks and core neighborhood resource groups for extending and monitoring the ECCD programs and sharing experiences among the community members.

## **Component 2: Providing quality child-friendly ECCD program**

This component will focus on creating an enabling, child friendly environment that incorporates child participation, play and learning, stimulation, care and protection both at home and in the constructed ECCD centers. This component supports four activities: (i) building capacity of facilitators of Community Based (CB) ECCD centers as well as government officials for improving CB ECCD Program; (ii) conducting training sessions for core-mothers group leader parents on child friendly Home Based (HB) ECCD program implementation; (iii) organizing maternal literacy program for promoting ECCD activities, and (iv) conducting community seminar on health, nutrition and hygiene for poorest families.

ECCD facilitators, formal teachers from MoEYS, volunteer teachers from the communities and health workers will be trained and provide the necessary resources for CB program to encourage children to be active through play and learning, organized arts, and reading-related activities, providing them with opportunities to participate in daily interaction with their siblings and parents related to child development, health and nutrition. Core Mothers and group leader parents will also be trained and provided the essential resources to promote better care and stimulation to young children in the neighborhood through HB program. This component will also work to link parents' literacy with content knowledge on child rearing practices and ECCD. In addition, this component will provide health, nutrition and hygiene capacity building for poorest family representatives through NGOs.

## **Component 3: Strengthen capacity of government and community structures**

This component will contribute to effective implementation of ECCD policies focusing on children's holistic development through strengthening the linkages between government and communities. This component will include support to three activities: (i) strengthening local structures and capacity of government, communities and NGOs to support ECCD program implementation, (ii) strengthening ECCD networking and coordination among all stakeholders and, (iii) facilitating advocacy activities.

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<sup>1</sup> In Cambodia, community based ECCD centers serve as venue for implementation of ECCD programs including pre-school classes, training sessions, awareness raising and other development related activities, while home based ECCD programs are implemented by trained core-mothers for neighborhood mothers who have 0 to 5 years old children.

The existing government structure at the community level is known as the Commune Council. Each Commune Council has a Committee for Women and Children (CCWC) who is in charge of all issues related to women and children in their community. Their role includes promoting maternal and child health, community preschool, child protection and gender. The project will work to strengthen this system together with School Support Committees (SSC) through inclusion of child representatives and the education system (POE, DOE, and primary school) with the support from local NGO partner. The CWCC will be encouraged to hold regular meetings to discuss update and take action about children and women issues in the community.

#### **Component 4: Project Management and M&E**

This component consists of two activities: (i) facilitating project management, including advocacy-related activities, and (ii) undertaking results-based monitoring and evaluation (M&E) of the program. The Results-Based M&E plan will be developed at the start of the project implementation through a participatory process, led by the Save the Children Education Manager. POE staff will participate in the M&E plan development together with any other stakeholders in the process (e.g. NGOs). The Results-Based M&E plan will be oriented to the project staff, relevant government officials and other stakeholders at the project kick off meeting. It will continue to be monitored on a regular basis.

#### **Project Institutional Arrangements:**



The Early Childhood Care and Development for Floating Villages Project will be implemented at provincial, district and school levels in targeted areas in Kampong Chhnang and Pursat province. The project will run over a period of four years with the expected start around summer 2014. Save the Children in Cambodia will assume overall responsibility for management, coordination and implementation of the program, including procurement, disbursement and financial management.

Save the Children (SC) currently has one Area Office (East) covering the eastern part of the country (Prey Veng, Kampong Cham, Kratie and StuengTreng). The office is run by an Area Manager and he is reporting to the Director of Implementation. Prior to the project effectiveness, SC will establish an Area Office and an Area Manager will be hired to be based in Pursat, covering our programs in Kampong Chhnang, Pursat and Koh Kong. The Area Manager (West) will be managing and overseeing the implementation of the project, with technical support from the Senior Education Advisor, the Early Childhood Care and Development Advisor, the Health Specialist, the M&E specialist, and the Education Manager.

A SC project implementation team will be established, consisting of a Project Manager (new recruitment under the project) based in the Area Office West. The Project Manager will be directly responsible for the implementation of the project. The Project Manager has two Project Officers reporting to him/her, based in Kampong Chhnang and Pursat respectively. To support the financial and administrative aspects of the field implementation, a Project Admin staff and Finance Assistant will be based in the Area Office.

The Early Childhood Education Department (ECED) of MoEYS will be working closely with project to: (i) provide technical inputs to the design of ECCD centers; (ii) developing and adopting HB ECCD training curriculum in the floating area; (iii) provide technical capacity building to POEs and DOEs Early Childhood Education trainers; (iv) provide technical inputs to teaching material development; and (v) participate in documentation of project good practice to share with other development partners and replicate to other provinces. The ECED, particularly those teams working in the offices of preschool, early childhood education and inspection, will also be working together with the Early Childhood Care Development Advisor to ensure the quality of ECCD services, through field monitoring visits and regular meetings with the POE and SC program staff.

1. The POE Directors will coordinate with the following groups to support project implementation: ECE focal staff at POE and DOE, school principals and teachers under the POEs of Kampong Chhnang and Pursat, counterparts in other sectors (health, Women and Social Affairs), and the communities. The ECE focal staff at POE and DOE, who receives capacity building from MoEYS and SC, will be mainly involved in on-going project training to Core Mothers and parent group leaders on relevant topics such as child development, health and nutrition, and protection. They will also build capacity of the HB ECCD facilitators and Community Based ECCD Center facilitators on delivery mechanism and ECCD center services delivery, in addition to monitoring the operation and quality of ECCD services in the centers.

2. The participation of communities, especially of parents and families, has been central in the project design and will continue to be during implementation. Commune Council and School Support Committee, both of which are composed of representatives of community members, will support the implementation team of the project, conduct annual project reviews and develop annual project implementation plan.

3. In addition, MoEYS ECED teams will conduct spot checks and monitor to get feedback from school and community on quality of POEs and DOEs' support. The ECE focal staff at POE and DOE will conduct on-going monitoring to the project sites. They will

conduct consultation meetings with parents, children and community/local authorities to get their feedback and progress in order to improve training delivery and ECCD services.

### **3. Environmental Assessment Overview:**

The proposed project builds on existing environmental practices under the previous Global Partnership Education (GPE) program funded by the World Bank. Given the nature and scale of civil works for classroom construction and sanitary facilities, a formal environmental assessment report was not considered necessary based on national laws and Bank policy OP 4.01. The project is classified as environment category B since the impacts are known and likely to be minimal.

The civil works for ECCD centers will be designed to be aligned with the MoEYS Education Facilities Plan. This ECCD project will have open space for children to play, protection wall or fence from falling into lake waters and will include appropriate ventilation, lighting, and low cost environmental friendly sanitation facilities. Since the community members, sometimes and especially during dry season, come to existing community center or school for defecating, particular attention will be given to designing appropriate, environmentally friendly and operationally sustainable sanitation facilities that would reduce water pollution and improve health aspects and ultimately living conditions of the targeted communes.

The potential risks from or to project activities which could directly or indirectly affect the environment, the health and the safety of the communities are the following:

The potential risks from or to project activities which could directly or indirectly affect the environment, the health and the safety of the communities are the following:

- Project pre-construction stage: One of the primary concerns envisaged from the assessment is related to the capacity of local authority and local community in understanding the environmental and social impacts from the project activities such as: 1) securing land for the construction for building of ECCDs. The land will have to be assured that it is not involved with acquisition and/or cultural heritages or UXOs. As a measure, a screening checklist is provided and attached in the annex below. 2) An understanding of EMP remains to be developed among site engineers (and workers) and local people, often observed when implementing the previous education projects (ESSUAP). As a measure, a brief explanation session will have to be provided by SC to relevant stakeholders. Besides, a free, prior and informed consultation is often overlooked. SC was advised to consult with local people, and the results of consultation are attached below.
- During construction: Some general concerns are related to safety of workers and management of construction waste. This has been observed during ESSUAP project. In the EMP, these issues are discussed and measures are taken into account: safety, air quality and dust, noise, poor water quality from sediment from construction materials, land and water quality from sanitation, solid waste, impact on nearby historical and cultural heritage, improper disposal of toxic and hazardous waste<sup>2</sup>, conservation of fauna and flora, pedestrian safety. A separate measure was prepared for waste water treatment expected to be generated from toilet use, particular for the floating design school. Wetland Works provided mitigation measures based on its successful cases accepted by various agencies including Ministry of Environment, NGOs and Ministry of Education, Youth, and Sports.

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<sup>2</sup> Asbestos is one of the potential yet unlikely wastes which must be tackled carefully. Mitigation measures are discussed in a dedicated chapter in this document.(Chapter 6.4)

- During operation: Apart from solid waste management issues, impacts from malfunction of wastewater treatment system are key concern. SC, with Pod system developed and to be applied, will monitor waste water before discharging into the river/lake. An understanding of solid waste management practices will be delivered to school children especially on waste packing and discharging. Save the children will be responsible for the maintenance of Pods system during implementation and each commune council will take over the responsibility after the project closure.

The risks and corresponding mitigation measures are described in further detail in chapters 6 and 7 of this document.

The lessons learned from development and operation of existing community built centers and schools funded and implemented by other agencies echo the risks anticipated during operation:

1. General lack of environmental knowledge and absence of training on quality supervision and environmental and social safeguards to community construction support committee;
2. Lack of safety in terms of school design;
3. Lake water quality, which is the main source of every household water use, is contaminated with human and animal waste, causing health risks to individuals.
4. No knowledge or adoption of solid waste management;
5. Lack of sanitary facility in school building or community center;
6. No separate boy and girl sanitary facility;
7. No wastewater treatment system introduced to floating community;

Mitigation measures to the above environmental problems have to be addressed and minimized or prevented from happening. The EMP offers preventive and mitigation measures incorporated into standard practices and the contracts for civil works.

Contractor specifications to address environmental issues relevant for the project, including construction dust and noise control, waste management, site management, safety controls, provision of clean water and sanitation facilities, and asbestos containing material have been adequately addressed and described in the EMP Matrix.

Appropriate supervision provisions throughout the construction cycle will be built into the contract documents to include provincial engineers and local engineer consultants as well as the involvement of stakeholders at commune level. Some training programs for school personnel, students and communities will be conducted throughout the life of the proposed Project to foster sanitary awareness, promote environmentally friendly schools, maintain the newly installed sanitation facilities, prevent the spread of diseases and reduce maintenance costs.

## **4. Social Assessment Overview and Public Consultation / Community Participation process**

### **4.1 Social Assessment**

A Social Assessment (SA) including the free, prior and informed consultations was conducted in November 2013 to assess the potential positive and adverse project impact on ethnic minorities and local population in the potential project sites.

A combination of different methods was used for the social assessment:

- 1- Desk Review of population statistics data including Khmer, IP, Cham and Vietnamese to support ethnic minority screening

2- Key Informant Interviews (KIIs) with various provincial, district and commune stakeholders (up to 8 per site visited).

3- Focus Group Discussions (FGDs) of groups of 12-16 community members including women, in 3 out of 20 sites strategically selected to be representative of other sites, except for the fact that villages where higher concentrations of minority groups were targeted for the purpose of the FGDs. The topics covered during the FGDs included (i) Socioeconomic information, (ii) Traditional and cultural practices, (iii) Access to education, (iv) Factors affecting access to education, and (v) Migration issues.

4- Informal individual and group conversations with community members in 10 out of 20 sites. The informal interview with community groups followed a list of topics similar to the ones covered under the FGDs.

The assessment showed strong support from the communities for the implementation of the project and identified project benefits to the disadvantage population on the floating villages including ethnic minority groups. The KIIs and FGDs were also used as a tool to get a better understanding of the socio-economic situations and challenges faced by the communities selected to benefit from the project, in order to inform the final stages of project design. These findings have been compiled in a separate general Safeguards Report.

#### **4.2 Public Consultation/ Community Participation proposed throughout 4 successive stages of project implementation**

Upon project approval, similar initial consultations will be systematically conducted initially in the 20 project sites to refine the project understanding of specific social and environmental issues in the circumstances of each individual village. In addition, the assessment will provide an understanding of actual and perceived risks by all stakeholders in regards to social and environmental impacts, including local awareness of issues involved and what should be the responsibilities with regards to implementation of environmental mitigation measures.

As the project evolves into the planning stage of project implementation, SC will then conduct Community mobilization/PRA to: (i) Refine design of centers, share draft design with community and stakeholders and collect feed-back, (ii) Establish/reinforce community group to oversee project & assign roles, (iii) Consolidate support and understanding of the project by Community and DoE, (iv) Establish formal or informal partnership agreements with community (and other partners) for construction and operation phase outlining any responsibilities and contributions (if apply), and (v) Plan and/or provide training to community and Local Government as necessary (including construction site management, EMP execution, and general monitoring). SC understood that dissemination of understanding of EMP is critical to mitigate impacts. Therefore, the EMP (Khmer version) will be disclosed publically and locally, and brought for discussion with Provincial Department of Education; as well as the district level during its monthly progress meeting. At lower level, the district Office of Education will disseminate this EMP knowledge to School Directors (SDs) of relevant districts. SDs will call for meeting among School Support Committee of relevant villages/catchment area, and explain the EMP. Besides, the Bank advised SC to apply good safeguard practices for school construction developed by MoEYS for ESSUAP project.

During construction stage, SC field personnel will continue to actively collaborate with community/school committee to (i) prompt community input – as well as government - as per the agreed plan (site, materials, labor, supervision & monitoring), (ii) solicit regular feed-back with Community/school committee and local Government on all aspects of the project. The results of safeguard monitoring will be incorporated in the progress report.

Finally upon completion of construction, SC will (i) facilitate the establishment of an Operations & Maintenance plan and agreement between community & Local Government (LG), (ii) provide O&M training if necessary (w/input from CT), (iii) Monitor project impact and preparing a final Monitoring report which will involve seeking feed-back from stakeholders, and prompt O&M by community and LG if needed.

The various consultation activities throughout the life of the project are clearly stated in an office-wide Construction Project Management and Implementation Manual recently developed and adopted by SC Cambodia. The manual does not design specifically for floating or onshore construction of school facilities, but it is a generic guideline that focuses on process and management of construction projects including bidding, procurement, consultation, and monitoring. The guideline will be sufficient for the implementation and monitoring of bank financed-ECCD facilities.

## **5. Environmental Management Plan – Bid Specifications**

Contractor bid technical specifications for school buildings and sanitary facilities will include environmental provisions for construction techniques, noise and dust, site and waste management, asbestos containing material management, cultural and historic resources such as nearby pagodas, and provision of clean water and sanitation facilities.

Since the project nature is similar to the ongoing ESSUAP (Education Sector Support Scale Up Program) and GPE (Global Partnership for Education) projects financed by the World Bank, lesson learned from ESSUAP construction sites are taken into account for this ECCD construction center as well. It is noted that during construction of ESSUAP some environmental issues were not properly address such as notice of the EMP at construction site, workers sanitation, and waste generation from construction site, provision of safety fence, and less attention on EMP supervision by school committee.

This EMP will address all environmental issues learned from previous school construction projects by the WB as follows;

### **5.1 EMP Notice and Site Safety for Construction Site**

The Contractor shall put the notice of the EMP (includes in the bidding document) at the construction site and it should be visible by all visitors as well as teachers and school construction support committee. The School Construction Committee, SC staff and all other entities involved in the construction monitoring should be briefed by the SC Construction Engineer on safety rules and regulations at the Construction Site.

“Safety First” is very common in all construction sites. The construction site shall be protected by safety fence to discourage people around the work area. Children, teachers and visitors are not allowed to enter the site during construction if permit is not granted.

### **5.2 Environmental Code of Practices**

The Environmental Code of Practice (ECoP) is developed for the ECCD project. It is trusted to be simpler and practical for safeguarding the construction of facilities (see Appendix 1). The Contractor shall be aware of the ECoP and implement it as part of their professional practice. School committee, site engineers, and other relevant stakeholders will need to check construction site before starting civil works and appropriately advise the contractor if there is any wrong doing (please see checklist on construction site in Appendix 2). It is the contractor’s responsibility to implement ECoPs and this EMP provisions.

### 5.3 Environmental Management Construction - environmental impacts and mitigation measures

**Dust:** The ECCD center construction will take place in village centers. The windows of residences in these settings are typically open during clement weather. The open windows would make residents liable to airborne dust exposure from construction activities. Exposure to airborne dust has the potential to exacerbate and/or cause several health conditions, including asthma.

*Should activities begin to generate visible airborne dust, the contractor(s) will cease the activity(s) which generate the dust: (i) until the dust is controlled with means such as water spray or (ii) another technique which prevents and/or reduces generation of airborne dust.*

**Noise** is another concern near residential areas, health centers and in schools. The contractor shall limit: (i) hours of work when noise generation activity could take place to regular daytime hours, and (ii) sound levels during work to 60dBA<sup>3</sup>.

**Waste Generation During Construction:** Construction activities at ECCD construction sites will generate domestic waste. The Contractor shall manage to install waste bins at the construction site to keep the site clean at all times. All wastes from the site including plastic and construction materials (wood and concrete) shall be properly handled and dumped in a licensed area nearby the site as permitted by the local authority.

### 5.4 Practices for Asbestos Cement Roofing Material- for on land ECCD sites

Asbestos, a fiber mined in several countries, has been widely used worldwide as a construction material and insulator because of its strength, durability and heat resistance characteristics. In recent years, evidence on the adverse health effects of exposure to asbestos has been mounting globally leading to urgent calls to cease production of the most-harmful asbestos types, limit the use of less-harmful asbestos (e.g. discontinued spraying of asbestos), and to impose strict exposure standards for workers handling raw asbestos and asbestos- containing products. Occupational exposure to asbestos by inhalation can cause asbestosis (scarring of the lung tissue), lung cancer, and mesothelioma (cancer of the lung's lining). In developed countries, occupational asbestos exposure is thought to have peaked in the 1970's but the effects of exposure continue to manifest themselves today with an estimated 30,000 new asbestos-related cancers being diagnosed every year.

Fiber cement roofing material is still present in some of the older school buildings in rural areas in Cambodia. This roofing material typically contains asbestos fibers as reinforcement. By its nature, the present project is unlikely to directly involve any demolition or rehabilitation and will avoid asbestos for new construction. However, the recommendations below, as well as the *Good Practice Note: Asbestos by the World Bank Group May 2009* will be followed closely by the contractors in the cases where asbestos may be encountered at the project sites.

#### Non-friable Asbestos

US EPA categorizes non-friable asbestos containing materials (ACM) as category I and category II. Resilient floor covering is considered a Category I and Transite<sup>4</sup> board (roofing) is considered

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<sup>3</sup> Maximum permitted noise level in public and residential area, Sub-decree on Air Pollution and Noise Disturbance Control, July 2000.

Category II ACM. The following is excerpted from EPA guidance on demolition of Category I and II asbestos materials:

#### CATEGORY I non-friable ACM

Category I non-friable ACM includes resilient floor covering which contains more than one percent (1%) asbestos as determined by standard methods. Category I non-friable ACM must be inspected and tested for friability if it is in poor condition. If the ACM is friable, it should be handled as an environmental concern. Asbestos-containing resilient floor coverings must be removed if they are in poor condition and are friable.

If Category I or Category II non-friable ACM is to be sanded, ground, cut, or abraded, the material is considered an environmental concern and the owner or operator must:

- (i) Adequately wet the material during the sanding, grinding, cutting or abrading operations.
- (ii) Handle asbestos material produced by the sanding, grinding, cutting, or abrading, as asbestos-containing waste material.

#### CATEGORY II non-friable ACM

Category II non-friable ACM is any material, excluding Category I non-friable ACM, containing more than one percent (1%) asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

*Category II non-friable ACMs (cement siding, transite board shingles, etc.) subjected to intense weather conditions such as thunderstorms, high winds or prolonged exposure to high heat and humidity may become "weathered" to a point where they become friable.*

ACM need not be removed before demolition if it is a Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition. Proper disposal of ACM is important not only to protect the community and environment but also to prevent scavenging and reuse of removed material. ACM should be transported in leak-tight containers to a secure landfill operated in a manner that precludes air and water contamination that could result from ruptured containers. Similar requirements apply to remediation of sites such as mines, mills, and factories where asbestos fiber was processed and products manufactured (see further in Good practice notes: Asbestos: occupational and community health issues, World Bank Group, 2009).

### **ACM Disposal**

Where construction material debris will be recycled, any asbestos remaining on the debris must be removed prior to any recycling that will sand, grind, cut, or abrade the asbestos or otherwise cause it to become an environmental concern by releasing asbestos fibers. Asbestos-containing roofing material may not be ground up for recycling into other products.

Depending upon the contractors involved and the condition of the asbestos-containing roof debris, the debris may or may not be segregated from other demolition debris. If the asbestos-containing roofing material is not in poor condition and is not friable, it may be disposed of in a landfill which accepts ordinary demolition waste.

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<sup>4</sup>Transite originated as trade name that [The Johns-Manville Corporation](#) created for a line of asbestos-cement products, including boards and pipes.

In general, since cleanup activities such as loading waste debris onto trucks for disposal do not subject non-friable materials to sanding, grinding, and cutting or abrading, such materials are not an environmental concern.

However, waste consolidation efforts which involve the use of jack hammers or other mechanical devices such as grinders to break up asbestos-containing concrete or other materials covered or coated with Category I non-friable ACM, are an environmental concern.

In addition, operations such as waste recycling which sand, grind, cut, or abrade Category I or II non-friable ACM are an environmental concern. When these types of activities are performed, Category I and II non-friable ACM become an environmental concern.

## **5.5 Water Quality**

All existing stream courses and drains within, and adjacent to, the site will be kept safe and free from any debris and any excavated materials arising from the ECCD construction both on land and floating centers. Chemicals, sanitary wastewater, spoil, waste oil and concrete agitator washings will not be permitted to be deposited in the lake.

In the event of any spoil or debris from construction works being deposited on land or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Supervising Engineer.

## **5.6 Protection of Historic and Cultural Resources- on land site**

To avoid potential adverse in the case of impacts to historical and cultural resources, the Contractor shall:

Protect sites of known antiquities, historic and cultural resources by the placement of suitable fencing and barriers.

Adhere to accepted international practice and all applicable historic and cultural preservation requirements of the RGC (Royal Government of Cambodia).

In the event of unanticipated discoveries of cultural or historic artifacts (movable or immovable), or human remains in the course of the work, the Contractor shall take all necessary measures to protect the findings and shall notify the Construction Supervisor and concerned provincial-level and central government levels representatives of the Department of Construction, Ministry of Education, Youth and Sports [#80 Norodom Blvd, Phnom Penh, 023-210-134]. If continuation of the work would endanger the finding, work shall be suspended until a solution for preservation of the artifacts is agreed upon.

## **5.7 Clean Water and Sanitation Facilities for Construction Workers**

The contractor shall provide at the site potable (safe from a health standpoint) drinking water at a minimum rate of 4.5 liters per day per worker.

The Contractor shall provide a temporary privy facility if there are no existing facilities available at the construction site for the workers. The facility will be dismantled, pit filled and site cleaned to pass inspection of the Construction Supervisor when permanent privy facilities available for the construction workers are constructed and operational at the site. The privy shall be located more than 30 meters of an existing water supply well or surface water body, unless a lack of available



site area or other extenuating circumstance prevents such a safety distance. Alternatives shall be approved by the Construction Supervisor.

### **5.8 Environmental Management Plan and Mitigation Measures**

The intent of an EMP and Mitigation Measures is to recommend feasible and cost-effective measures to prevent or reduce significant adverse impacts to acceptable levels as well as relevant monitoring actions.

For purposes of the proposed Project for which environmental impacts are expected to be limited, particular attention is given to outlining best management practices and design measures which should be put in place to ensure that environmental impacts are minimized during civil works activity and that human health and environmental concerns are fully addressed on an ongoing basis during project implementation. Best management practices and mitigation measures are detailed by activity in the following matrix.

**Environmental Management Plan for ECCD Center for Construction Stage (A-H), and Operation Stage (I-K)**

ACTIVITY	PARAMETER	MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
<b>A. General Conditions</b>	Notification and Worker Safety	<ul style="list-style-type: none"> <li>(a) The local construction and environment inspectorates and communities have been notified of upcoming activities.</li> <li>(b) The public has been notified of the works through appropriate notification in the media and/or at publicly accessible sites (including the site of the works)</li> <li>(c) All legally required permits have been acquired for ECCD construction.</li> <li>(d) All work will be carried out in a safe and disciplined manner designed to minimize impacts on neighboring residents and environment.</li> <li>(e) Workers' PPE will comply with international good practice (always hardhats, as needed masks and safety glasses, harnesses and safety boots).</li> <li>(f) Appropriate signposting of the sites will inform workers of key rules and regulations to follow.</li> <li>(g) EMP notice in Khmer shall be displayed near the construction site and should be visible to all. The notice shall be well protected against water - put in a waterproofing transparent plastic bag.</li> </ul>	Contractor	SC Junior Engineer (JE) from independent SC Construction Team / Safeguards TA from SESSP /Community
<b>B. General Construction Activities</b>	Air Quality/ Dust	<ul style="list-style-type: none"> <li>(a) Suppress dust during pneumatic drilling/ by ongoing water spraying and/or installing dust screen enclosures at site.</li> <li>(b) Keep surrounding environment (roads, paths) free of debris to minimize dust.</li> <li>(c) There will be no open burning of construction / waste material at the site.</li> <li>(d) There will be no excessive idling of construction vehicles at sites.</li> <li>(e) In the case of floating sites, construction of floating units will take place away from immediate house and community structures to</li> </ul>	Contractor	SC Junior Engineer (JE) from independent SC Construction Team / Safeguards TA from SESSP /Community

ACTIVITY	PARAMETER	MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
		minimize disturbance, and will be floated onto final location only upon completion.		
	Noise	<ul style="list-style-type: none"> <li>(a) Construction noise will be limited to restricted times agreed to in the permit.</li> <li>(b) During operations the engine covers of generators, air compressors and other powered mechanical equipment should be closed, and equipment placed as far away from residential areas as possible.</li> <li>(c) In the case of floating sites, construction of floating units will take place away from immediate house and community structures to minimize disturbance, and will be floated onto final location only upon completion</li> </ul>	Contractor	SC Junior Engineer (JE) from independent SC Construction Team / Safeguards TA from SESSP /Community
	Water Quality	<ul style="list-style-type: none"> <li>(a) The site will establish appropriate erosion and sediment control measures such as e.g. hay bales and / or silt fences to prevent sediment from moving off site and causing excessive turbidity in the lake.</li> </ul>	Contractor	SC Junior Engineer (JE) from independent SC Construction Team / Safeguards TA from SESSP /Community
	Sanitation facility during construction	<ul style="list-style-type: none"> <li>(a) The construction site needs to be equipped with latrine/toilet for workers.</li> <li>(b) Location of temporary toilet/latrine shall at least 30m from the existing well or water drinking source.</li> <li>(c) After handing over of construction, the latrine shall be dismantled, pit filled, site cleaned.</li> </ul>	Contractor	SC Junior Engineer (JE) from independent SC Construction Team / Safeguards TA from SESSP /Community
	Waste management during construction	<ul style="list-style-type: none"> <li>(a) Mineral construction wastes will be separated from general refuse, organic, liquid and chemical wastes by on-site sorting and stored in appropriate containers.</li> <li>(b) Contractor shall minimize the waste if there is possibility.</li> <li>(c) Construction waste will be collected and disposed properly by licensed collectors.</li> <li>(d) The records of waste disposal will be maintained as proof for proper management as designed.</li> <li>(e) Whenever feasible the contractor will reuse</li> </ul>	Contractor	SC Junior Engineer (JE) from independent SC Construction Team / Safeguards TA from SESSP /Community

ACTIVITY	PARAMETER	MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
		and recycle appropriate and viable materials (except asbestos).		
<b>C.</b> Individual wastewater treatment system	Water Quality from construction	<p>(a) The approach to handling sanitary waste and wastewater from building sites (installation or reconstruction) must be approved by the local authorities.</p> <p>(b) Before being discharged into receiving waters, effluents from individual wastewater systems must be treated in order to meet the minimal quality criteria set out by national guidelines on effluent quality and wastewater treatment. When mobilizing to the construction site, the contractor will put in place a temporary latrine and septic tank to be used by the workers during construction until the final ECCD latrine is built. This solution can apply for both land and floating sites since, in the case of floating ECCDs, the centers will actually be built on or near land and later be floated to their final site within the community.</p>	Contractor	SC Junior Engineer (JE) from independent SC Construction Team / Safeguards TA from SESSP /Community
<b>D.</b> Historic building(s)	Cultural Heritage	<p>(a) If the building is a designated historic structure, very close to such a structure, or located in a designated historic district, notify and obtain approval/permits from local authorities and relevant Ministries and address all construction activities in line with local and national legislation.</p> <p>(b) Ensure that provisions are put in place so that artifacts or other possible "chance finds" encountered in excavation or construction are noted, officials contacted, and works activities delayed or modified to account for such finds.</p> <p>(c) Based on Environmental Assessment site visits, there is no important landmark, monument, grave or any other conservation that need be avoided or mitigate the impact</p>	Contractor/ School Support Committee	SC JE/Safeguard TA for SESSP /Representative from Ministry of Culture and Fine Arts (MCFA)

ACTIVITY	PARAMETER	MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
		for. For all sites, the ECCD will be built in the compound of existing primary schools <sup>5</sup> .		
E. Toxic Materials	Asbestos management	<p>By its nature, the present project is unlikely to directly involve any demolition or rehabilitation and will avoid asbestos for new construction. However, the recommendations below (see chapter 5.4 for further details), as well as the Good Practice Note: Asbestos by the World Bank Group May 2009 will be imposed on and closely followed by the contractors in the cases where asbestos may be encountered in the project.</p> <p>(a) If asbestos is located on the project site, mark clearly as hazardous material</p> <p>(b) When possible the asbestos will be appropriately contained and sealed to minimize exposure</p> <p>(c) The asbestos prior to removal (if removal is necessary) will be treated with a wetting agent to minimize asbestos dust</p> <p>(d) Asbestos will be handled and disposed by skilled &amp; experienced professionals</p> <p>(e) If asbestos material is be stored temporarily, the wastes should be securely enclosed inside closed containments and marked appropriately</p> <p>(f) The removed asbestos will not be reused</p>	Contractor	SC JE / Safeguards TA for SESSP Community
	Toxic / hazardous waste management	<p>(a) Temporarily storage on site of all hazardous or toxic substances will be in safe containers labeled with details of composition, properties and handling information</p> <p>(b) The containers of hazardous substances should be placed in an leak-proof container to prevent spillage and leaching</p> <p>(c) The wastes are transported by specially licensed carriers and disposed in a licensed</p>	Contractor	SC JE/ Safeguards TA for SESSP/ Community

<sup>5</sup>In the case of Kampong Leaeng, the site for the ECCD was donated by the nearby Pagoda. The elders from the community, pagoda representatives, and school teacher and school director all participated the consultation meeting that took place to discuss the ECCD. All were fully supportive of the planned project.

ACTIVITY	PARAMETER	MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
		<p>facility.</p> <p>(d) Paints with toxic ingredients or solvents or lead-based paints will not be used</p>		
<b>F.</b> Affects fish conservation lot and/or protected areas	Protection	<p>No protected areas have actually been identified in the immediate vicinity of the project villages. The following measures apply.</p> <p>(a) All recognized natural habitats and protected areas in the immediate vicinity of the activity will not be damaged or exploited, all staff will be strictly prohibited from hunting, foraging, logging or other damaging activities.</p> <p>(b) For large trees in the vicinity of the activity, mark and cordon off with a fence large trees and protect root system and avoid any damage to the trees</p> <p>(c) Adjacent wetlands and streams will be protected from construction site run-off, with appropriate erosion and sediment control feature to include but not limited to hay bales, silt fences.</p> <p>(d) There will be no unlicensed borrow pits, quarries or waste dumps in adjacent areas, especially not in protected areas.</p>	Contractor	SC JE/ Safeguards TA for SESSP/ Community
<b>G.</b> Traffic and Pedestrian Safety-	Direct or indirect hazards to public traffic and pedestrians by construction activities	<p>In the context of the present project, the mostly flooded nature and size of the villages involved, and relative isolation and poverty levels of the communities, lead to the fact that very few and primarily small vehicles (small boats, motorbikes) are involved, and thus traffic congestion is not seen as a major risk. That said:</p> <p>(a) In compliance with national regulations the Contractor will ensure that the construction site is properly secured and construction related traffic regulated. This includes but is not limited to</p> <ul style="list-style-type: none"> <li>▪ Signposting, warning signs, barriers and traffic diversions: site will be clearly visible and the public warned of all potential</li> </ul>	Contractor	SCJE/ Safeguards TA for SESSP/ Community

ACTIVITY	PARAMETER	MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
		<p>hazards</p> <ul style="list-style-type: none"> <li>▪ Traffic management system and staff training, especially for site access and near-site heavy traffic. Provision of safe passages and crossings for pedestrians where construction traffic interferes.</li> <li>▪ Organize suitable parking, or docking and landing areas around the construction sites and schools to facilitate access during construction.</li> <li>▪ Adjustment of working hours to local traffic patterns, e.g. avoiding major transport activities during rush hours or times of livestock movement</li> <li>▪ Active traffic management by trained and visible staff at the site, if required for safe and convenient passage for the public.</li> <li>▪ Ensuring safe and continuous access to office facilities, shops and residences during renovation activities, if the buildings stay open for the public.</li> </ul>		
H.Child and Traffic Safety during operations-	Hazards to ECCD users	<p>Take into account when finalizing plan and design:</p> <p>(a) Organize suitable parking, or docking and landing areas around the schools to facilitate access for drop off and pick up of children during operation.</p> <p>(b) The ECCD centers themselves will be designed to ensure maximum safety so that pupils cannot fall into the water or down to the ground from an elevated platform by raising walls and/or building sufficiently high and impossible to climb barriers around the periphery of the structure. The same considerations will apply when designing latrines.</p> <p>(c) The project will strengthen ECCD operational capacity by the community to ensure adult</p>	Community/ School staff	SC field personnel/ PoE& DoE

ACTIVITY	PARAMETER	MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
		supervision of children and anticipate for periodic maintenance of stilts (land sites), flotation devices (floating sites), barriers and floorings to maintain maximum safety of children.		
<b>Operation Stage</b>				
I. Water supply during operations	Health of ECCD users	(a) Maximize supply (capture of rain water, use rainwater collection tanks for latrines); (b) Maximize storage (tanks or cisterns), (c) Prevent contaminated surface water from contaminating wells in land sites by elevating systems when possible, and identifying well sterilization (chlorination) techniques (d) If not existent, introduce a mobile and small water treatment system for floating village (e) If no plant available, identify and encourage clean water supply arrangement from private vendors (f) Identify vendors of low cost bacteriological screening kits <b>See chapter 6 for details.</b>	Community/ School staff	SC field personnel / PoE& DoE
J. Solid Waste during operation	Environment, Water Quality, Health	(a) Conduct Environmental Awareness program (b) Waste segregation (c) Waste bins <b>See chapter 6 for details.</b>	Community/ School staff	SC field personnel / PoE& DoE
K. Sanitation during operation	Environment, Water Quality, Health	(a) On land solution for latrine design (b) Floating solution for latrine design <b>See chapter 6 for details.</b>	Community/ School staff	SC field personnel / PoE& DoE



## 6. School Sanitation Design Options

### 6.1 The Need for Water Supply and Sanitation Facilities

Every year in Cambodia, diarrheal diseases that result from inadequate sanitation and poor hygiene practices account for approximately 10,000 deaths of children under five years old<sup>6</sup>. As would be expected, the prevalence of diarrhea among children under-five in rural areas is about twice the prevalence in urban areas<sup>7</sup>.

The importance of access to clean water and sanitation is emphasized by a recent World Bank study on the poverty/environmental nexus in Cambodia:

“[The study mapped] total cases of childhood diarrhea, population without access to clean water, and population without access to toilets in Cambodia. [This mapping] suggests a close spatial correlation between poverty and lack of access to clean water. Regression analysis ... also indicates that poor households have much less access to safe water than higher-income households in Cambodia. The implications for child mortality are suggested by [mapping], which displays the regional distribution of childhood deaths in Cambodia. Again, the spatial correlation with the poverty population is evident. We conclude that safe water is a poverty/environment nexus issue of great importance in Cambodia.”

“... we should note the difference between the spatial distributions of poverty and mortality *rates*, and the spatial distributions of total poverty and mortality. The latter provide the basis for our welfare analysis, because they reflect the total number of people affected. By this criterion, the central population axis of Cambodia is the high-priority area for addressing both poverty and mortality from lack of clean water and sanitation. Poverty and mortality *rates*, by contrast, are generally higher in the northern and eastern parts of the country. The proportion of households affected by poverty and waterborne disease ... is higher in these areas, but the total number of affected households is much lower than in the central population axis.<sup>8</sup>”

### 6.2 Overview School Water Supply and Sanitation Problems

The ECCD project shares problems with schools in developing countries worldwide:

- water supply is either non-existent or inadequate for the number of school children;
- toilets and latrines do not function properly due, for example, to poor design and/or lack of water for flushing (on land site);
- smell from the small cubicle with tin roof which is very hot under the sun;
- children, specifically girls, do not attend school because appropriate and private sanitation facilities are lacking ([WHO, 1997](#)).

The provision of safe water and sanitation facilities combined with good hygiene education inevitably improves the health and attendance of children and may potentially result in a lower drop out, especially of girls. In essence, it is the combination of hard and software components that prevent water and sanitation-related diseases ([UNICEF and IRC, 1998](#)).

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<sup>6</sup>Cambodia Water Supply and Sanitation Sector Review (2012)

<sup>7</sup>National Institute of Statistics, Directorate General for Health, and ICF Macro. (2011)

<sup>8</sup>The Poverty/Environment Nexus in Cambodia and Lao People's Democratic Republic by SusmitaDasgupta, Uwe Deichmann, Craig Meisner, David Wheeler, DECRG World Bank Policy Research Working Paper 2960, January 2003.

### **6.3 Background – the Cambodia Context**

Three main problems for floating community living on Tonle Sap Lake are:

1. **Clean Water Supply:** Generally the community use water from the lake for their daily living includes bath, washing, cooking and drinking. Some people boil water before drinking and some household make it transparent by adding potassium permanganate and drink. This habit may cause health risk in long term.
2. **Solid Waste Management:** Throwing all household waste and other waste into the lake is the common practice of both floating and on stilt villages. In dry season the use of chemical pesticides are very high among people who have secondary income from vegetable garden and rice paddy. This practice habit contaminates the water and health risk to floating communities who depend on lake water as their daily consumption.
3. **Sanitation:** The most common problem for all community members. Lack of sanitation in school visited and no proper design was introduced for children. Learning from field visit the school sanitary design cannot be considered as child-friendly school or center. The current design does not address the problems or the needs of children: for instance there is no separation of latrine or toilet between boy and girl (very sensitive for female student grade 4 to 6).

**Further details and Recommendations and Mitigation Measures for Water Supply, Solid Waste and Sanitation during operation**

Environmental Problem	Recommendation and Mitigation Measures
<p><b>Clean Water Supply</b></p> <p>Only two visited sites have access to clean water while other schools do not have clean water supply and they are forced to use water from lake if rain water is not enough. Children bring their own drinking water to school from their homes.</p>	<p><u>Options for Improved Clean Water Supplies:</u></p> <ul style="list-style-type: none"> <li>• maximize supply (capture of rain water);</li> <li>• maximize storage (tanks or cisterns),</li> <li>• For floating village a mobile and small water treatment system (HAGAR/or similar system) should be introduced for each ECCD center</li> </ul> <p><u>Water Supply Systems for On Land Sites:</u> Surface water entering wells is the main source of pollution. Flood water is likely to be contaminated, and could contaminate wells via inundation of the pump.</p> <p>The following are options for design changes and specifications to maintain safe water supplies:</p> <ul style="list-style-type: none"> <li>• Consider elevation of the water supply well pump and apron in areas of flooding; to avoid contamination by flood water and allow user access during floods;</li> <li>• Encourage community water treatment plant as in the village of PralayMeas and Peam Khnang; or identify and encourage clean water supply arrangement from private vendors</li> <li>• Identify vendors of low cost bacteriological screening kits, and;</li> <li>• Identify a well sterilization (chlorination) technique and recommended frequency, to restore wells that have become contaminated and/or use rainwater collection tanks for latrines.</li> </ul>
<p><b>Solid Waste</b></p> <p>Common habit and practice in all community living on Tonle Sap Lake is to discard of it untreated, directly in the lake.</p> <p>During the construction solid waste is created</p>	<p><u>Environmental Awareness Program</u></p> <p>The Ministry of Environment with support and other NGOs working on environment (Live and Learn Environmental Education) should design/establish an environmental awareness program specifically for community living on Tonle Sap Lake to contribute to Cambodia's poverty reduction strategy.</p> <p><u>Waste segregation</u></p> <p>Dividing waste into dry and wet. Dry waste includes wood and related products, metals and glass. Wet waste, typically refers to organic waste usually generated by eating establishments and</p>

are heavy in weight due to dampness. Waste can also be segregated on basis of biodegradable or non-biodegradable waste.

The most rational way to cope with all this is to collect it at its source in each area and to separate it immediately where possible. The way that waste is sorted must reflect local disposal systems. The following categories are common:

- Paper
- Cardboard (including packaging for return to suppliers)
- Glass (clear, tinted – no light bulbs or window panes, which belong with residual waste)
- Plastics
- Battery
- Compost
- Special/hazardous waste
- Residual waste

Organic waste should also be segregated for disposal. The following categories are recommended:

- Leftover food which has had any contact with meat should be collected separately to prevent the spread of bacteria.
- Meat and bone should be retrieved by bodies responsible for animal waste
- If other leftovers are sent, for example, to local farmers, they should be sterilized before being fed to the animals
- Peel and scrapings from fruit and vegetables can be composted along with other degradable matter. Other waste can be included for composting, too, such as cut flowers, corks, coffee grindings, fruit, tea bags, egg- and nutshells, paper towels etc.

#### Waste Bin

This can be achieved by providing bins in communal areas for segregated waste. It is important to involve the children in ECCD centers in the recycling policy. It is important to make sure that recycling information is prominently displayed, with clear instructions about what you would like the children or the community members to do.

At the Construction sites the Contractor shall install waste bins to keep the site clean at all times. All wastes from the site, including plastics and construction materials shall be properly handled and dumped in a license area nearby the site as permitted by the local authority.

**Sanitation**

For on land sites, lessons learned concerning sanitation systems (pour flush toilet) currently in use include poor operation of the school latrines, resulting in requirements for maintenance every three to five years. During the wet season percolation is poor, preventing flushing, and during the dry season, with little or no flush water, solids build up and have to be removed.

For floating villages there were little sanitation systems, compare to population living on the boat, to store and treat wastewater before discharge into the lake. Children has problem using the drop-hole toilet in school where they build a small room with a hole and covered by metal roof and surrounded by wood plank or plastic. All wastes flow directly into the lake and contaminate the water. This is very common on Tonle Sap Lake and this habit cause disease, especially diarrhea among children.

**A. On Land (ON STILTS) Option for ECCD center**

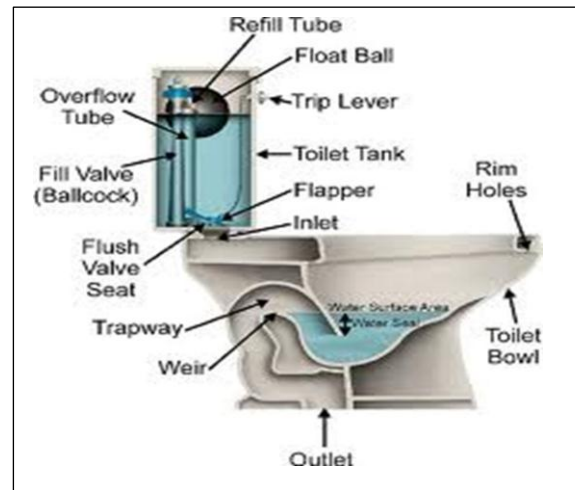
There are options for sanitation in floating communities. For on land, site septic tank is the better option since there is no water during dry season. But the sanitary system must address minor issue which not much attention is paid to during construction of the latrine.

Basic Design: Plumbing

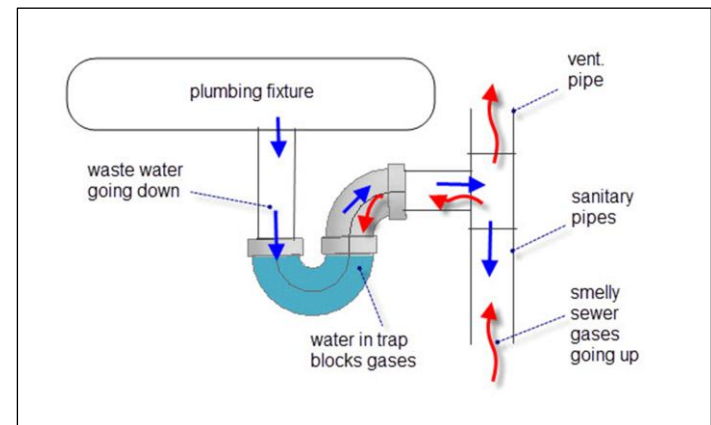
Design flaws in the plumbing of the water carriage latrine designs currently in use for construction of schools in Cambodia is probably the major source of dissatisfaction with these sanitation systems. The plumbing becomes clogged and the latrine becomes unusable.

Plumbing Improvements:

For water carriage systems, there should be a trap either within the toilet fixture or in the plumbing directly connected to the toilet fixture. This trap holds water and prevents sewer gas from escaping into the latrine room. The toilet plumbing should be vented to avoid siphoning the water out of the traps.



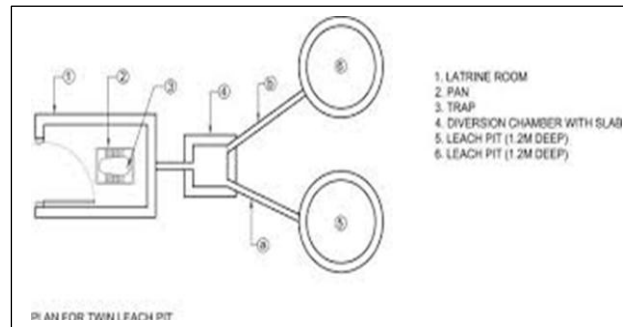
Toilet Fixture With Built-in Trap



"P" Type Trap and Vent

A standard cleanout, which consists of the same four-inch diameter PVC pipe with a threaded cleanout port in the top, can be located directly downstream of the toilet fixture, to enable bypassing the trap in order to auger the rest of the drain pipe to the septic tank. Additional cleanouts can be added where needed, with access through a covered manhole, but these should all be standard PVC cleanout fittings that do not alter the flow in the drain line. There should be no "cleanout" boxes in the plumbing prior to the outlet into the septic tank, as these will slow flow, collect solids and clog the plumbing.

- Eliminate the box located directly under the toilet fixture, this box slows flush water flow and will collect solids and prevent complete flushing of wastes into the septic tank, if available;
- Eliminate the cleanout box that interrupts the pipe run to the septic tank, as this will slow flow, collect solids and clog. Use standard PVC cleanout fittings where required for convenient auguring of the drain pipe instead;
- Waste pipe diameter should be 4 inches, with slope of at least 1/4 inch per lineal foot, the greater the slope the better;
- Built-in and encased plumbing should not be approved;
- The most sanitary seats, particularly for children, are the U-shaped type made of nonabsorbent material;
- At least one washbowl should be placed near the toilets. The number of washbowls should at least be equal to the number of classrooms in the building;



Twin Pits Pour Flush Toilet



On Stilt Toilet with Elevated Pits

**Specific environmental monitoring actions for POD wastewater treatment system:**

**Parameters:** referred to Sub-decree on pollution control (Government of Cambodia, April, 1999). See table below. SC will select only key parameters to be tested (to be decided in consultation with Provincial Department of Environment and/or Wetland Works!)

Effluent Standard for Pollution Sources: Discharging Wastewater to Public Water Areas or Sewer

N <sup>o</sup>	Parameters	Unit	Allowable limits for pollutant substance discharging to	
			Protected public water area	Public water area and sewer
1	Temperature	°C	< 45	< 45
2	pH		6 – 9	5 - 9
3	BOD <sub>5</sub> ( 5 days at 200 C )	mg/l	< 30	< 80
4	COD	mg/l	< 50	< 100
5	Total Suspended Solids	mg/l	< 50	< 80
6	Total Dissolved Solids	mg/l	< 1000	< 2000
7	Grease and Oil	mg/l	< 5.0	< 15
8	Detergents	mg/l	< 5.0	< 15
9	Phenols	mg/l	< 0.1	< 1.2
10	Nitrate (NO <sub>3</sub> )	mg/l	< 10	< 20
11	Chlorine ( free )	mg/l	< 1.0	< 2.0
12	Chloride ( ion )	mg/l	< 500	< 700
13	Sulphate ( as SO <sub>4</sub> )	mg/l	< 300	< 500

14	Sulphide ( as Sulphur )	mg/l	< 0.2	< 1.0
15	Phosphate ( PO <sub>4</sub> )	mg/l	< 3.0	< 6.0
16	Cyanide ( CN )	mg/l	< 0.2	< 1.5
17	Barium ( Ba )	mg/l	< 4.0	< 7.0
18	Arsenic ( As )	mg/l	< 0.10	< 1.0
19	Tin ( Sn )	mg/l	< 2.0	< 8.0
20	Iron ( Fe )	mg/l	< 1.0	< 20
21	Boron ( B )	mg/l	< 1.0	< 5.0
22	Manganese ( Mn )	mg/l	< 1.0	< 5.0
23	Cadmium ( Cd )	mg/l	< 0.1	< 0.5
24	Chromium ( Cr ) <sup>+3</sup>	mg/l	< 0.2	< 1.0
25	Chromium ( Cr ) <sup>+6</sup>	mg/l	< 0.05	< 0.5
26	Copper ( Cu )	mg/l	< 0.2	< 1.0
27	Lead ( Pb )	mg/l	< 0.1	< 1.0
28	<b>Mercury ( Hg )</b>	mg/l	< 0.002	< 0.05
29	Nickel ( Ni )	mg/l	< 0.2	< 1.0
30	Selenium ( Se )	mg/l	< 0.05	< 0.5
31	Silver ( Ag )	mg/l	< 0.1	< 0.5
32	Zinc ( Zn )	mg/l	< 1.0	< 3.0
33	Molybdenum ( Mo )	mg/l	< 0.1	< 1.0
34	Ammonia ( NH <sub>3</sub> )	mg/l	< 5.0	< 7.0
35	<b>DO</b>	mg/l	>2.0	>1.0



36	Polychlorinated Byphemyl	mg/l	<0.003	<0.003
37	Calcium	mg/l	<150	<200
38	Magnesium	mg/l	<150	<200
39	Carbon tetrachloride	mg/l	<3	<3
40	Hexachloro benzene	mg/l	<2	<2
41	DTT	mg/l	<1.3	<1.3
42	Endrin	mg/l	<0.01	<0.01
43	Dieldrin	mg/l	<0.01	<0.01
44	Aldrin	mg/l	<0.01	<0.01
45	Isodrin	mg/l	<0.01	<0.01
46	Perchloro ethylene	mg/l	<2.5	<2.5
47	Hexachloro butadiene	mg/l	<3	<3
48	Chloroform	mg/l	<1	<1
49	1,2 Dichloro ethylene	mg/l	<2.5	<2.5
50	Trichloro ethylene	mg/l	<1	<1
51	Trichloro benzene	mg/l	<2	<2
52	Hexaxhloro cyclohexene	mg/l	<2	<2

**Frequency of monitoring:** SC will conduct test every three months for the first one year after the ECCDs will be put for operation.

**Locations for monitoring:** Of the ten floating facilities, at least five school locations will be tested. Samples of waste water discharged from the POD system, and areas around the vicinity of the ECCDs (to be decided) will be selected for monitoring.

**Responsibility:** SC, with support from its environment consultants (and Wetland Works), will carry

out monitoring of waste water before discharge into the water body. SC will work closely with Provincial Department of Environment on the key parameters for monitoring and results. The results of monitoring of waste water will be included in the progress report of SC, and share with bank for review and comments.

## **B. Floating Center**

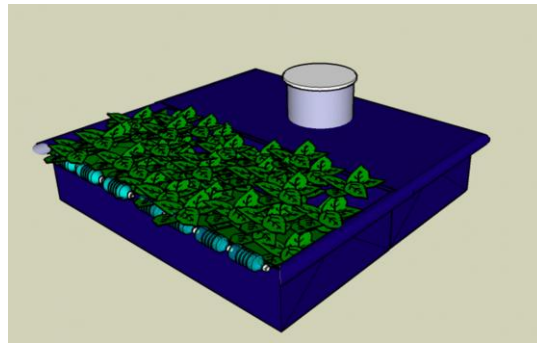
### Treatment Pods

To solve current water quality problem or contaminated water from human waste, Wetlands Work (WW) has developed an individual household wastewater treatment system that uses floating “PODs” that are positioned under the toilets of the households occupied by low-income fishing families. The PODs are filled with floating special plants, and the bacteria that reside on the plant roots are capable of breaking down contaminants and making the water significantly cleaner. In O Akul village, O Sandan commune, Krakor district, where Wetland Work (WW) experiments the prototype pods was not successful initially. The community complained about smell, visuals and non-durability of the tarpaulin used. In addition to the system people prefer to use flush toilet instead of drop-hole (see Appendix 3 on field visit report). based on these initial experiments, according to WW, the treatment system design has been revised to include the community feedback, recommendations and preferences. Consequently, the tarpaulin will be replaced with HDPE plastic type, which gives the system durable operation time.

At present the “Pod” is Wetlands Works! sanitation system for floating houses, which was found to be able to improve ambient water quality significantly. The “Pod” uses aquatic plants (e.g., water hyacinth) to treat human waste. Wastewater from the house is diverted to a floating “Pod”, where it is contained and brought into contact with the roots of water hyacinth. Hyacinth, a floating plant commonly found on the lake, is particularly effective at treating wastewater as their roots have an extensive surface area harboring countless microorganisms. These microorganisms reduce the numbers of harmful bacteria and other pathogens in the wastewater, treating the water from a contaminated to a vastly improved state. Raw sewage added to the “Pod” without anaerobic pre-treatment showed that the waste added amounted to 15% of the overall volume of the Pod and the levels of E. coli reduction detected were significant (see Appendix 4 for Handy Pod).

The Pod requires little to no operational maintenance and there are no associated costs beyond locally available materials, simple fabrication, and installation during the construction phase. The Pod requires no chemicals or electric power source. It is simple to understand, and aesthetically appropriate technology. At this point, the Pod is the only treatment technology that has been proven

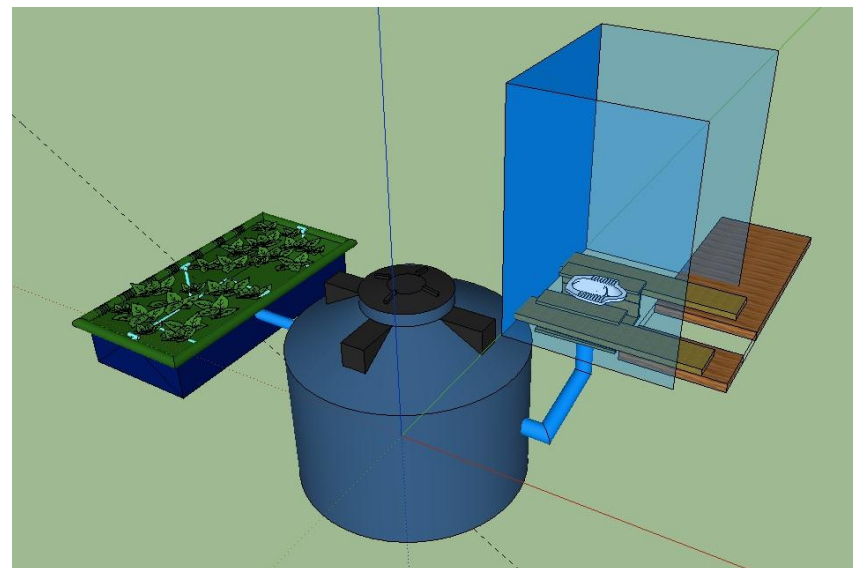
to be effective and appropriate for rural floating communities in Cambodia. The technology has been recognized by the Ministry of Environment, through its pilot test of POD design (report is available for review). Highly adaptable, the Pod is appropriate to be used in homes and schools as well as other settings in floating villages. It is known and observed also during field visit that the water level of floating village during dry season is about one meter high. Thus, the Pod treatment system can work year round with no problem. After completion of facilities, School Support Committee will be responsible for maintenance of facilities, not only for POD system but also the overall hardware (latrines and drilled wells) and software (the use of built facilities for education purposes only). The budget will come from various sources including parent contribution.



Anaerobic Pod is attached to aerobic hyacinth Pod with small flow space between



Pods and privacy screens (blue)

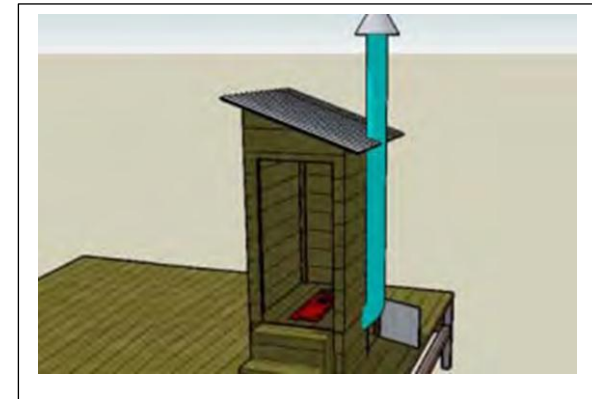


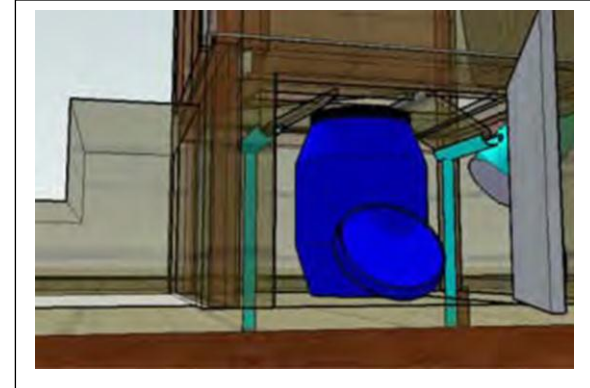
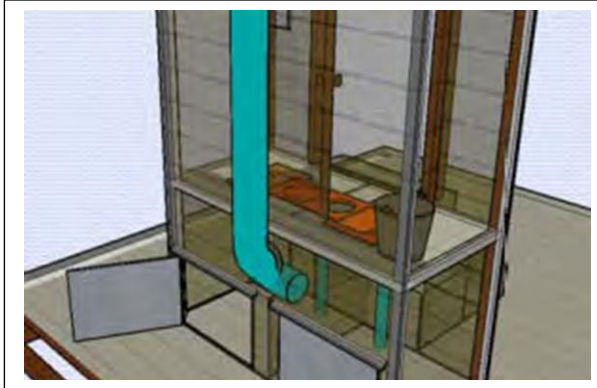
This is another optional for household waste management that is already introduced to Cambodia's floating villages. This sanitation system is locally made, and affordable to low income fishing family in the floating villages. This system could treat human waste thus provide, in general, the villages with clean and safe drinking water. Lien Aid is also exploring other options on the use of especially adapted septic tanks plus ecological sanitation using the urine diversion-desiccating toilet.

### **Toilet Design**

The urine-separating squatting pan is fabricated by combining cement with other locally available materials. The pan is needed to separate liquids from feces in order to enable desiccation as the most efficient method for the destruction of pathogens. The community members are currently using water for hand washing and anal cleansing after defecation, so there is an additional requirement for the disposal of wash water.

The pan has 3 holes; one hole is used to divert urine away from the feces hole, a straight hole for feces, and a large pan area and hole for wash-water. The pan is preferably lightweight, and can also be carefully designed making it a strong structure, scratch resistant, lightly colored and shiny. The current available local pan production is limited to the use of cement. The dimension of the pan is 50cm x 70cm.





A desiccation process is used in treatment of the human waste using the application of additional wood ash to speed up the drying of waste and to increase the pH for pathogen destruction. This type of treatment is used in land-based settings and the required minimum time for treatment to kill the pathogens is 6 months.

The requirements for this type of treatment are the following:

- 20L bucket for storage of waste (diameter 0.32m, height 0.35m)
- 2 or 3 hole pan for diversion of urine and wash water
- Disposal and/or collection method for urine and wash water
- Storage method for faecal waste for sufficient period of time under desiccating and alkaline conditions
- An appropriate additive to assist the desiccation process (ash)
- An effective means to incorporate the design into existing houses and structures

### Pros and Cons of Sanitation Options

	Pod Treatment System	LIFE System
<b>Design</b>	Ceramic squat pan	Cement

		Only one hole for both urine and waste	Two to three holes: urine, waste and washing water
		Simple with one collector tank and then to the treatment pod	Can be different collector tank for human waste, urine and washing water. Or urine and washing water can directly go into water
		Storage and Pod are floating on the water	Space below squatting pan for waste storage tank
	<b>Costing</b>	Low cost construction	Low cost construction
	<b>Operation</b>	User friendly	Take care of the two or three holes
			Need waste storage method
			Use wood ash to assist the desiccation process
		No chemical require	Require 6 months to kill faecal pathogens and require land-based settings
		Naturally treated of wastewater	Collect all waste and bring to land-based setting for composting
	<b>Efficiency</b>	Experiment proven to be very efficiency of wastewater treatment	Urine and washing water (containing soap agent) may directly drop into the lake and contaminate the water
	<b>Maintenance</b>	Low or no maintenance	High maintenance
		Always floating and require minimum water level	Extra cost for wood ash
<p>From the above table it is concluded that LIFE system is a bit difficult for floating community to keep waste for composting since majority of the population is mainly rely on fishing and no vegetable garden at boathouse. While Pod system is simple, no operational maintenance and there are no associated costs beyond locally available materials, simple fabrication, and installation.</p>			

## **6.4 EMP implementation: responsibilities, capacity building and funding**

The contractor will be responsible for implementing mitigation measures during construction stage and the community and school staff will be the primary implementer of recommendations during operations.

During construction, Save the Children will assign a Junior Engineer (JE) to monitor the implementation of the EMP throughout the life of the project. This JE is part of an in-house construction team independently sponsored outside of the immediate project budget. He/she will collaborate closely with the safeguard Technical Advisor (TA) for SESSP (Second Education Sector Support Program), and liaise with relevant Ministry representatives (MoE, MAFF, MCFA) as necessary. He/she will be responsible for producing a brief monthly EMP Monitoring report which will be attached to the project's regular progress reports.

The safeguard TA will provide support to the work of the SC JE and have a double benefit to the ECCD Centers. Under SESSP, the TA provided capacity building and training programs for MoEYS officials at central, provincial and district level on topics such as wetland pollution prevention. It is expected that the SC JE and, training to the extent possible, other relevant project stakeholders will participate in those training.

In addition, SC will include safeguards training as part of standard project started community intervention activities targeting the school stakeholders and wider community, with the support of the JE.

Throughout the process, MoEYS will be the responsible institution that oversees environmental management. SC has one international consultant who will provide overall guidance on environmental safeguards. In addition, three staff in the construction team will work to not only ensure the quality of construction, but also to minimize the environmental, archaeological and paleontological impacts of all construction activities.

During construction, all interventions that will take place as a result of the execution of the EMP will be built into the budget of the project itself and factored into the agreement with the contractor. During operations, the expenditures linked with the maintenance of the center (latrine, solid waste, security barriers etc.) will be forecasted and budgeted for under the schools' standard operating and maintenance costs, and funded by the MoEYS and/or the Commune Investment Budget as applies. As stated earlier, School Support Committee (school director, village chief, village representatives, respected elderly people, etc.) will be responsible for maintenance of facilities after handover.

## **6.5 Recommendations**

- Consultations with local community who directly benefit from the project should continue to be carried out during ECCD center drawings/design and construction.
- The Contractor needs to ensure that plumbing mistakes in current sanitation designs should be rectified in the new ECCD centers that will be constructed under the project.
- Through design and construction stage, water supply pumps and toilet facilities should be elevated above flooding level, as currently practiced, and would be more usable if attached to the school platform
- Septic tank for ECCD on land site should be well designed protecting human waste from floating into water surface during wet season

- Maximum use should be made of water supply storage
- Catchment and storage of rain water is encouraged for ECCD center
- Solid waste management and environmental awareness program should be a priority in the floating villages and ECCD program. “Clean environment starts from kids or the ECCD centers“
- Waste segregation awareness, in cooperation with other NGOs working in floating village, should be regularly introduced
- Wastewater treatment system (TREATMENT PODS) or ECCD center is the treatment system and technology recognized by Ministry of Environment and Ministry of Education, Youth, Sports
- One sanitation facility should be also constructed attached to each ECCD center for public use purpose (squat flush toilet is the best option for community-according to field survey)
- A follow-up site screening process to determine the best system for school size, and detail environmental conditions should be initiated for all proposed project sites. The appropriate technology should be matched to the specific project and site. At early stage of project identification, site screening was carried out by SC taking into consideration a few key criteria such as enrollment rate; dropout rate and class repetition rate. The result has recommended Kampong Chhnang and Pursat provinces as project candidate sites for ECCD facilities. Discussion was also made separately with Early Childhood Department of MoEYS at national level, provincial Department of Education, and School Support Committee on floating school design. Experiences of floating schools built by EU/ADB were also discussed. Comments were recorded and used for designing the floating school (structural design). Apart from this, separate discussion was made with Wetland Works for the designing of wastewater treatment system for floating facilities. For the purpose of updating the EMP, SC carried out rapid social and environmental assessment (see annex below) to understand overall social and environmental related issues. Site screening does not specifically aim at neither designing POD system nor monitoring the impacts (before and after the project). Thus, no detail environmental information are recorded. Besides, this ECCD is categorized B, and it follows similar nature of the previous ESSUAP project. A full scale EA is not relevant.
- Community meetings should be organized for consultation of EMP organized by MoEYS once it’s disclosed.

## **7. Grievance Redress Mechanism**

School construction support committee will have a role in the grievance redress mechanism. If there are any complaints from the community people including verbal complaints, the school construction support committee shall request to receive these in writing. Complaints may be received at any time during the school year.

Based on the findings from the school construction support committee, Save the Children together with MoEYS will decide on a response and contacts the person who submitted the complaint regarding actions to be undertaken. If needed, community people will also be able to contact the POE or ECED directly. The phone number and mailing address of the POEs and ECED will be made available on the public boards of two POEs.



All efforts will be undertaken to respond to grievances as quickly as possible. The response in writing shall be sent out within 30 days after receiving complaint letter from the Save the Children or MoEYS.

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## **APPENDIX1 : Environmental Code of Practices - ECoP**

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### **ENVIRONMENTAL CODES OF PRACTICE FOR ECCD CONSTRUCTION SITES**

#### **Introduction**

The environmental codes of practice (ECoP) of the proposed Early Childhood Development Education for Floating Villages Project is prepared for ECCD construction sites to enable developers and contractors working in Cambodia to understand what standards should normally be adopted when undertaking the following building works:

- a. Site safety
- b. Site clearance and preparation
- c. Construction
- d. Maintenance and repair

It is the responsibility of the main contractor to ensure that all sub-contractors and site personnel are aware of and comply with the requirements of the codes.

#### **1. Legal Framework**

Whilst compliance with the code of practice is voluntary it should avoid the need for enforcement action using statutory notices. Where, however, the code of practice has been incorporated into a bidding document as part of the contract agreement, failure to comply with its requirements could result in enforcement action under Cambodia law.

#### **2. Community Relations**

Based on experience of construction works within community/village area clearly demonstrated the benefit of warning residents and commercial operators in advance of the disruption that may arise. It is to ensure that contractors who are intending to undertake construction works:

1. Establish a local point of contact for any enquiries and/or complaints relating to the construction works,
2. Nominate a member of staff who will liaise (as necessary) with SC, residents and commercial operators,

In addition the main contractor should display at the prominent position on the site boundary details of his name, address and telephone number, together with an indication of the likely duration of works.

#### **3. Working Hours**

It is important that the following working hours should apply when there are sensitive receptors (e.g. school, hospital, pagoda, residential property) adjacent to the construction site.

08:00 – 18:00 hours Monday-Friday

08:00 – 12:00 hours Saturday-Sunday

Unless agreed in advance with SC, no working should be undertaken on Public Holiday. SC also acknowledges that some activities may be undertaken on site without causing disturbance to neighbors (e.g. electrical rewiring, painting) and therefore may be scheduled outside the normal working hours. Prior warning of such works should be given to the Environmental Safeguards Specialist of the project.

#### **4. Child Labor Is prohibited**

(Refer to ILO Conventions 138 and 182 and to the UN Convention on the Rights of the Child)

According to the UN Convention on the Rights of the Child, a person is a child until the age of 18. Child labor is not allow in the construction site. No person shall be employed at an age younger than15 or younger than the legal age for employment. The contractors must take the necessary preventive measures to ensure that they do not employ anyone below the legal age of employment.

#### **5. Security and Safety Fence**

Construction sites should be fully enclosed to protect the general public, student, and pupil and deter unauthorized entry. The safety temporary fence should have appropriate high above pavement level.

Temporary safety fence should not be used for advertising. However, it may be used to display details of the site including project name and duration, name, address and telephone number of the main contractor and/or site agent.

#### **6. Access Gates and Scaffolding**

Access to and from the site should be organized to allow vehicles to enter and leave the site in a forward gear. When necessary a gate marshal should be employed to ensure the safety of pedestrians using adjacent public footpaths.

#### **7. Lighting**

Though ECCD site is in the village but the contractors should ensure that any lighting of the site and its perimeter is sufficient to ensure the safety of workers and other pedestrians. In addition the lighting should be located and orientated so that it does not cause intrusion to adjacent residential property or distract passing motorists.

#### **8. Access Road Management**

Where reasonably practicable all loading and unloading of contractors' vehicles should be within the site boundary. Deliveries and collections should be scheduled to coincide with the normal working hours.

#### **9. Environmental Control**

##### **9.1 Dust**

The ECCD construction center will be located on land where it is easy to access to construction materials and other supply to the construction. Though the construction is not in the target village

but other community whose do not benefit from the project shall not be affected by construction activity, for instance, dust.

1. Bulk storage of potentially dusty materials should be located away from the site boundary.
2. Mixing large quantities of concrete on site should be undertaken using enclosed plant.
3. Cutting and grinding operations should be undertaken using appropriate dust suppression techniques.
4. Potentially dusty spoil and other waste materials should be damped down regularly when handled and transported in sheeted vehicles.
5. Rubble-chutes should be used with care and drop heights kept to a minimum.

## 9.2 Air Pollution

Smoke, fumes and particulate emissions can be minimized by ensuring that:

1. No on-site bonfires are used for the disposal of any waste.
2. All plants are properly maintained and throttled down or switched off when not in use.
3. Fuel storage tanks are located away from the site boundary and vented at a point remote from sensitive receptors (e.g. school, hospital, pagoda or residential property).
4. When tar boilers are in use the lid should be kept closed as far as reasonably practicable.

## 9.3 Land Contamination

In some cases the remediation of known or suspected land contamination may require the excavation and disposal of soils and other waste materials. Such materials should be adequately segregated and removed to a suitably licensed facility in accordance with article 13 and article 16 of Sub-decree on Solid Waste Management (No. 36 ANRK.BK, April 1999). If there is likely to be an offensive odor or vapor associated with the excavation and disposal operation the local authorities should be advised in advance.

## 9.4 Asbestos

Works involving the treatment of asbestos products should be undertaken by carefully and handled in accordance with hazardous waste management of Solid Waste Management Sub-decree, 1999, of the Ministry of Environment.

## 9.5 Noise and Vibration

The contractors shall take necessary measures to minimize noise and vibration impacts to nearby community. Noise from the proposed construction works should comply with article 7 of Sub-decree of Air Pollution Control and Noise Disturbance (July 2000) of Ministry of Environment. See table below.

### Maximum Permitted noise level in public and residential area (dB(A))

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

No	Area	Period of Time		
		From 6:00 - 18:00	From 18:00 - 22:00	From 22:00 - 6:00
1	Quiet areas - Hospitals - Libraries - School	45	40	35

	- Kindergarten			
2	Residential area: - Hotels - Administration offices - House	60	50	45
3	Commercial and service areas and mix	70	65	50
4	Small industrial industries intermingling in residential areas	75	70	50

The contractors have to use the best practicable means to minimize noise for example:

1. All equipment should be selected having regard to its published sound power level.
2. If an activity is inherently noisy (e.g. driven piling) then an alternative technique should be investigated.
3. Effective silencers and acoustic covers should be provided and maintained in good working order.
4. Temporary structures and buildings may provide useful noise screening.
5. Fixed items of plant (e.g. generators) should be electrically powered rather than diesel or petrol driven.
6. Sufficient time should be allocated for large concrete pours.
7. Anti-social behaviors involving swearing, shouting and loud radios should be avoided.

## 9.6 Water and Effluent

Water and effluent generated from on-site activities should be treated and disposed of in accordance with the provisions on waste and hazardous discharge of the Sub-decree on Water Pollution Control, April 1999 of Ministry of Environment.

Adequate pollution prevention techniques should be adopted to ensure that any potentially hazardous substances do not come into contact with vulnerable water (e.g. via surface water drainage systems). Recycling water should be encouraged.

## 9.7 Pest Control

Preventive measures should be adopted to control any rodent activity on site and test baiting may be necessary to confirm the existence or otherwise of an infestation. All redundant drainage and sewerage infrastructure should be improved or stopped up and accumulations of putrescible waste should be avoided.

## APPENDIX 2 :Checklist for Construction Site

### CHECKLIST FOR CONSTRUCTION SITE

ECCD Construction Center, Save the Children Cambodia

<b>Directives:</b> This form has to fill by local authorities or school committee					
<b>I. General Information</b>	1. Name of village, commune and province				
	2. Name of proposed scheme				
	3. Type of scheme	New construction	<input type="checkbox"/>	Other (please specify) .....	<input type="checkbox"/>
		Reconstruction	<input type="checkbox"/>		
	4. Objective of the proposed scheme and brief description				
				<b>Please Tick mark (√)</b>	
	5. Does the proposed scheme involve all types and classes of the people in the locality?	<input type="checkbox"/> Khmer	<input type="checkbox"/> Cham	<input type="checkbox"/> Vietnamese	
<b>II. Environmental Checklist (Please tick mark in the right place)</b>	1. Is the construction site locates near historical, fishery conservation/wetland area nearby the propose scheme?	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	2. Does the scheme's implementation interrupt the natural flow of river, canal or any stream?	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	3. Do the floating structures get beached on land for certain period of the year (dry season)? if yes, for how long? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	4. [For on stilt]: How many months of the year is the ground dry? ..... How many months of the year are the stilts in water? .....				

**Directives:** This form has to fill by local authorities or school committee

How high is the water? .....			
5. Does the scheme's implementation increase the possibility of ground water pollution (on land site)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
6. Does the scheme's implementation increase the possibility of surface water pollution (floating site)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
7. Does the scheme will generate any waste?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
8. Is there any chance of increase public health problem by throwing waste into open water bodies?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
9. Is there any waste management plan for the scheme if it generates waste?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
10. What are current community garbage/waste solutions? ..... .....			
11. What are the current community toilet and wastewater solutions? ..... .....			
12. Where does the community get its drinking water from? ..... Washing water from? .....			
13. For construction of ECCD Center, is there any chance to create problem to river which is the only source of water used by the community?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
14. Does the scheme generate air and dust pollution?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
15. Will the ECCD Center construction generate noise or disturbance?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
16. For sanitary latrine construction, is there any drinking water source near 30m distance of the latrine? [for on land site only]	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
17. Is there any chance of trees to be cut by the implementation of the proposed scheme [for on land site only]? (If yes, then please specify the number of tree to be cut)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
18. Is there any chance of destruction of biodiversity (fish, birds, and animals) habitat by the implementation of the scheme?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
19. Is there any reason leading to think that water hyacinth could not grow in the local environment (floating			



**Directives:** This form has to fill by local authorities or school committee

	only)?.....			
	20. How far is the dry season site from the wet season site? ..... KM			
	22. Is there any land available near the dry season site where ECCD construction can be used?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
	23. Mitigation measures:			
	24. What are your concerns to construction and your suggestions for ECCD center:			

**III. Evaluation by Environmental Safeguards Specialist**

The form is filled correctly or not?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Mitigation measures are satisfactory or not?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
If the mitigation are not satisfactory then please specify your opinion (where necessary):		
<b>Name of Environmental Safeguards Specialist</b>	<b>Signature</b>	<b>Date</b>

## **APPENDIX 3 : Lesson Learned from Field Visit**

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### **ENVIRONMENTAL ASSESSMENT ON EARLY CHILDHOOD DEVELOPMENT EDUCATION FOR FLOATING VILLAGES PROJECT**

#### **A. Background and Objectives**

Cambodia, in efforts to reduce poverty and increase prosperity, has recognized the key importance of education to its national development. Parallel to the government objective, Save the Children Cambodia with the grant from Japan Social Development Fund and The World Bank will implement a project for early childhood development education for floating villages in Kampong Chhnang and Pursat province.

The project objective is to improve school readiness of children under six years of age and increase age-appropriate grade 1 enrollment of children from floating communities. The objective will be supported by improving access to, and the quality and management of the early childhood care and development (ECCD) system through community and home-based programs. Particular attention will be paid to the most vulnerable children i.e. children from the poorest families, children with disabilities, girls, etc.

The project consists of the three components. And one of the component focuses on providing low-cost community and home-based ECCD programs for children and parents living in the target villages, including construction of 20 ECCD centers, establishment of HB ECCD programs and creation of a network for village ECCD facilitators and core mothers. The project in general is classified as environmental category B which needs partial assessment. The impacts of this category are site specific and the mitigation measure can be designed.

To assess environmental issues that may derive from civil works of the proposed 20 ECCD center, field visit to the villages in the two provinces were conducted.

The objectives of this field visit are to:

1. Visit existing school in the target villages and assess overall environmental conditions and potential impacts that may cause during construction;
2. Assess the school committee awareness in relation to EMP implementation
3. Understand the role and responsibility of local authority/school committee with regards to environmental mitigation measures which include the solutions or what the contractor must do during construction (EMP)
4. Improve existing EMP and other tools if required

#### **B. Methodology**

The target villages are selected by Save the Children Cambodia and the field visit to those sites were discussed among the study team with help from Save the Children.

Wetland Works that experiment on floating wastewater treatment pods for lake communities was also interviewed and discussions were held with them about the sanitation system prior to field visit.

At each visited site, the school principle and school support committee members were invited to a meeting to discuss environmental related issues (noise, dust, solid waste, safety, site management, sanitation facilities, surrounding environment, etc.) if the project happen in the short future in their own village. They were also consulted for their opinions and suggestions for better project implementation in terms of environmental safeguards. Students in the school were also consulted with regards to the use of facilities.

### **C. Field Findings**

The environmental specialist visited 5 floating sites and 3 on land sites and meeting with DoEs, commune chiefs, village chiefs, school principles, teachers, students and villagers. Key findings during the field visit as followings:

#### **I. Awareness of Environmental Safeguards**

The school support committee and community members are not well aware of environmental safeguard of the project and never pay attention to environmental parameters. They understand that there is no impact to environment if there is construction of ECCD center. Community Construction Support Committee in AnlongRaing are not active in construction of community center funded by ADB ( as they have duties and appointed to supervise and control construction quality) since the construction is in Raing Tel village (5-6KM from community) and the members do not have enough budget for traveling.

#### **II. Land Acquisition**

All villages are floating during wet season and some village will be on land during dry season. People has right to use the land but no ownership was granted. No land acquisition involve for this project.

#### **III. Heritage, Conservation Site**

Fish conservation is located far from the village. People are not allowed to live near the conservation sites.

#### **IV. Construction Activities**

The environmental impact during ECCD construction may include: dust, noise, water quality, hazardous materials. However, these impacts are short-term impact and during construction time only. It was proposed that the construction of the center should start during dry season and located on land near waterway. The reason is to minimize transportation cost of construction materials and also lessen impact to water quality. Yes it is also easy to manage waste generated from the construction.

#### **V. Sanitation Facilities**

Currently sanitation practice of people in floating villages:

1. Use own toilet in the house:
  - a. Hole in the floor or from the edge of the house boat
  - b. A cubicle with two wood planks
  - c. Flash away toilet type
2. Go to bush nearby the village
3. Toilet with treatment pod (by Wetlands Work) in the experiment village, Akul, O Sandan commune, Krakor district.

In all school and community sites visited at least one toilet is attached to the center/school construction. No separation between girls and boys toilet. According to discussion with school principals it is very important to have at least two toilets in a school to separate between boys and girls. It was noted that female students especially grade 4-6 asked permission from teacher to go back home or to bush if they need toilet since toilet at school sometimes is difficult to use (very deep and no proper wood plank to stand or sit) and no privacy. Gender sensitivities should be taken into account if sanitation facilities are designed.

The study found that toilet in school also serves as public toilet (not only used by pupils but also by villagers) in case they cannot go to bush or no nearby bush during dry season.

The discussion also revealed that people do not want to see the waste once it is wasted. A conventional pour flush toilet type with ceramic bowl or squat ceramic is the preferable type. The reason is it looks clean and safe to squat and children have no fear of falling into water.

## **VI. Wastewater Treatment System**

The study found that community members squat to defecate and use water for anal cleansing. Water also used by women for cleansing after urination. Whilst some households have cubicles that provide privacy, all community members defecate, urinate, and dispose of waste directly into the lake.

Treatment system is not common in the floating community. However, some NGOs are trying to introduce waste treatment system such as Live & Learn Environmental Education, Wetlands Work, BORDA-Cambodia (Bremen Overseas Research and Development Agency), etc.

Among the visited sites in Pursat and Kampong Chhnang, none of the village is using one of the system introduced by NGOs. Some village they have pour flush toilet with soak away system (similar to septic tank) below (on land sites).

## **VII. Solid Waste Management**

On land site: Solid wastes are burned in the dry season and throw into water in wet season.  
Floating site: Solid wastes always throw into the lake.

It was noted that Koh Russei primary school practice waste separation. The school principal has knowledge about environment and also used to participate in waste management meeting with various NGOs working in the village. The school has organic waste for composting and plastic bottles and bags are stored in separate place for recycle or reuse.

## **D. Recommendations**

- Environment construction related issues awareness and site safety should be well trained to local school/community support committee who is responsible for daily site supervision. Training sessions should arrange for the committee cover both construction supervision and environmental related issues.
- EMP implementation for ECCD center: The contractor/site engineers should be well aware of the contents of EMP which is included in bidding document and should be enforced/monitored by school/community committee.
- A meeting between site supervisor and school/community committee should be more often during every his/her site visit to discuss, share, explain or follow up construction activities.
- The consultation with local school committee shown that there is a lack of environmental specialist during construction. It is recommended that an environmental safeguard specialist

should involve in every ECCD center construction. Together with site engineer, environmental safeguard specialist should provide a refreshment training on site safety, supervision and environmental safeguard issues.

- Sanitation facility in the center should have boy and girl pupil separately. In addition, as the building sanitation is accessible by community members, a public toilet is very helpful for villager to come and share this facility.
- Since water quality is very much affected by wastewater from the facility should be properly treated before discharging into the lake (and tested every three months?)
- Solid waste management in the ECCD center should be introduced and training should be provided at same time with school/community support committee.

## E. Field Pictures



AnlongRaing Primary School



Toilet for the School



Toilet introduced by Wetlands Work in Akul Village



Focus Group Discussion in AnlongRaing





Along Raing Primary School



Ses Slab School



Pour flush toilet with soak away system in Koh Russei



Meeting in PralayMeas Community Members and School Principal



Proposed ECCD Center - On Land Site



Yuk Kanthur School – Waste Bin

## EARLY CHILDHOOD DEVELOPMENT EDUCATION FOR FLOATING VILLAGES PROJECT

### Visited Villages During Field Visit

Date	Province	Activity/Meeting	Proposed Site		Location
24.10.2013	Pousat	- Visit Akul primary school - Visit the wastewater treatment pod designed by the Wetlands Work			Village: O Taprok Commune: O Sandan District: Krakor
		- Meeting DoE Director - DoE staff - Teacher head of the school - WCCD focal person			DoEYS office
25.10.2013	Pousat	Focus Group Discussion at Along Raingfloating center	- AnlongRaing	Floating	Village: Kampong Lor Commune: Kampong Pou District: Krakor
		- Visit KohKaEk by ICE&SSDD - Visit Ka-am Samna by ICE&SSDD - Meeting PoE by ICE&SSDD	- KohKaEk - Ka-am Samna	Floating	
29.10.2013	Kampong Chhnang	- Meeting DoE - WCCC focal person			DoE office WCCC office
		- Visit floating center	- Yuk KanThur	Floating	Village: ChhnokTrou Commune: ChhnokTrou District: Boribo
		- Meeting ChhnokTrou commune chief			Commune Office
		- Visit Ses Slab primary school	- Ses Slab	Floating	Village: Ses Slab Commune: ChhnokTrou District: Boribo
30.10.2013	Kampong Chhnang	- Visit KohRussei	- KohRussei	On land	Village: KohRussei Commune: PralayMeas District: Kampong Leng
		- Visit PeamKhnang school	- PeamKhnang	Floating	Village: PeamKhnang Commune: Kampong Hav District: Kampong Leng
		- Visit Slort village	- Slort school	Floating	Village: SlortKhnong Commune: PlovTouk District: Kampong Leng
		- Visit AnlongKanchos primary school and home-based ECCD	- AnlongKanchos	On land	Village: AnlongKanchos Commune: PralayMeas District: Kampong Leng
		- Visit PralayMeas school and ECCD	- PralayMeas	On land	Village: KrangPhtel Commune: PralayMeas District: Kampong Leng

## APPENDIX 4 : Wetlands Work - HandyPod

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Wetlands Work!, a social-enterprise based in Cambodia, provides effective sanitation solutions to the challenges present in floating communities. Wetlands Work! designs situation appropriate wastewater treatment systems with a special focus on constructed wetland technology. With this approach, Wetlands Work! has done what no one has been able to do before: design a “floating toilet” that is proven to be effective, low-cost, and maintenance-free.

The HandyPod is Wetlands Work!’s sanitation system for floating houses, and it is able to improve ambient water quality significantly in a unique way. The HandyPod uses aquatic plants to treat human waste. Wastewater from the house is diverted to a floating Pod, where it is contained and brought into contact with the roots of water hyacinth. Hyacinth, a floating plant commonly found on the lake, is particularly effective at treating wastewater as their roots have an extensive surface area harboring countless microorganisms. These microorganisms reduce the numbers of harmful bacteria and other pathogens in the wastewater, treating the water from a contaminated to a vastly improved state.

Wetlands Work! has conducted experiments to determine the efficiency of the HandyPod in treating wastes with very high levels of *E. coli*. Experimentation involved a 234 L size Pod filled with water hyacinth. Raw sewage was added to the Pod without anaerobic pre-treatment. The amount of waste added amounted to 15% of the overall volume of the Pod. The levels of *E. coli* reduction detected were significant.

<i>begin cfu</i>	<i>% change</i>	<i>end cfu</i>
9,800,000	<b>99.72</b>	27,400
8,300,000	<b>99.99</b>	720
1,580,000	<b>99.97</b>	550
2,020,000	<b>99.91</b>	1860

Figure 1: *E. coli* fecal coliform units (CFU) reduction per 100 ml in a simple HandyPod without prior anaerobic treatment.

Even greater treatment takes place with a larger Pod surface area relative to the amount of added waste input. The dimensions are easily adapted such that the HandyPod can be sized appropriately for a large household, school or health center.

Additionally, the treatment capability of anaerobic digestors is well established and this element is another part of the Wetlands Work! design. The design includes an anaerobic digester to provide pre-treatment before wastewater flows to the HandyPod for treatment. In this way a more significant overall reduction in *E. coli* takes place.



## Appendix 5: Cambodia Map and target area

