

Environmental Assessment Report

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

Project Number: 38560-01

June 2009

CAM: Second Rural Water Supply and Sanitation Sector Project

The Summary Initial Environmental Examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

A. Introduction

1. The Second Rural Water Supply and Sanitation Project (the Project) will improve water supply and sanitation infrastructure in rural villages of subproject communes in eight provinces of Cambodia and build capacities of commune councils and communities for the planning and implementation of infrastructure improvements and their sustained operation and maintenance.

2. Although substantial environmental improvements will result from the Project, there are potential adverse impacts associated with location, design, construction and operation of the proposed infrastructure. An initial environmental examination (IEE) has been prepared which examines the potential impacts in respect of proposed project outputs and identifies mitigation measures to avoid adverse impacts and maximize beneficial impacts to the extent possible. It has been prepared according to the *ADB Environmental Assessment Guidelines* (2003) and in accordance with appropriate national legislation¹. The environmental category for the Project is B (non-sensitive) according to ADB classification. IEE preparation involved field visits and a questionnaire survey of potentially affected communities. This summary IEE summarizes the background information presented in the IEE and its findings and conclusions.

B. Description of the Project

3. The Project will aim to increase access to improved water supply and sanitation in 330 rural villages in 33 subproject communes. It will benefit xx rural residents, of which 259,000 will be provided with access to improved water, and 167,200 will benefit from improved sanitation facilities. It will cover 100% villages in each commune and will aim to achieve 100% water supply and 75% physical sanitation coverage in each commune.

4. The proposed Project will include 5 outputs: (i) improved community health and hygiene practices; (ii) rehabilitated, upgraded and developed new water facilities; (iii) improved public and household sanitation; (iv) strengthened sector planning and development; and (v) improved capacity for project implementation, operations and maintenance.

Table 1.1: Summary of Project Outputs

1	Output 1: Improved community health and hygiene practice	(i) increased community mobilization and action; (ii) preparation of village water supply and sanitation plans; (iii) formation and training of Water and Sanitation User Groups (WSUGs); (iv) strengthened community groups and individuals for effective deliver of health and hygiene messages; and (v) improved household management of water supply and sanitation.
2	Output 2: Rehabilitated, upgraded and developed water points	(i) rehabilitation and construction of deep drilled wells; (ii) the upgrading, rehabilitation and construction of hand dug wells; (iii) the construction of combined wells, where a drilled well is constructed inside a hand dug well to improve access of the well to aquifers; (iv) rehabilitation (desilting) and upgrading of existing ponds where water will be filtered prior to human consumption, and construction of new protected ponds with filtration; and (v) household rainwater collection and storage.

¹ Sub-decree on Environmental Impact Assessment No. 72.ANRK.BK of August 1999.

3	Output 3: Improved public and household sanitation	(i) construction of public latrines at schools, pagodas, health centers and commune offices (2 per commune); and (ii) the provision of household latrines.
4	Output 4: Strengthened sector planning and development	(i) improved monitoring and supervision of RWSS facilities; (ii) strengthened private sector involvement in RWSS development through training in technical and management fields; (iii) improved RWSS monitoring and evaluation for health outcomes.
5	Output 5: Improved capacity for project implementation, operations and maintenance	(i) project orientation workshops in each province and at the sub-national levels; and (ii) capacity development program for MRD, PDRDs, DORDs, commune councils and WSUGs.

C. Description of the Environment

1. Physical Resources

5. Much of the Project area is situated on the vast Mekong Flood Plain, while the hills of the Kulen range occur to the north and west of the area. Underlying rock in much of the Mekong floodplain is generally sedimentary, though there are frequent igneous intrusions. A number of different soils occur. The characteristics of the soils reflect their origins. Around the Tonle Sap lake, soils have generally developed under wet conditions, while in higher areas soils have generally developed under forest cover. Soils vary considerably in their structure and nutrient status.

6. The country has a moist tropical climate, featuring warm to hot temperatures throughout the year and an annual monsoon cycle of alternating wet and dry seasons. The wet season occurs between June and October. Average monthly rainfall is around 1,500mm. However, total rainfall can vary considerably from year to year, resulting in occasional years of severe flooding and conversely, years of significantly low rainfall. The average daily temperature in Cambodia is 28°C, ranging from 17°C in January to 40°C in May and June.

7. Water resources in the area, both surface and groundwater, are abundant and relatively under-exploited. The quality and quantity of available surface water varies, it is vulnerable to sedimentation from river bank erosion and to the effects of damage to forested areas in the basin, which has been prolific in recent decades. Levels of coliform bacteria and biological oxygen demand of surface water are often high, particularly during the dry season. The total estimated ground-water resource in Cambodia² is around 17.6 billion m³, readily recharged by rainwater. While the resource as a whole is copious, its distribution is uneven and actual extraction rates in certain localities may be low, particularly towards the end of the dry season. In some localities, groundwater is used for irrigation and where this occurs, there is potential for resource conflicts.

2. Ecological Resources

8. The Tonle Sap Biosphere Reserve (TSBR) accounts for much of the Project area. The Tonle Sap lake has a unique annual cycle whereby water from the Mekong river flows inwards continuously for approximately half of the year, and this water drains out steadily for the other half of the year. This has resulted in a correspondingly unique ecosystem, dominated by species that are adapted to thrive in the substantial zone around the lake that is subject to an annual cycle of inundation and dry conditions. This

² MOWRAM. 2001. *National Water Sector Profile*. Kingdom of Cambodia. MOWRAM, Phnom Penh.

area features both forest and grassland, both of which have substantial conservation significance. The integrity of the TSBR is of strong international concern.

9. Agriculture and fishing are the main sources of livelihoods in the majority of the Project area. On a national scale, the population is predominantly rural and around 72% of all household incomes are dependent on agriculture. In the Project area, particularly around the periphery of the Tonle Sap lake, agriculture was well developed and well regarded prior to the country's upheavals of the late 1960's onwards. Rice from Battambang province was particularly sought after in markets in neighboring countries as well as within Cambodia.

10. Forest covers some 59% of total land area, representing a substantial decline in recent decades. Where still ecologically intact forests are rich in resources that have traditionally played an essential role for the rural population both in terms of subsistence and income generating activities. However within the TSBR forest cover is estimated to have been reduced by around 50% since the 1960's, largely due to poorly regulated logging that has been most prolific since the mid 1980's. Remaining forest areas include some seasonally inundated gallery forest on the margins of the Tonle Sap lake, which play an important part in the life cycle of fish populations by providing spawning grounds, upland deciduous forest on the Khulen and other hill ranges, and various remnant fragments around the countryside.

11. Cambodia's protected areas system includes national parks, wildlife sanctuaries, protected landscapes and multiple use areas, all of which are represented in the Project area. The Tonle Sap lake and its surrounding wetland is also classified by UNESCO as a Man and the Biosphere Reserve (and known as the TSBR). Within the Tonle Sap basin, the waterbird, fish and other wildlife that inhabit the area are of acute international interest and similarly, there is considerable concern for the integrity of this ecosystem. Besides the Tonle Sap system, aquatic ecosystems that occur in the area include seasonally flooded fields, rivers, canals and large artificial water impoundments. Migratory fish abound in the area. The integrity of aquatic ecosystems in the Project area is subject to habitat change (primarily resulting from forest clearance), heavy fishing, release of silt into waterways during large construction activities and impedance of water flows that interfere with fish movements. Losses in species diversity in the Tonle Sap and its tributaries over recent decades are known to be occurring.

3. Socioeconomic Conditions

12. The protected landscapes of Angkor and Banteay Chhmar both have the remains of large temple complexes that date from the period of the ancient Angkorian civilization. Some further temples and other structures that remain from the Angkorian period exist outside the protected areas and are scattered around the countryside but unlikely to be affected by small water supply schemes.

13. Access to safe water supplies, and the availability of sanitation facilities is a major determinant of public health, and is generally poor in the project area. Of the diseases suffered by one or more members of sample households in the past year, the most common were diarrhea (35.7% of households), typhoid (35.6% of households), malaria (29.2% of households) and dysentery (23.6% of households)³. Skin diseases

³ ADB TA 7098-CAM Second Rural Water Supply and Sanitation Sector Project – household surveys, 2009.

and dengue fever were also relatively common. These diseases are overwhelmingly water related and in most cases, likely to be directly attributable to unsafe water and/or poor sanitation conditions.

14. The livelihoods of potential beneficiaries are predominantly based on agriculture. Farming is the main source of income for 76% of households in the Project area, most of the remaining occupations work in the construction or other industries, Government employment, and trading. Fish catching or rearing is a very minor income source. Many rural families do not have regular cash incomes, either because of access constraints, lack of landholdings and shortage of employment opportunities. Many families are dependent on remittances by non-resident family members working away from home, most often in the construction and garment industries. The survey found that around 58% of households have a daily income of under \$3. The average household size of 5.3.

15. Unexploded ordnance (UXO) remaining from civil conflict is widespread in the Project area, resulting from both aerial drops and from ground fighting. Clearance of areas either known or suspected to contain UXO is a slow and expensive process, but is taking place systematically, in much of the Project area. UXO are typically encountered when ploughing fields, searching for scrap metal and even by children playing. Due to the prolonged and complex nature of the conflict in the region, the placing of ordnance is difficult to predict and, except where thorough clearance has taken place, or in areas that are frequented by people and livestock, the possible presence of UXO always exists. Where there is a significant risk of UXO presence, specialist clearance and/or verification services are necessary.

D. Screening of Potential Impacts and Mitigation Measures

1. Overview of Subproject Impacts

16. The most significant impacts expected to arise from the Project are major improvements to public health and quality of life resulting from the availability of safe drinking water supplies, improved sanitation, user awareness and behavioral change. Direct impacts from physical works are mainly localized, occurring in and around the individual activity sites. Due to the small scale of works and wide separation of the sites, there is no scope for physical impacts to compound and result in cumulative, or sector wide impacts. Sector impacts will however arise from the sector strengthening and capacity building outputs, and also as secondary impacts from the anticipated improvements in public health and socioeconomic development in the rural areas.

17. Potential environmental impacts associated with the Project interventions include: (i) risks associated with UXO; (ii) the adequacy of groundwater sources; (iii) presence of arsenic or iron in groundwater; (iv) risks associated with inadequate operation and management of improved facilities; (v) provision for drainage and proper management around water outlets; and (vi) construction impacts.

18. **Unexploded Ordinance.** While Project works will take place in areas that are already well trafficked and often where excavations have previously taken place, some pipe laying activities and well excavations are potentially vulnerable and where there is any risk of encountering UXO, the site needs to be investigated. On all sites where excavation or ground clearance needs to take place, where there is a reasonable doubt as to the safety of the area an approved mine clearance agency should be engaged for

an agreed package of verification, detection and clearance work, to ensure that all areas where excavation, or access construction will take place are clear of UXO.

19. **Adequacy of Groundwater Sources.** In most of the Project area, groundwater reserves are known to be extensive and readily recharged. However, the extent to which groundwater is able to flow freely between aquifers varies and it is possible for the groundwater reserves in particular locations to be limited in capacity, isolated from neighboring aquifers and slow to recharge. In some areas, groundwater sources are used for irrigation which may increase the risk of localized groundwater depletion. The risk can be mitigated by careful assessment during the conduct of subproject feasibility studies, and where there is a risk of localized limitation of groundwater, avoiding areas where wells have been dug or are planned to be dug to obtain water for irrigation.

20. **Presence of Arsenic or Iron in Groundwater.** Arsenic is known to occur in groundwater a small localized area within the subproject area. Water from all sources will be tested prior to the commissioning of communal water facilities. Where arsenic is found in groundwater, the construction of wells will be avoided and an alternative source including household level rainwater collection and storage will be promoted as a source of water for human consumption. Iron is also commonly found in groundwater. While the risk of iron to public health is low, it can render groundwater unacceptable for drinking water use and unsuitable for some domestic uses such as washing clothes. Where high levels of iron occur in the groundwater, the construction of deep wells will either be avoided or accompanied by simple aeration and filtration at the point of use, the home.

21. **System Operation and Maintenance.** The success of an improved water supply facility in consistently delivering water, in the short and long term, is dependent on the existence of the WSUG capacity to operate and maintain it, including regular maintenance, protection of the equipment, ability to detect problems and arrange their remediation rapidly, as well as collection and proper use of users' contributions. The Project capacity building plan for WSUGs and local technicians provide the necessary training to fulfill their roles in sustained and effective operation and maintenance is important from an environmental point of view. Sound provision for operation is necessary to avoid risks associated with poor operation.

22. **Water Outlet Sites.** Households and household clusters receiving access to new improved water facilities are likely to use more water for cooking and washing. In sites on flat terrain, drainage is limited and even relatively small quantities of drainage water may form unsightly ponds of dirty water which provide a habitat for mosquitoes and pose a health hazard. This will be mitigated by the inclusion of suitable platforms and design of drains that conduct wasted water away from water facilities. In addition, users can be encouraged to ensure that drainage is maintained, and to exclude livestock from the water facility areas. Awareness raising over risks associated with ponding will also help ensure that sites are kept clean and free of ponded water and mud.

23. **Construction Impacts.** While the scope of most construction operations will be minor, they will, if unmitigated, cause significant noise and dust nuisance, release of silt into waterways, and safety hazards. These can be prevented by requiring contractors to adhere to conditions of contract that that require high standards of personnel, equipment and site management. Potential construction impacts and their mitigation are described in detail in the IEE.

2. Sector Level Impacts

24. **Water Resource Conflicts.** With rural populations being primarily dependent on agriculture, improvements in living conditions and expanded irrigation go largely hand in hand. Further population and economic growth will result in increased demand for drinking, domestic and irrigation water in the future. Despite the relative abundance of freshwater resources in Cambodia, this may lead to difficulties in certain locations, particularly during or towards the end of the dry season, or during particularly drier years. These risks can be reduced or avoided by progressively improved water resource management. Besides capacity building, water resource management as a whole can benefit from improved collection and management of information on groundwater, rainfall, stream and river flows. Information on the extent of water availability over several years enables a more informed feasibility review of options for the use of supplementary water sources and water storage, enabling better management for the avoidance of water resource conflicts.

25. **Contribution to Capacity Development in the Sector.** Sector strengthening under the Project will build on progress achieved under TSRWSSSP and previous projects, adding to the pool of personnel in Government offices, the private sector and the communities with the capacities to manage the maintenance and expansion of water supplies and of the introduction of sound sanitation practices. Projects to date have provided valuable case studies into reasons for success and failure of individual schemes. The development of further schemes and remediation of deficient ones will provide more plentiful models on which ensuing successful schemes may be based. The effects are cumulative and positive.

26. **Private Sector Capacity Enhancement.** Private sector consultants and contractors involved in the schemes will acquire experience design and construction that can be replicated on comparable initiatives around the country. Besides the learning opportunities provided by involvement in the project, individual firms have the opportunity to develop their resources, including personnel, equipment and operating capital, to provide further services in an increasingly efficient manner. In addition, increased scheme activity in the maintenance and expansions of water supply schemes will increase the demand for materials and equipment such as good quality pipe, pumps and meters, lowering the cost of these items and thereby the costs of scheme maintenance and repair. The effects are again cumulative and positive.

E. Institutional Requirements and Environmental Monitoring Plan

27. MRD is the Executing Agency for the Project and a Project Steering Committee will provide policy guidance and inter-ministry coordination. Overall Project planning and coordination, financial control and implementation of safeguards will be the responsibility off the Project Coordination Unit (PCU) within the Department of Rural Water Supply, a department of MRD. The Project will be implemented by Provincial Department of Rural Development (PDRD) in each of the eight participating provinces. Commune Councils will play a key role, including decision-making on the approval of plans for village water supply and sanitation and will manage community mobilization with the assistance of NGOs. NGOs will work as facilitators and trainers at commune and village level.

28. The environmental assessment of the subprojects will be carried out by PDRD staff after receiving training from the Project consulting team. The Project consulting

team will provide ongoing support to PDRD on safeguard, including environmental issues, as required. Environmental screening checklists will be part of the subproject feasibility report. If the result of an environmental screening checklist shows need for further environmental analysis, Initial Environmental Examination with environmental management plan will be prepared by the PDRD. All construction supervisors and contractors will be aware of, and conform to, the EMMP.

29. Main environmental monitoring will cover two main areas: community feedback and water quality monitoring. Community feedback provides for the monitoring of environmental indicators gauged by public perception. Appropriate indicators include: (i) changes in water quality (taste and color); (ii) reductions in the incidence of waterborne diseases; (iii) availability of water; and (iv) effectiveness of improved drainage.

30. Water quality monitoring includes: (i) water quality testing for about new and rehabilitation points before installation (16 parameters for each water point) and; (ii) annual water quality testing for new and improved water points (6 parameters for each water point). An estimated cost of \$225,000 is included in the project budget.

F. Public Consultation and Information Disclosure

31. Consultations have taken place⁴ among central, provincial and district level stakeholders as well as potential user communities. These included formal meetings with officials, and focus group discussions with small groups representative of the beneficiary population as a whole.

G. Findings and Conclusions

32. The Project will address key environmental issues of access to improved water and sanitation facilities in rural villages in selected subproject communes in eight provinces. The Project will also provide high levels of capacity building among Government agencies as well as awareness raising and behavioral change for improved water use and sanitation practices, and hygiene. These inputs are expected to have a major positive impact on the public health and quality of life for the rural communities, all of which suffer from the regular occurrence of waterborne diseases, or diseases spread by insect vectors that breed in stagnant water. The overall finding of the IEE is that the negative environmental impacts are relatively minor and in most cases can be mitigated due to small scale of interventions. Therefore, No further environmental assessment is required, beyond the issues to be reviewed during detailed design.

⁴ ADB TA 7098-CAM Second Rural Water Supply and Sanitation Sector Project – Field consultations, 2009.