APPENDIX 7

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

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AP7.2 Scoping and TOR for EIA Study

AP7.2.1 TOR for EIA Study

Terms of Reference for Local Consulting Services for Environmental Impact Assessment (EIA) on Natural and Social Environment

The major objectives of the EIA is to qualitatively and quantitatively estimate potential major natural and social environmental impacts to be caused by the proposed project. While, in the first stage, all the alternatives including *'Zero Option'* were preliminarily evaluated by the IEE-level environmental and social environmental studies, the proposed project, namely, *'Ferry+Bridge Option (Route A)'*, will be evaluated under the full-scale EIA study.

This TOR (Terms of Reference) has been prepared in order to clarify the contents of the local consulting services for the EIA-level environmental and social considerations studies on the Construction of the 2nd Mekong Bridge in the Kingdom of Cambodia.

I. TERMS OF REFERENCE FOR EIA-RELATED NATURAL ENVIRONMENTAL STUDY

1. INTRODUCTION

JICA Study Team intends to engage a local consultant to conduct the following EIA-related natural environmental studies:

1) Roadside Air Quality Survey
2) Roadside Noise Survey
3) Water Quality Survey
4) Soil Survey
5) Biological Environment Study
6) Hydrological Study (Mekong River Cross Sectional Flow Measurement Survey)

The details for those studies, mentioned above, shall be described in the following sections.

2. ROADSIDE AIR QUALITY SURVEY

2.1 Outline of air quality survey

Roadside air quality measurement is carried out around the study area in order to obtain the baseline roadside air quality data. 24-hours continuous surveys are to be carried out at two points around the study area (one point at the east side of the Mekong River while the other at the west side) during the weekday period. Exact survey points are to be determined through the consultations with competent environmental organization such as MoE and JICA.

2.2 Parameter of Concern

Five parameters such as TSP, CO, NO_2, SO_2 and the traffic volume by the vehicle type during the survey period are of concern.

2.3 Preparation of survey report

Following information and/or results shall be contained within the survey report.

1) Brief description of the measurement site.
2) Analytical results of each air quality parameter.
3) Photograph of measurement and/or sampling activities.
4) Measurement records (e.g., counted traffic volume by the vehicle type, comments on weather condition and others).
5) List of all study and/or survey personnel engaged in this study.

3. ROADSIDE NOISE SURVEY

3.1 Outline of noise survey

Roadside noise measurement is carried out around the study area in order to obtain the baseline roadside noise data. 24-hours continuous surveys are to be carried out at two points around the study area (one point at the east side of the Mekong River while the other at the west side) during the weekday period. Exact survey points are to be determined through the consultations with competent environmental organization such as MoE and JICA.

3.2 Parameter of concern

Hourly Leq value and traffic volume by the vehicle type are of concern.

3.3 Preparation of survey report

Following information and/or results shall be contained within the survey report.

1) Brief description of the measurement site.
2) Noise level (dBA) measurement results in electronics.
3) Leq-Time variation (24-hrs) @ each sampling point.
4) Photograph of measurement activity.
5) Measurement records (e.g., comments on weather condition, occurrence of big noise transmitted from other non-traffic sources, counted traffic volume by the vehicle type and others).
6) List of all study and/or survey personnel engaged in this study.

4. WATER QUALITY STUDY

4.1 Sampling program

Water quality measurement is carried out around the study area in order to obtain the baseline water quality data. Water sampling point is chosen based on the surrounding environment such as geological and hydrological conditions, and throughout this site selection process, Ten (10) sampling points are to be chosen around the study area (six (6) for the Mekong River while remaining four for (4) for the groundwater). Two (2) measurements (once in dry season and the other in rainy season, respectively) are to be conducted.

4.2 parameter of concern

Ten parameters such as pH, turbidity, DO, BOD, COD, conductivity, temperature, SS, E-Coli form and Total Coli form are of concern. Also, the availability of on-going water quality monitoring data monitored by the water quality laboratory of DoHR, MWRM, is to be examined to improve the credibility of the whole water quality data collected within this study.

4.3 Preparation of survey report

Following information and/or results shall be contained within the survey report.

1) Brief description of the measurement site.
2) Analytical results of each water quality parameter.
3) Photograph of measurement and/or sampling activities.

4) Measurement records (e.g., comments on weather condition and others).

5) List of all study and/or survey personnel engaged in this study.

5. SOIL SURVEY

5.1 Outline of soil survey

Soil survey is carried out at two points around the study area (one point at the east side of the Mekong River while the other at the west side) in order to obtain the baseline soil characteristics data that would support the identification of potential soil contaminated sites. Exact survey points are to be determined through the consultations with competent environmental agency and/or organization such as MoE and MPWT.

5.2 Parameter of concern

Four heavy metal and other contaminant parameters such as iron, lead, zinc and mercury are of concern.

5.3 Preparation of survey report

Following information and/or results shall be contained within the survey report.

1) Brief description of the measurement site
2) Analytical results of each parameter.
3) Photograph of sampling activity.
4) Measurement records (e.g., comments on weather condition and others).
5) List of all study and/or survey personnel engaged in this study.

6. BIOLOGICAL ENVIRONMENT STUDY

6.1 Objectives

Based on the proposed field survey and comprehensive literature reviews (e.g., IEE report of the main report of this project), the biological environment study is carried out in order to describe the existing biological environment condition around the study area, to determine the presence/or absence of threatened/or endangered species and species communities, to assess the potential impacts of the proposed project on biological resources, and to map the major habitat types in the study area and to highlight areas of special sensitivity.

6.2 ARea of concern

Intensive field survey is carried out within the potentially influenced area (e.g., 500 meter both sides from the selected route option) that would contain floodplain, agricultural fields, residential area, the Mekong River, Phnon Knong Island that may exist around the selected route option and others. Exact study area of this field survey is to be determined through the consultation with competent agency and/or organization such as MoE, MoAFF and JICA.

6.3 methodology

1) Review data from current study reports, regarding the bio-diversity in the study area; threatened/or endangered species, species that use the some parts of the survey area as a breeding ground, geography, climate and current wildlife population trends.

2) Review environmental literatures from comparable projects such as the construction of the first Mekong Bride.

3) Send a team of experts from the participating institutions to update past data and evaluate the effect of the construction project.

4) Undertake field surveys of the area and combine with pre-existing data to form up-to-date analysis (special attention will be paid to Neak Loeung deep pools in the Mekong River as well as the Bassac Marsh).

5) Estimate potential impacts during both construction and operation phases.

6) Use of a GIS to provide maps appropriate to the needs of the EIA.

6.4 Description of existing biological environment conditions

Scientific description of the flora and fauna as well as other natural resources and habitats, mentioned as follows, shall be prepared.

6.4.1 Floral components

(1) General vegetation patterns of entire study area
(2) Plant species
(3) Tree species
(4) Rare plant species in entire area
(5) Others

6.4.2 Faunal components

(1) Amphibians
(2) Reptiles
(3) Mammals
(4) Fishes
(5) Birds
(6) Rare faunal species
(7) Benthos
(8) Others

6.5 Procurement of relevant legislation and regulations

The information on pertinent legislation, regulation, criteria, or guidelines related to the biological environment implemented by environmental and/or natural resource agencies at the provincial and national level should be prepared in order to facilitate the evaluation of baseline conditions and the impact-significance determination.

6.6 preparation of study report

Following results and/or information shall be contained within the study report,

1) Brief description of the survey site and survey method
2) Summary of relevant legislation and regulation on the conservation/or protection of biological environment in Cambodia.
3) Photograph of field survey activity.
4) Vegetation map based on results of the field survey.
5) Lists and locations of key species.
6) Habitat and distribution maps highlighting important areas based on results of the field survey.
7) Discussion on the potential impacts to be caused by the proposed project.
8) GIS-linked data sets.
9) List of all study and/or survey personnel engaged in this study.

7. HYDROLOGICAL STUDY (MEKONG RIVER CROSS SECTIONAL FLOW MEASUREMENT SURVEY)

7.1 Outline of survey program

Mekong River cross sectional flow survey is carried out along the selected bridge route in order to grasp velocity profile that would have a strong correlation with the ecosystem of aquatic fauna of Neak Loeung deep pool. Flow survey is to be carried out, using ADCP.

7.2 preparation of survey report

Following results and/or information shall be contained within the survey report,

1) Brief description of the survey site and survey method.
2) Brief description of ADCP equipment.
3) Depth averaged velocity profile (flow direction and velocity magnitude).
4) Cross sectional view of Mekong River (i.e., riverbed profile) to be obtained from ADCP.
5) List of all study and/or survey personnel engaged in this study.

II. TERMS OF REFERENCE FOR EIA-RELATED SOCIAL ENVIRONMENTAL STUDY

INTRODUCTION

JICA Study Team intends to engage a local consultant to conduct the following EIA-related social environmental studies:

1) Survey on Socio-economic Profiles of PAPs (including 'Simple Survey')
2) Survey on Socio-economic Profiles of Market-related People and Vendors at Ferry Terminals
3) Survey on Socio-economic Profiles of Socially Vulnerable People
4) Survey on Other Socially Negative Issues in Project Affected Area

The details for those studies, mentioned above, shall be described in the following sections.

8. STUDY AREAS

The baseline social environmental information/data around the study area of Neak Loeung including 16 villages in the following 6 communes will be profiled. More in-depth data will be collected in the project affected area by the proposed project, namely, *'Ferry+Bridge Option (Route A)'*.

Province	District	Commune	Number of Villages
Kandal	Leuk Daek	Kampong Phnum	2
Kandal	Leuk Daek	Preak Tonloab	2
Prey Veaeng	Peam Ro	Preak Khsay Ka	2
Prey Veaeng	Peam Ro	Preak Khsay Kha	6
Prey Veaeng	Peam Ro	Neak Loueng	2
Prey Veaeng	Peam Ro	Banlich Prasat	2

9. CONTENTS OF STUDY

9.1 Outline of survey on socio-economic profiles of paps (including 'simple survey')

The survey on socio-economic profiles of PAPs includes:

1) Baseline study on PAPs' socio-economic profiles;
2) Baseline study on PAP's ownership of land and assets; and

3) ‘Simple Survey’ on PAPs

Specifically, ‘Simple Survey’ will be implemented to confirm the basic socio-economic profiles and the basic consensus on the resettlement by the proposed project, namely, *‘Ferry+Bridge Option (Route A)’*. The outline of the resettlement by the proposed project is as follows.

Item		Unit	Estimated Number
Land	Acquired Area	M2	227,000
Houses	No. of Houses	No.	51
PAP	PAP per Household	No.	5.2
	Total PAP	No.	263

9.2 outline of survey on socio-economic profiles of market-related people and vendors at ferry terminals

The survey on market-related and vendors at the ferry terminals will be composed of the following 4 studies:

1) Baseline study on socio-economic profiles and present situations of commercial activities of mobile vendors at ferry terminals;
2) Baseline study on socio-economic profiles and present situations of commercial activities of retail shop owners at ferry terminals;
3) Baseline study on socio-economic profiles and present situations of commercial activities of market-related people at ferry terminals; and
4) Baseline study on the present socio-economic situations of staff of Neak Loeung Ferry

9.3 outline of survey on socio-economic profiles of socially vulnerable people

The survey on socio-economic profiles of socially vulnerable people (women, children, ethnic minority, and etc.) will be composed of the following 4 studies:

1) Baseline study on socio-economic profiles as well as the of socially vulnerable PAPs (ethnic minority);
2) Baseline study on socio-economic profiles of socially vulnerable PAPs (women);
3) Baseline study on socio-economic profiles of socially vulnerable PAPs (children); and
4) Baseline study on socio-economic profiles of other socially vulnerable PAPs

9.4 outline of Survey on socio-economic profiles of other socially negative issues

The survey on socio-economic profiles of other socially negative issues in the project affected area will be composed of the following 3 studies.

1) Baseline study on the present situations of the occurrence of HIV/AIDS
2) Baseline study on the present situations of the occurrence of human trafficking
3) Baseline study on the present situations of the land ownership and land utilization in the planned flood-free zone.

10. REPORTS AND SUBMISSION

The reports and data which must be submitted by the local consultant are as follows.

1) Brief description of study area
2) Summary report on results of the above studies
3) Summary report on results of ‘Simple Survey’
4) Complete data set for the above studies and ‘Simple Survey’

Diskettes including digital data of survey results, original and two (2) copies of survey report shall be submitted to the Study Team.

Table Time Schedule

Work Items	May	June	July	August
Preparatory Work				
Natural Environmental Study				
Social Environmental Study				
Reporting				

AP7.3 Impact Assessment of Natural Environment

AP7.3.1 Descriptions of Preliminary Impact Assessment

(1) Air Quality

a) Dust during the construction period

Since construction activities will result in frequent delivery of construction materials and equipment, temporal roadside air quality deterioration may not be negligible during this period. It would be likely to have roadside dust problem during this period. Construction activities comprise of large-scale earthworks but are scheduled to be done within relatively short period, so the magnitude of the dust level will not be significant during this period. It might be recommended that stock piles of sand and soil are well screened from residential areas. Frequent usage of sprinklers would be inappropriate at Neak Loeung due to the fine soil characteristics (e.g., silt or "dispersive" clay). Multi-directional fall-out buckets should be used to monitor dust levels during the construction period.

b) Future roadside air quality condition after the construction

As described in the engineering study section, some portions of the project route are to run through the residential area on where current traffic volume is very few. So, after the operation will start, local roadside air quality environment may be deteriorated to some extents. However, those residential areas are located at open space on where local air circulation is always good and no large buildings that would cause a stagnation of the local air movement exist. Thus, a quick dispersion of the vehicular emission gas or pollutants emitted from the vehicle can be expected. In addition, the estimated traffic demand under

Do-scenario in Year 2020 is of approximately 9,000 PCU/day (note that the traffic volume counted in Year 2004 is of approximately 2,400 PCU/day), so the impact on the roadside air quality would be small.

So far, no roadside air quality data exist around the study area, so it is essential to carry out the roadside air quality survey in order to obtain the baseline data although IEE evaluation regarding the impact on the roadside air quality seems to be minor.

(2) Water Quality

a) Risk of water pollution to the Mekong River during the construction.

During the construction period, it is likely that the water quality (e.g., turbidity) of the Mekong River may be degraded temporally due to the bridge pier construction activity to be held inside of the river.

Also, the water pollution may be caused by the accidental spillage of oil or any chemical solvent. So it would be wise to prepare for the occurrence of accidental spillage of the oil/other chemical materials and/or construction wastes. Periodical water quality monitoring work shall be carried out in order to monitor the potential water quality change quantitatively. It is essential that strict controls must be established on operations in the storage of all potentially hazardous liquids such as oils. Emergency procedures should be developed in the event of an accidental spillage.

b) Potential of water quality degradation due to the erosion during/and after the construction

During the construction period, the water quality degradation of the surface/subsurface water (e.g., worsened turbidity) may occur temporally as the second impact of the erosion of the road bank (more detailed discussion about the erosion issue will be described later). So, special attentions shall be paid to erosion-related water quality degradation during/and after the construction period shall be prepared. It is recommended to carry out periodical water quality monitoring of surface/subsurface water around the project site during/and after construction phases.

(3) Soils and sedimentation

a) Potential for soil erosion during/and after the construction.

Most of the approach roads that will have an averaged height of 5.0 meters are to be constructed over the Mekong floodplain area (note that the total distance of the approach road is of approximately 3.4 km), highly prone to flood and/or inundation during the rainy season. Several types of on-going erosions are recognized at the road bank and/or road shoulder along the current national roads (e.g., NRs 1 and 11) and local feeder roads around the study

area. Some of those erosions are occurred due to the wind-induced wave erosion when a large-scale inundation occurs during the rainy season.

Besides, the erosion due to the existence of "dispersive clay" commonly found within the embankment material used in past construction projects becomes one of the critical issues within the current road maintenance work in Cambodia. When any surfaces of the embankment containing components of this dispersive clay to some extents have direct exposures to the rainfall or the inundated water during the rainy season, the erosion eventually starts and the crack will be developed within relatively short time period (more detailed explanation of this erosion mechanism is presented in the geological study section of this main report). Later, this crack will be developed further to the piping and/or gully, and finally lead to the partial destruction of the embankment (e.g., the occurrence of the rotational slip). So it is essential to implement appropriate anti-erosion mitigation measures for the protection of the road bank and/or shoulder while comprehensive geo-physical and geo-chemical tests for the selection of suitable embankment material shall be carried out.

b) Potential of sedimentation due to the erosion during/and after the construction

During the construction period, the earthwork along the approach roads will provide large-scale soil exposure to the erosion that would generate extra sediments when the torrential rain hits the study area. This would provide excessive water blockage as well as the water quality degradation, mentioned above, and consequently jeopardize the regional drainage system.

After the operation of both new roads and the bridge will start, if any anti-erosion measures such as the vegetation is not implemented for the protection of the road bank, the potential of the erosion occurrence along the approach roads would not be negligible during the rainy season, also. As mentioned above, once the erosion starts, some portions of the road structure without appropriate protection measures may be washed away within relatively short time period. Eventually, a rapid sedimentation may occur at the downstream site of the regional drainage system. So, special attentions must be paid to avoid the local flood/or inundation to be caused by the accidental blockage of the drainage system while appropriate erosion-related mitigation measures during/and after the construction period shall be implemented.

c) Potential of Cross - Sectional Seepage of the Approach Roads after the construction

After these approach dike roads over the east-side floodplains will be constructed, some portions of low-land floodplain areas will be bounded by current National Roads 1 and 11, those have no drainage facilities such as pipe culverts, and newly constructed approach dike road. As a result, this tightly-bounded area will become "flood-free" land ($A \cong 100$ ha).

As mentioned earlier, approach roads will have an averaged height of 5.0 meters. When a large-scale inundation occurs across the floodplain outside of this "flood-free land" during the rainy season, a steep hydraulic gradient would be generated inside of the embankment of the approach dyke road if no appropriate seepage-related protection and/or mitigation measures will be taken. Eventually, this steep hydraulic gradient would induce cross-sectional seepage. If this seepage flow would reach to anywhere at the opposite side slope of the road shoulder (i.e., the inside of the flood-free land), eventually it may trigger the erosion of the road structure. Note that the averaged inundation depth around Neak Loeung is varied between 3 and 4 meters and this inundation usually lasts for several months (see the hydrological study section of this report for more detailed descriptions). It is essential to incorporate appropriate seepage-related mitigation and/or protection measures within the design work of those approach roads.

By the same token, the potential of the seepage through the road base or the foundation, to be caused by the possible steep hydraulic gradient, mentioned above, may occur during the rainy season although the likelihood of this seepage flow occurrence would not be significant compared with the cross-sectional one, mentioned above, due to the existence of several impermeable layers. However, it is essential to carry out a comprehensive seepage study as well as to prepare for the seepage-related mitigation measures.

(4) Waste Disposal

a) Preparation of excavated soil dump site.

Approach road at both sides of the Mekong River would comprise of the embankment to be constructed over the soft floodplain. If certain soft ground treatment methods such as the replacement are to be implemented within the construction of the approach roads, several soil dump sites might be required for the dumping of the replaced soil.

Many forms (steel ot wooden forms) are to be used for the bridge construction work, and most of used forms are re-cycled or exported to Vietnam as raw scrap material. Also, some of sludge to be generated during the bridge pier construction is recyclable, but certain amounts of sludge shall be treated and then, dumped after proper treatment process. So, it is essential to prepare for the appropriate construction waste disposal sites for the dumping excavated soil/or sludge to be generated from entire construction work.

b) Household wastes discharged from construction yard during the construction period

Construction yard is to be created at the east side of the Mekong floodplain and many construction workers and their families will stay therein temporally. It is quite essential to prepare for the well-organized sewage and household waste treatment systems that will not

deteriorate the current local environmental condition as well as other relevant infrastructure facilities.

(5) Noise/vibration

a) Noise and vibration during the construction period

Since construction activities will result in almost continuous noise from a mobile mechanical plant and others, the order of the magnitude of the noise and the vibration level may not be negligible during this period. Applications of special mitigation measures such as noise barriers or a silent construction machinery might be considered to alleviate the noise and the vibration impact around the school or residential areas.

Besides, due to the material transport of a large amount of the fresh concrete and other road/bridge construction materials to be required for the entire construction, the temporal traffic increase and traffic jams are expected to occur at several sites during the construction period. Thus, the risk of the deterioration of the roadside noise environment may not be negligible.

b) Future roadside noise and vibration after the construction.

Due to the increased regional traffic volume that is expected to occur after the operation of the proposed project starts, those roadside noise environments of several major routes such as National Road No. 1 would become worse. Currently, several hospitals and schools that require calm environment, exist along those roads. Also, some portions of the project route are to run through several residential areas at where the current traffic volume is very few. As mentioned earlier, the estimated traffic demand under Do-scenario in Year 2020 is of approximately 9,000 PCU/day whereas 6,000 PCU/day for the Do-nothing scenario (note that the traffic volume counted in Year 2004 is of approximately 2,400 PCU/day). So, it is likely that the future roadside noise environment may be slightly worsened after the operation will start.

So far, no roadside noise data exist around the study area, so it is essential to carry out the roadside noise survey in order to obtain the baseline data although IEE evaluation regarding the impact on the roadside noise environment seems to be minor.

(6) Subsidence

a) Potential of Subsidence during/and after the construction.

As mentioned previously, the approach roads are to be constructed over the Mekong floodplain that is highly prone to the consolidation when large and heavy structures will be built. It is important to carry out appropriate geo-physical tests for the selection of the appropriate embankment material for the large-scale earthworks such as the construction of

the approach dike road. Otherwise, the risk of the subsidence-related issues such as the differential settlement that would cause cracks within the road surface may be increased. Once subsidence-related cracks will be generated, as described earlier, those will enhance the erosion process (e.g., the creation of the pothole). Eventually, this would lead to the destruction of the road structure within relatively short time period. Also, it is essential to evaluate the risk of the secondary subsidence to be associated with the construction of approach roads over the floodplain.

(7) Bad Smell

a) Bad smell due to the compost smell originated from the decayed plants under inundated water.

The likelihood of bad smell events, mainly due to the compost smell originated from the decayed plant/or plant roots under inundated water, highly depends on both spatial and temporal scales (i.e., the depth/or area and temporal length) of the inundation to be occurred across the flood free land during the rainy season. Regional drainage system such as discharge channels and ponds shall be designed based on the appropriate run-off study, mentioned earlier.

Currently, there is a circled levees that bounds the backyard of the east-side Neak Loeung, mostly used as the residential area. One pump station and the drainage pipe are installed for the discharge of collected rainfall therein. However, no proper pumping operation is established yet [Phalla, personal communication, 2005] and several areas are always inundated with mixture of the household effluents and the rainfall water.

(8) Topography and Geology (Flood/inundation and tributaries)

a) Worsened local flood/or inundation after the construction.

Without any appropriate local drainage systems, some portions of the flood-free land, mentioned above, would become inundated during the rainy season. Eventually, that may cause the outbreak of mosquito and/or lead to the occurrence of obnoxious compost smell of submerged and decayed vegetation, caused by newly created inundation problem.

It is important to carry out an appropriate regional run-off study for this newly created flood-free land, considering major water fluxes such as the rainfall, evapo-transpiration and groundwater flow (note: the collected rainfall water must be discharged outside of the flood-free land, and more detailed discussion about the selection of the appropriate discharge method will be presented in the hydrological study section of this report). Based on this hydrological study result, the capacity of any channel/or pond to be used as receivers for this drainage system shall be designed to mitigate the severeness of these local inundation events

as well as an appropriate regional drainage operation system (e.g., pumping operation) shall be established.

b) Risk of Malaria, Dengue and waterborne disease outbreak from newly created long-term inundated area.

Due to the temporal change of the regional drainage system, there are some possibilities to have newly flooded sites, that would cause new outbreaks of malaria and dengue during the rainy season. A structural integrity between current local drainage and newly created roadside drainage systems of the proposed project must be established in order to achieve a smooth regional drainage network system and lessen the chance of the creation of permanently/or long-term inundated area after the operation starts. Daily precaution such as use of mosquito spray must be taken in order to lessen the risk of those diseases infection on construction workers. If new inundated areas are happened to be created around the study area, it might be helpful to spray pesticide periodically.

c) Potential of the regional seepage/or recharge from the Mekong River to the regional drainage system of the flood-free land during/and after the construction.

It is known that the groundwater level of the unconfined groundwater across the Mekong floodplain is lower than the water level of the Mekong River throughout the year (note that the ground water level is less than 2 meters below the ground surface, see IEE section of this report for more detailed descriptions). This implies that the unconfined groundwater is recharged from the Mekong River under the normal circumstance.

So, when ditches and/or storage pools are to be created as the receiver of the collected run-off water inside of the flood-free land, it is likely that certain amounts of the water would be always kept with those ditches if the depth of those facilities would deeper than groundwater level.

Capacities of those storage and/or drainage facilities shall be well-designed based on results of the regional run-off study that would take into account of major water fluxes, mentioned above.

d) Potential of the erosion of the riverbank of the Mekong River.

Memorial park facility is to be constructed at the east riverbank of the Mekong River, prone to the erosion to be caused by the local flow pattern during the rainy season. It is essential to carry out appropriate anti-erosion mitigation measures for the protection of this facility. Also, on-going erosion is recognized at the eastside of the Phnon Knong Island, on where a new port and road, to be used for the construction materials delivery-purpose, is to be constructed

temporally. Appropriate anti-erosion mitigation measures shall be taken at the east side of this island.

(9) River Bed

a) Disturbance to the river bed condition (e.g., benthos)

Construction of several bridge piers are to be carried out at inside of the Mekong River, that covers both deep-pool and shallow areas, and, consequently, the river bed condition of those areas will be disturbed temporally. It is known that a deep-pool area is regarded as the migration corridor for several migratory fishes across the LMB while a shallow area may be one of regional spawning zone for fish. Further biological environmental study shall be carried out in order to assess potential significance of any impacts on both deep-pool and shallow areas to be caused by the construction activity.

(10) Flora/Fauna.

a) Destruction of natural floodplain vegetation

Entire project route will result in some loss of the natural floodplain vegetation that might be registered as protected flora by laws and/or regulations. Special attentions must be paid for project-related handling of the natural floodplain vegetation. Remnant areas of flooded shrub shall be left undamaged by bridge development activities (note: this should not present any problems because the nearest such habitat (i.e., Bassac Marshes) lies 500 - 2,000 m from the proposed bridge and approach roads). The biological environment study shall be carried out in order to grasp the importance of the current floodplain vegetation as well as local fauna at both sides.

b) Disturbance to birds and wildlife during the construction period.

During the construction period, the noise and the dust will be resulted from the mechanical plant movement, and/or any earthwork activities. It is likely that any wildlife or birds roosting or feeding around floodplain at both sides will move away to surrounding quieter areas such as Bassac Marsh temporally. The return of these animals or birds will depend on the scale of the construction and the increased noise to be resulted from greater number of trucks as well as the tolerance of those creatures to the repeated disturbance.

c) Illegal fishing/or hunting activities by bridge construction workers

During the construction period, many construction workers and their families will stay at Neak Loeung. If in-migration is expected during and following bridge construction, it will be important to ensure that any fishing activities/or hunting by construction workers is minimized, while inspecting effectively if there is no increase in current fishing levels in collaboration with both Kandal and Prey Veng Fisheries Department. Also, it is essential to

have special seminars for them to enhance their understanding about the importance of local fauna/flora including the local fishery resources around Neak Loeung.

d) Habitat change due to the physical change/or damage on the Mekong River.

Alternation in hydrology and river morphology (e.g., dredging and destruction of subsurface habitat), alternations to sediment and nutrient loads, changes to river flow patterns, modification of water temperature and blockage of fish migration channels, may negatively impact on various fish species. Minimizing discharge of construction materials into the main river and pollution, avoiding blockage of the river or modification of the main river channel, and maintaining the river's natural flow should all be prioritized during the bridge construction phase. It is essential to ensure that the construction of the bridge will have no significant long term direct impacts on the water quality or flow will minimize any impacts on the vast majority of fish species.

e) Risk of pollution to aquatic species during the construction period.

In case of the spillage accident, described earlier, there also will be the risk of the pollution-related damage to aquatic species of the Mekong River during the construction period. This could have a long-term, more severe impacts on aquatic species populations. Based on the results of the water quality test carried out within this feasibility study, to be discussed later, it is found that current water quality condition of the Mekong River is generally good, and therefore any large-scale pollution incidents could have significant negative impacts on the aquatic fauna. In particular, the temporal water quality degradation such as worsened turbidity caused by the sediment discharge or re-suspension of the bottom sediment; or increases in pH caused by the untreated water discharge from the concrete-batching plant could adversely affect local flora and fauna.

f) Disturbance to animal path after the construction.

Some portions of the project route will pass through several natural floodplain area, and may cause the habitat separation or the loss of the access to the drinking place. Mitigation measures such as the animal path or the conservation pond shall be taken in order to lessen both impacts of the fauna community separation and the animal path cutting if any species with important conservation status would occur around the project site. Also, the roadside fence or cage that would protect animal from traffic accidents shall be prepared.

To summarize flora/fauna-related discussions, described above, it is essential to carry out an appropriate biological environment study around the study area in order to determine the presence/or possible absence of any species with conservation status and assess the potential significance of any impacts to be caused by the construction activity.

(11) Water Resources

a) Demolition of shallow wells.

Existence of many shallow wells is recognized at several communities along the project route, and some of them might be demolished due to the road alignment. Alternative water supply system must be prepared as one of the compensation measures prior to the demolition work.

b) Risk of pollution to the aquifer during the construction period.

During the construction period, it would be wise to prepare for the occurrence of accidental spillage of oil and/or any hazardous solvents, and its resultant regional groundwater contamination. As described earlier, it is essential that all potentially hazardous liquids such as oils must be stored in secure containers in a restricted area while conducting groundwater quality test for the baseline data collection-purpose. Emergency procedures should be developed in the event of an accidental spillage.

(12) Accidents

a) Potential of increased traffic accidents during the construction period.

There is only one quarry site available for the proposed project, located on the east-side of the Mekong River. So, the embankment material to be used for the construction of the west-side approach road must be delivered from this quarry site to the west side of the Mekong River by the combined transport methods of trucks and barges/or cargo vessels during the construction period. Temporal traffic increase and traffic jam are expected to occur at several sites during the construction period, and thus, the risk of the worsened road safety as well as the roadside environment may be increased.

b) Undiscovered UXOs or landmines during the construction period.

Selected project route will pass through ex-heavily bombarded area, and the possibility to discover new UXO (i.e., unexploded ordinance) is not negligible in those areas during the construction period. All UXOs shall be cleared from the project site before the construction commencement. Also, as a pre-caution, special anti-bomb program shall be established prior to the construction while collecting the UXO-related information from surrounding communities as much as possible.

c) Increased Risk of Vessel Collisions.

Temporal three-vessels operation is to be carried out at Neak Loeung until the operation of the Mekong Bridge will start (more detailed discussion about the specific vessel operation system is carried out in ferry study section of this main report). Besides, container and oil tanker ships are passing to/and from several inland ports such as Phnom Penh, located along

the Mekong River. Barge/or cargo vessels will be frequently used for the delivery of the construction material across the Mekong River during the construction period.

Thus, it is likely that entire vessel transportation around Neak Loeung inland waterway would become congested during the construction period. Special attention shall be paid to its safety management in order to lessen or minimize the likelihood of the sea casualties (e.g., vessel collisions).

(13) Global Warming

a) Possible CO_2 emission reduction after bridge operation starts.

As mentioned previously, the future traffic demand forecast shows that there will be an increase in the future regional traffic volume by approximately 3,000 PCU/day to 9,000 PCU/day when the bridge operation will start. So, the total amount of CO_2-related vehicular emission under Do-project scenario maybe increased, compared with that of Do-nothing scenario.

The waiting time (i.e., idling time) for the ferry boarding will be disappeared and the entire traffic condition will be greatly improved after the bridge operation will start. Besides, 15.5-hours continuous (the ferry operation starts at 6:00 a.m. and finish at 9:30 p.m.) three-boats ferry operation will be ended at the same time, so that certain amounts of CO_2 emission reduction corresponding to this ferry operation will be expected under Do-project scenario.

AP7.3.2 Field Survey

(1) Roadside Noise Survey

In order to investigate the current roadside noise condition of Neak Loeung, 24-hour continuous roadside noise survey is conducted along the current National Road No.1 at both sides of the Mekong River. Within this measurement, noise parameter, Leq, is of concern. Based on the current traffic condition of Neak Loeung and the outline of the proposed bridge project, two points are chosen for this measurement. Table AP7.3.1 and AP7.3.2 summarize the outline of this noise measurement. Traffic volume by the vehicle type is also counted within this noise survey.

Table AP7.3.1 Noise Measurement

Total number of survey points = 2. Measuring period: June/02/05 - June/04/05	
Parameter	Instrument
Leq	Sound Level Meter AI320, IEC 651 Type II

Table AP7.3.2 Measurement Point Location (Noise)

Site #	Location (approx)

1	Roadside (30 m away from the centerline of the road.)of NR #1, near Hun Sen High School Kompong Phnom, Computer Center of Yeunguem University (west side of the Mekong River).
2	Roadside (30 m away from the centerline of the road.) of NR #1, Phum I (east side of the Mekong River).

Note: Roadside air quality surveys are also carried out at same points.

(2) Roadside Air Quality Survey

In order to analyze the current air quality conditions in Neak Loeung, air quality field measurements are carried out. Following four pollutants such as dust (TSP), CO, NO2 and SO_2 are of concern. Based on the current traffic condition of Neak Loeung and the outline of the proposed bridge project, two points are chosen for this measurement. Table AP7.3.3 and 7.3.4 summarize the outline of this air quality measurement

Table AP7.3.3 Air Quality Measurement

Total number of survey points = 2. Measuring period: June/02/05 - June/04/05	
Parameter	Instrument
Dust (TSP)	Low Volume Air Sampler, ECOTECH Microvol 1000
CO	Detector Tube, GASTEEC No.1 DL
NO_2	Naphthylenediamine Spectrometry, Kimoto Handy-Sampler HS-6N
SO_2	Pararosaniline Spectrometry, Kimoto Handy-Sampler HS-6N

Table AP7.3.4 Measurement Point Location (Air Quality)

Site #	Location (approx)
1	Roadside of NR #1, near Hun Sen High School Kompong Phnom, Computer Center of Yeunguem University (west side)
2	Roadside of NR #1, Phum I (east side)

Note: Roadside noise surveys are carried out at same points.

(3) Soil Quality Survey

In order to analyze the current soil quality conditions in Neak Loeung, soil quality field measurements are carried out along the selected project route. Six parameters summarized in Table AP7.3.5 are of concern. Based on the outline of selected project route alignment, two points are chosen for this measurement. Table AP7.3.5 and AP7.3.6 summarize the outline of this soil quality measurement

Table AP7.3.5 Soil Quality Measurement

Total number of survey points = 2. Measuring period: June/02/05 - June/04/05	
Parameter	Instrument
Iron (Fe) Manganese (Mn) Cadmium (Cd) Lead (Pb) Copper (Cu) Chromium (Cr)	AAS Perkin Elmer 5000 (Flame AAS)

Table AP7.3.6 Soil Sampling Point Location (Soil Quality)

Site #	Location (approx) and local land use
1	Kompong Phnom, just inside from NR 1 along the project route (west side). Mainly used for fruit tree plantation field. Not inundated during the rainy season.
2	Preaek Khsai, along the project route (east side). Mainly used for the rice field. Completely inundated during the rainy season.

(4) Water Quality Survey

In order to grasp the current water quality condition around the study area, the field measurement of the water quality is carried out. Within this measurement, ten parameters, listed in Table AP7.3.7, are of concern. Upon considering the topographic features of study area, results of several field observations and interviews with local residents, ten points are chosen as sampling points for this measurement. Among of them, six points are used for the surface water quality measurement while four for the groundwater. Measurements itself was carried out twice within this study (the first measurement in June and the second one in August). Table AP7.3.7 and AP7.3.8 summarize the outline of this water quality measurement. Figure AP7.3.1 shows the rough sketch of the surface water sampling point location across the Mekong River.

Table AP7.3.7 Water Quality Measurement

Total number of sampling points = 10. Measuring period: 1st measurement: June/05 2nd measurement: August/05	
Parameter	Temperature, pH, Turbidity, Conductivity, TSS, DO, BOD, COD, E-Coli-form, Total Coli-form
Lab	Analyzed at DoHR, MoWRM Water Quality Laboratory

Table AP7.3.8 Measurement/or Sampling Point Location

Site #	Sample ID	Location (approx)	E	N
Surface Water				
1	R1R	5.5 km upstream side from current ferry port	105°15'932""	11°18'582""
2	R1M	Same as above	105°16'516""	11°18'229""
3	R1L	Same as above	105°16'802""	11°18'078""
4	R2R	2.0 km downstream side from current ferry port.	105°16'497""	11°14'720""
5	R2M	Same as above	105°16'589""	11°14'568""
6	R2L	Same as above	105°16'839""	11°14'419""
Subsurface Water				
1	GW1	East side of the Mekong River	105°17'721""	11°15'613""
2	GW2	Same as above	105°17'764""	11°15'623""
3	GW3	West side of the Mekong River	105°15'681""	11°16'904""
4	GW4	Same as above	105°16'524""	11°16'524""

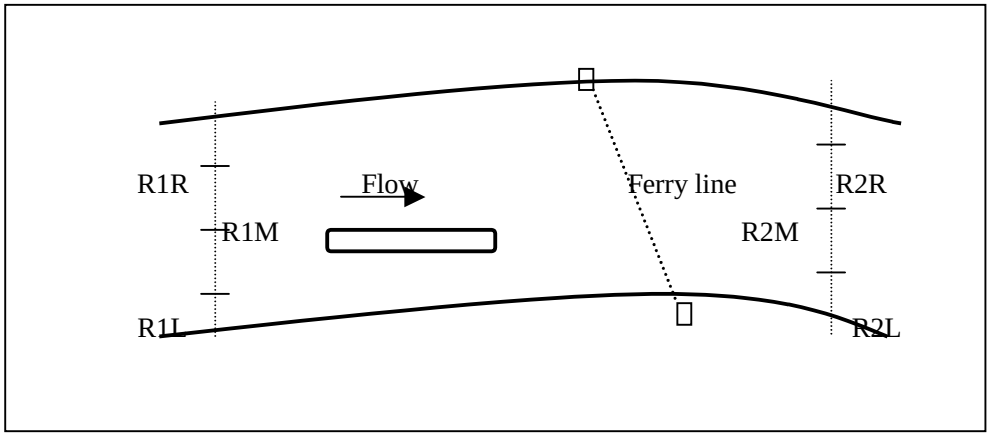


Figure AP7.3.1 Outline of the surface water sampling points located in the Mekong River

Note: Three upstream side sampling points are located about 5.5 km away from the current ferry line while other three downstream side ones are about 2.0 km away.

(5) Mekong River Velocity Profile Survey

In order to study the current cross sectional velocity profile of the Mekong River and to study the interaction between local flow condition and the habitats of aquatic species, field velocity surveys are carried out along the selected project route. Within this survey, ADCP (Acoustic Doppler Current Profiler) is used, and cross-sectional depth-averaged velocity profile at both shallow (i.e., the Mekong River between the west river bank of the Mekong River and Phnon Knong Island) and deep-pool areas (i.e., the Mekong River between Phnon Knong Island and the east river bank of the Mekong River) are obtained. Table AP7.3.9 summarizes the outline of this survey.

Table AP7.3.9 Mekong River Velocity Measurement

Total number of Velocity survey = 1. Measuring period: Aug/16/05 Shallow Area 8:00 a.m. Deep-pool Area 4:00 p.m.	
Parameter	Instrument
cross-sectional depth-averaged velocity	ADCP, Model: WHR 600-1 (Made in USA), Serial #: 2060 Patent #:5112990, 5208785, 5315562, 5343443

(6) Biological Environment (fauna/flora) Study

In order to grasp the current fauna/flora condition around the study area, the biological environmental study is carried out. This study has following specific objectives:

a. To compile a list of species of aquatic, riparian and terrestrial flora and fauna (from selected taxonomic groups) in the vicinity of the proposed project site.

b. To determine the presence/or possible absence of threatened/or endangered species and species communities in the same area.

c. To assess the potential significance of any impacts that construction will have on relevant species and species communities, particularly the threatened/or endangered species.

d. To map the major habitat types in the area and to highlight areas of special sensitivity.

e. To provide recommendations on mitigating effects to the area's faunal and floral values.

Table AP7.3.10 summarizes study methodologies implemented within this study.

Table AP7.3.10 Major Study Methodologies Implemented within Neak Loeung Fauna/Flora Study

1. **Literature and Unpublished Data Review**
All traceable previous biodiversity studies in the study area are reviewed, focusing on key faunal/floral components (i.e., globally and regionally threatened species).
2. Field Surveys
Field surveys focus on birds and an overview assessment of habitat types and dominant plant species. The timing of the field surveys only represent a late dry, hot spell at the end of a drought-like dry season. These surveys only represent a late dry season snapshot of species occurrence; species composition would certainly differ at the height of the rainy season when the majority of the site would be underwater.
3. Interview Surveys.
Interview surveys are used as the most efficient method to assess presence/absence of mammal and reptile species that may occur in the area at very low densities. Fourteen interviewees from eight villages provided information on a standard set of question relating to the occurrence or former occurrence of mammal and reptiles in the area.

Figure AP7.3.2 and AP7.3.3 show the location of the Second Mekong Bridge in relation to Habitats of Cambodian LMB and the biological environmental study site, respectively.

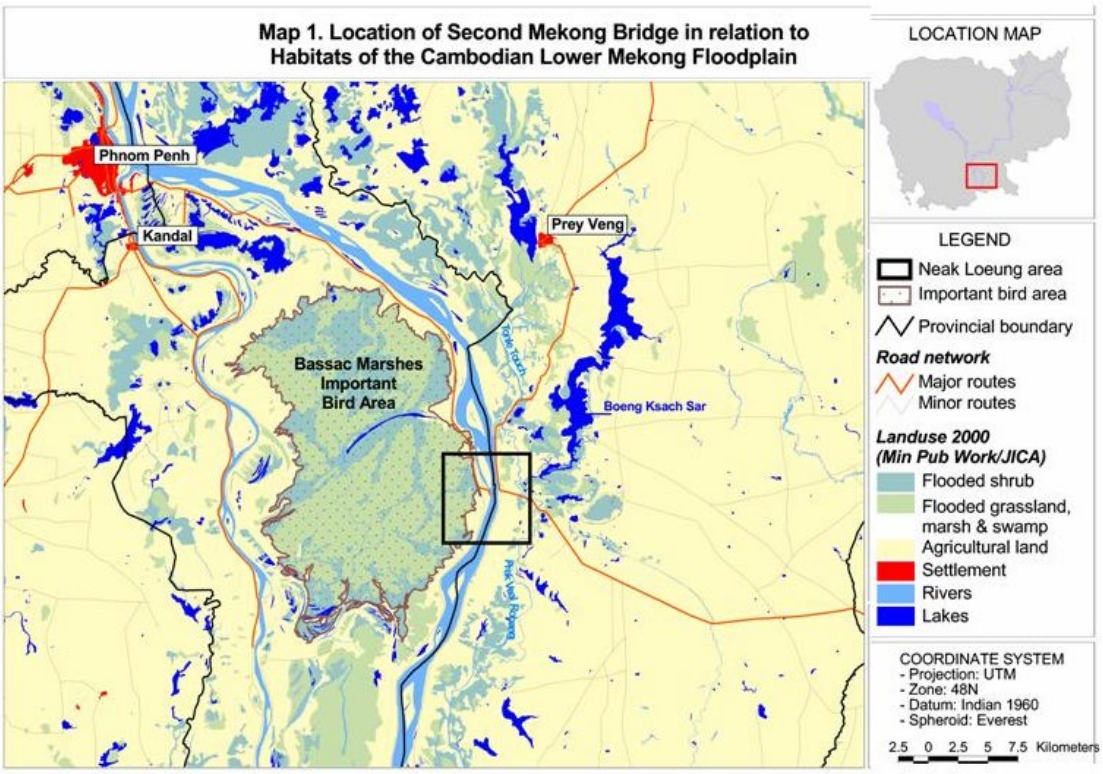


Figure AP7.3.2 Location of Second Mekong Bridge in relation to Habitats of the Cambodian Lower Mekong Floodplain

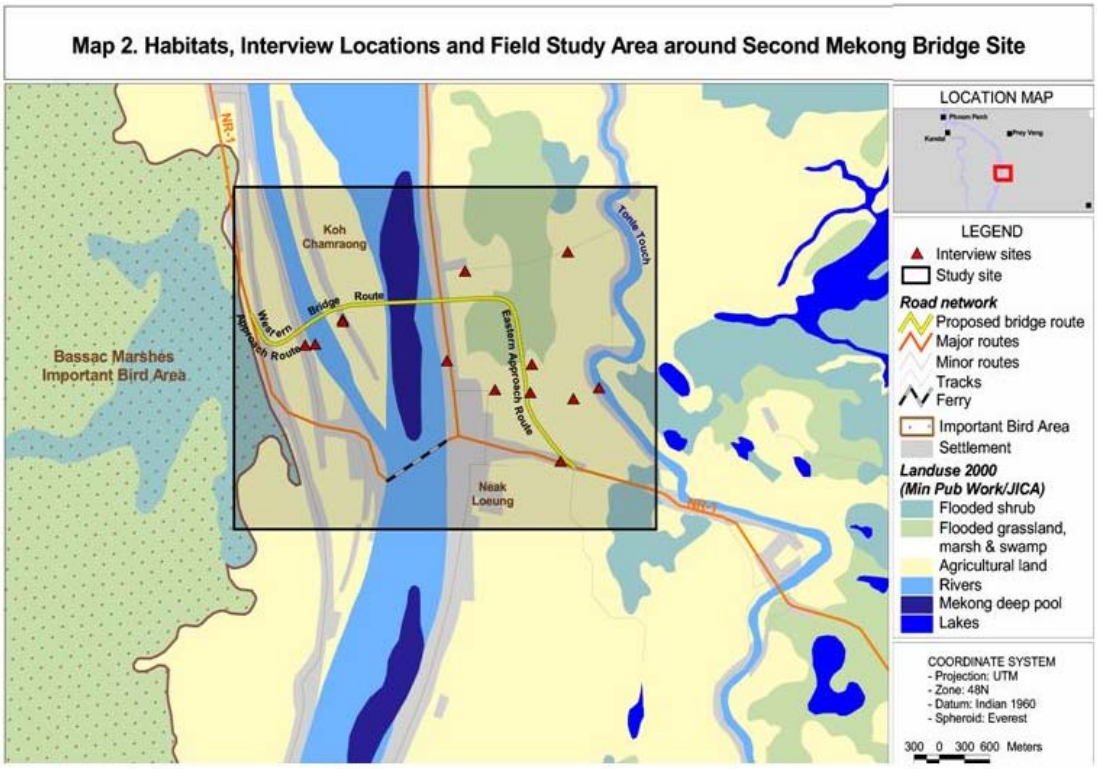
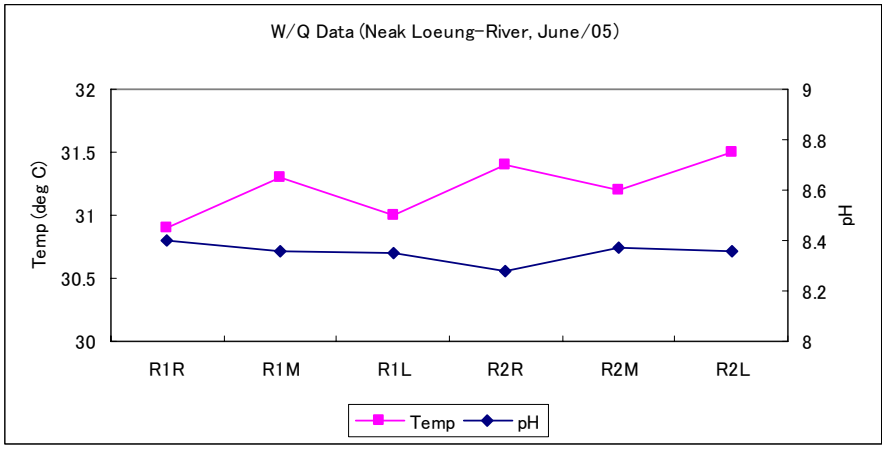


Figure AP7.3.3 Habitat, Interview Location and Field Study Area around the Second Mekong Bridge Site

(7) Water Quality Measurement Results



Note: "R1R" - "R2L" shown in this graph indicate ID codes of water sampling site, listed in Table AP7.3.8.

Figure AP7.3.4 Water Quality Results (Surface Water, Temperature and pH, June/05)

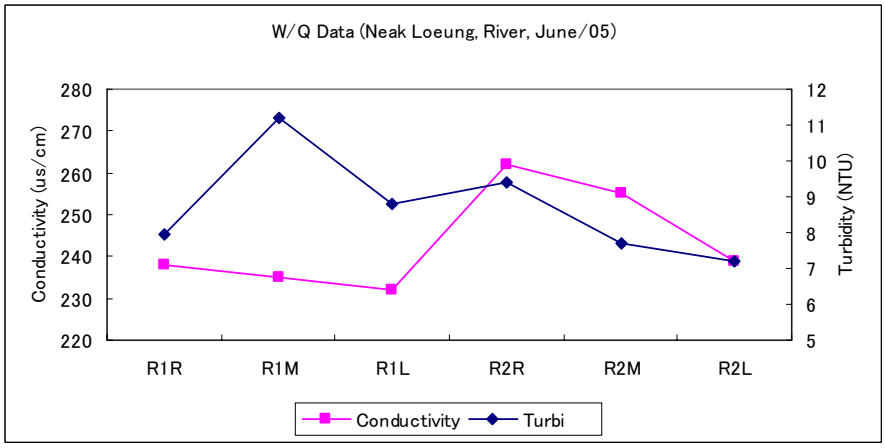


Figure AP7.3.4 Water Quality Results (Surface Water, Conductivity and Turbidity, June/05)

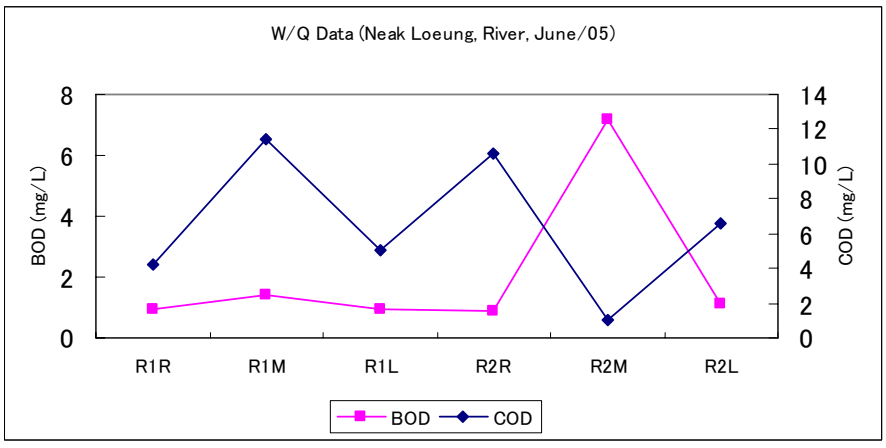


Figure AP7.3.4 Water Quality Results (Surface Water, BOD and COD, June/05)

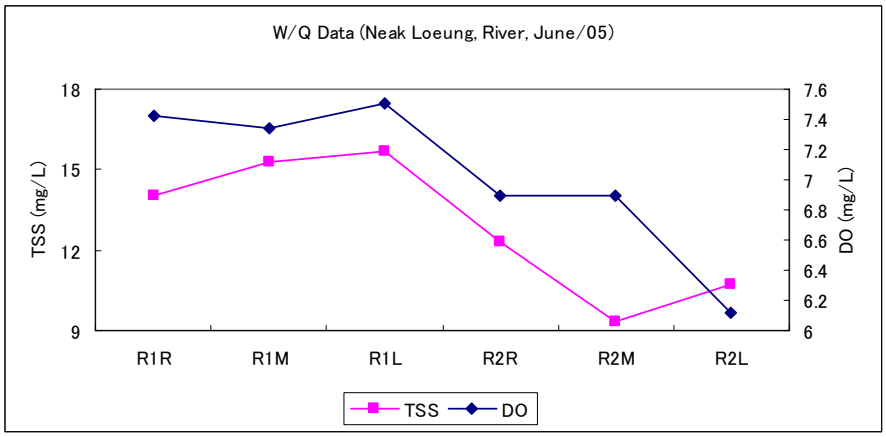


Figure AP7.3.4 Water Quality Results (Surface Water, TSS and DO, June/05)

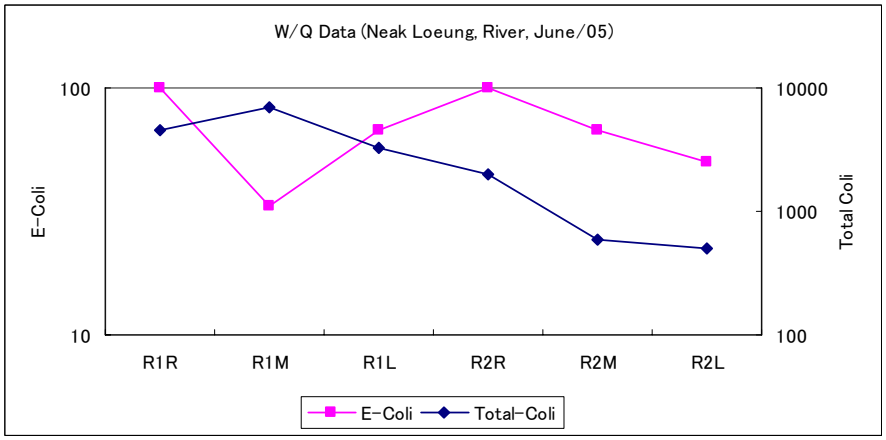


Figure AP7.3.4 Water Quality Results (Surface Water, E-Coli and Total-Coli, June/05)

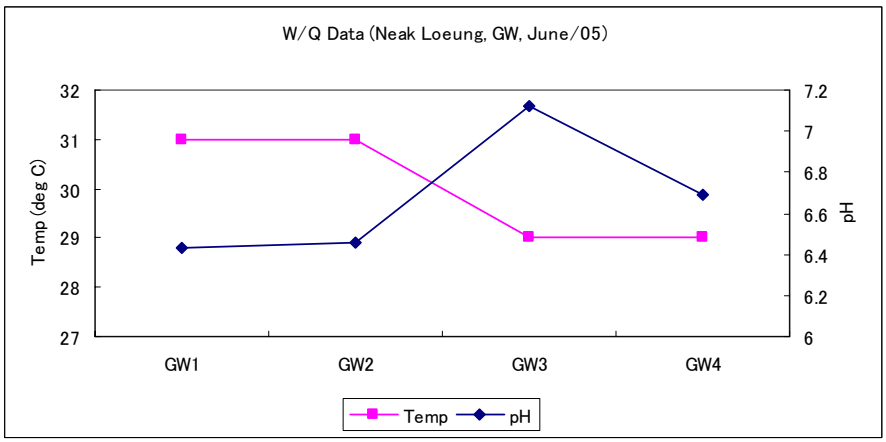


Figure AP7.3.4 Water Quality Results (Subsurface Water, Temperature and pH, June/05)

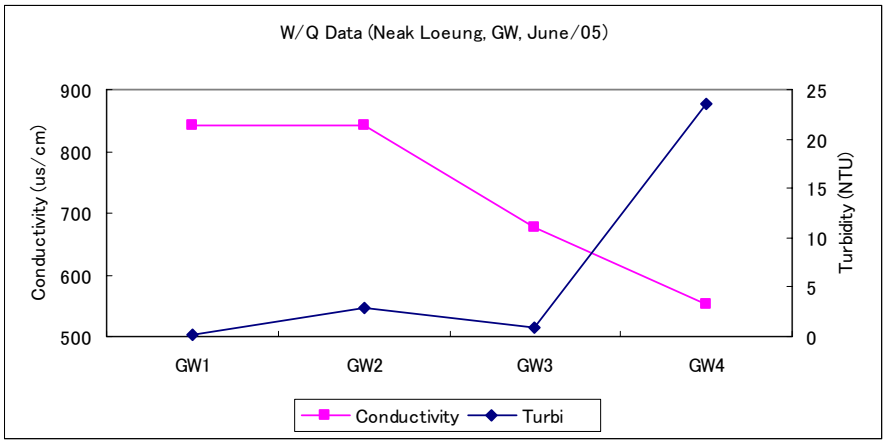


Figure AP7.3.4 Water Quality Results (Subsurface Water, Conductivity and Turbidity, June/05)

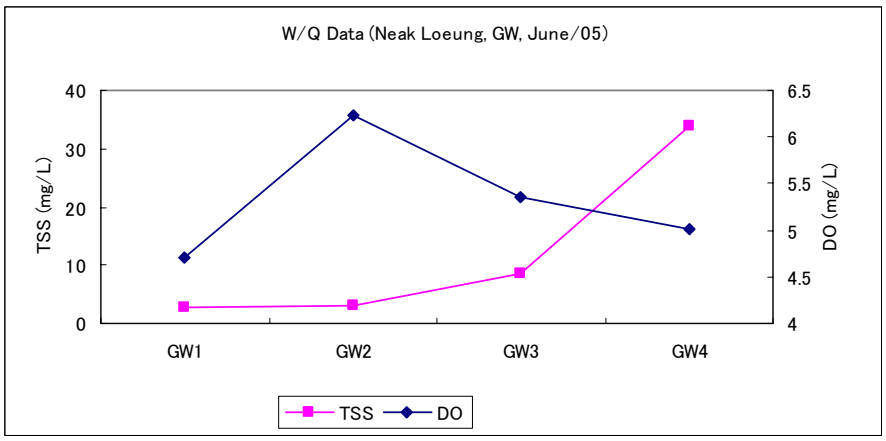


Figure AP7.3.4 Water Quality Results (Subsurface Water, TSS and DO, June/05)

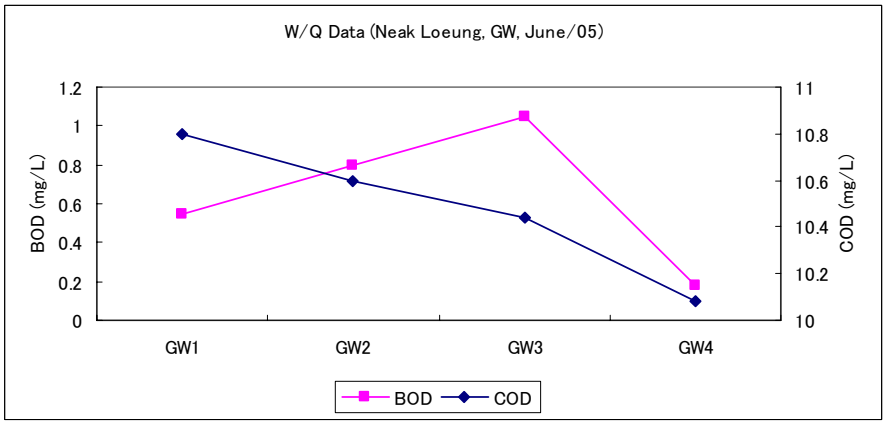


Figure AP7.3.4 Water Quality Results (Subsurface Water, BOD and COD, June/05)

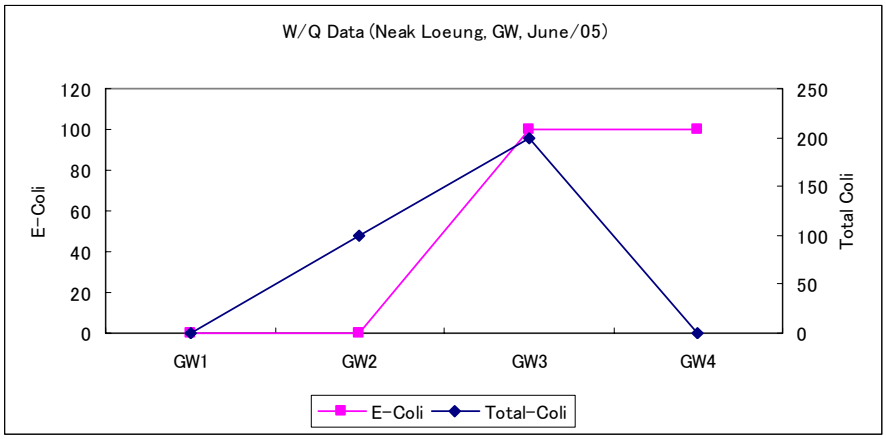


Figure AP7.3.4 Water Quality Results (Subsurface Water, E-Coli and Total-Coli, June/05)

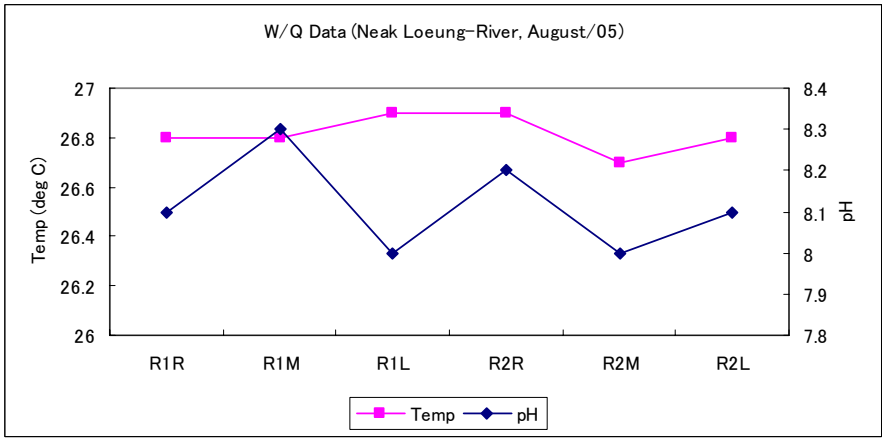


Figure AP7.3.4 Water Quality Results (Surface Water, Temperature and pH, August/05)

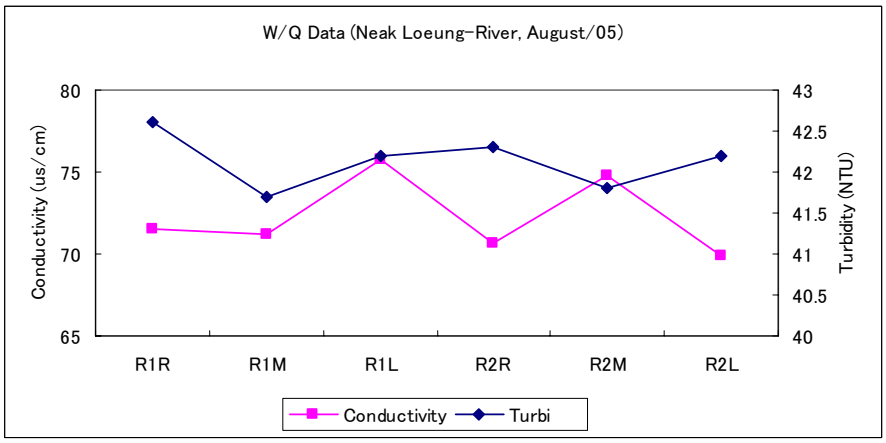


Figure AP7.3.4 Water Quality Results (Surface Water, Conductivity and Turbidity, August/05)

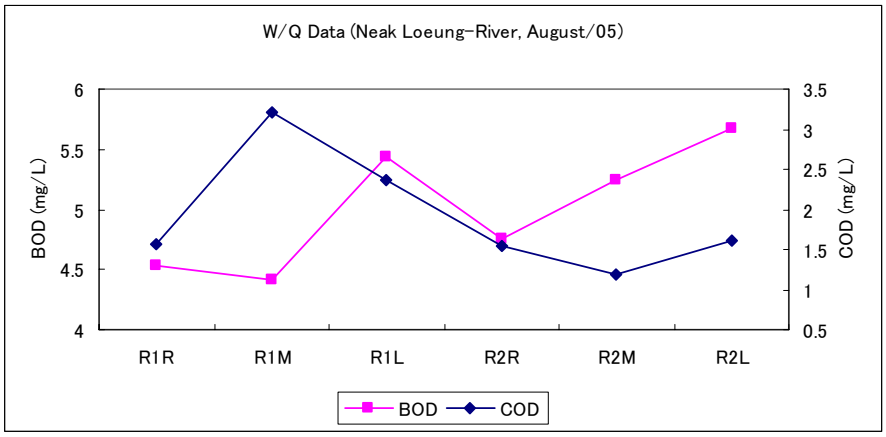


Figure AP7.3.4 Water Quality Results (Surface Water, BOD and COD, August/05)

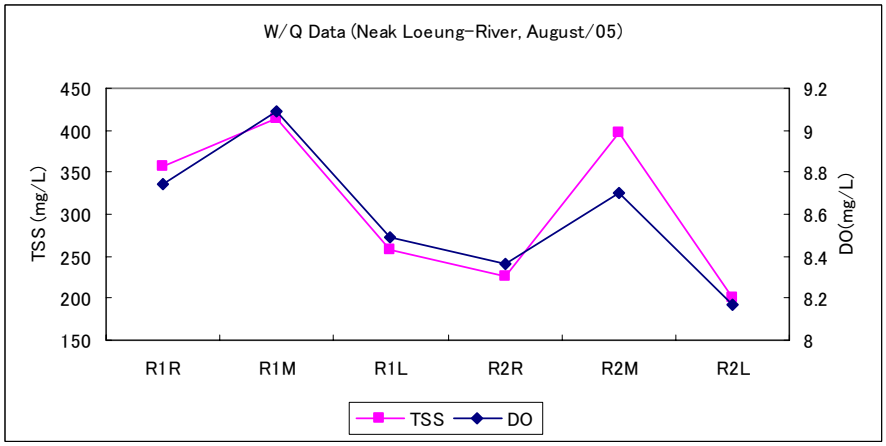


Figure AP7.3.4 Water Quality Results (Surface Water, TSS and DO, August/05)

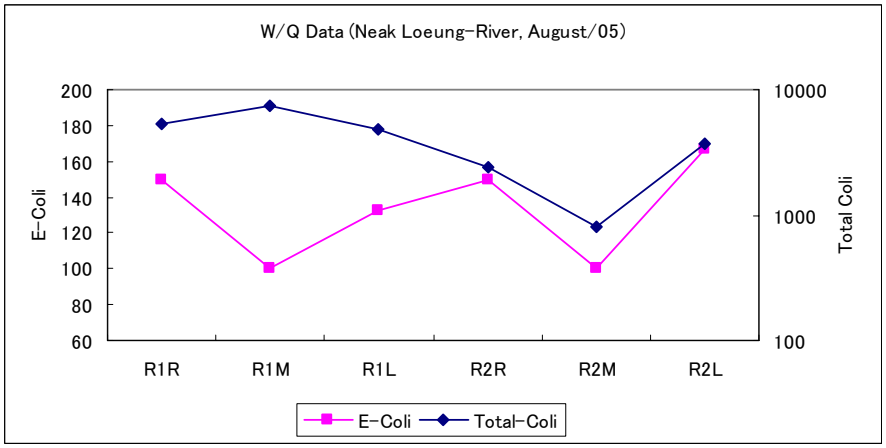


Figure AP7.3.4 Water Quality Results (Surface Water, E-Coli and Total-Coli, August/05)

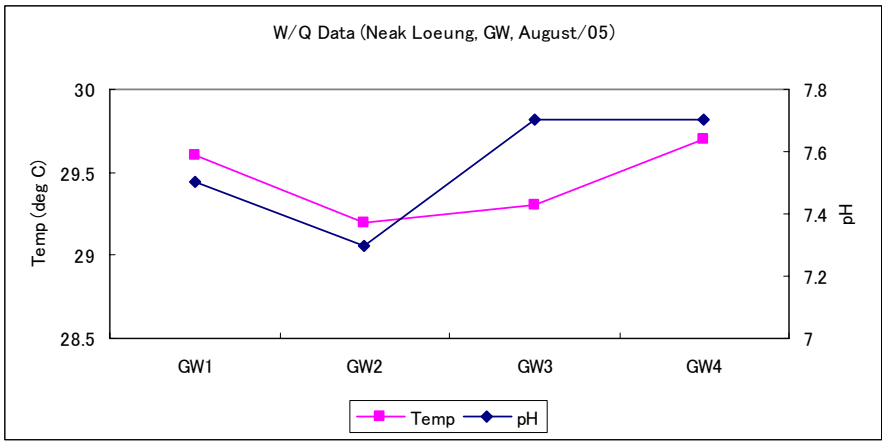


Figure AP7.3.4 Water Quality Results (Subsurface Water, Temperature and pH, August/05)

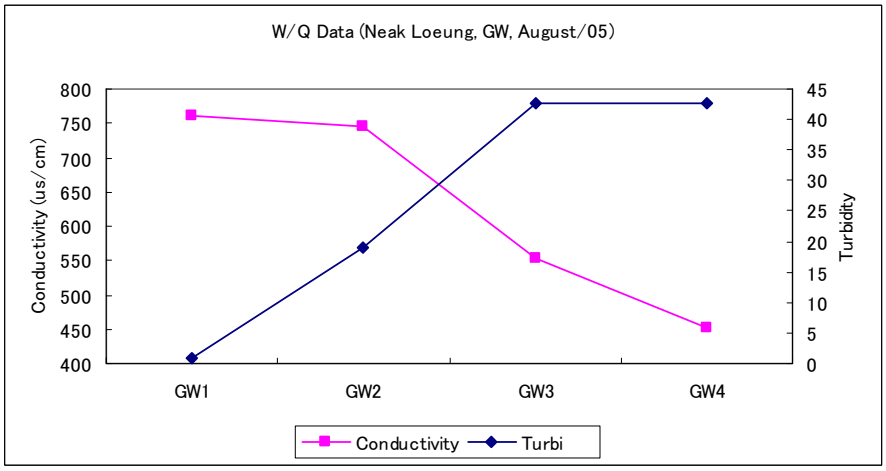


Figure AP7.3.4 Water Quality Results (Subsurface Water, Conductivity and Turbidity, August/05)

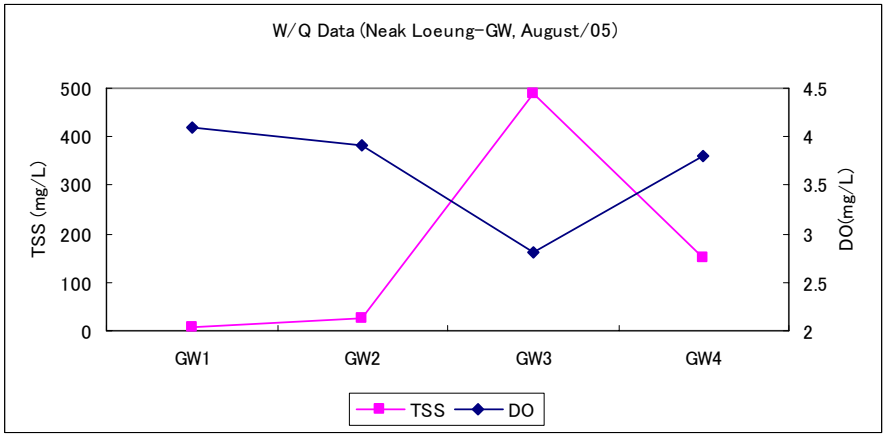


Figure AP7.3.4 Water Quality Results (Subsurface Water, TSS and DO, August/05)

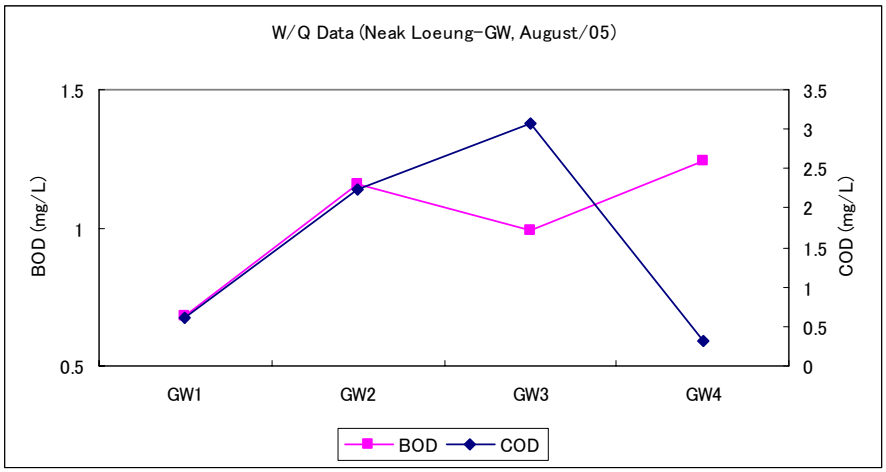


Figure AP7.3.4 Water Quality Results (Subsurface Water, BOD and COD, August/05)

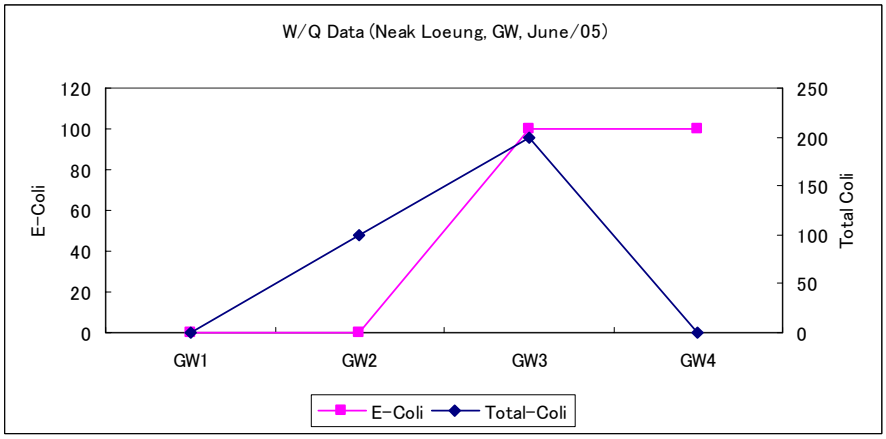


Figure AP7.3.4 Water Quality Results (Subsurface Water, E-Coli and Total-Coli, August/05)

AP7.3.3 IUCN Vulnerable Species found at Neak Loeung

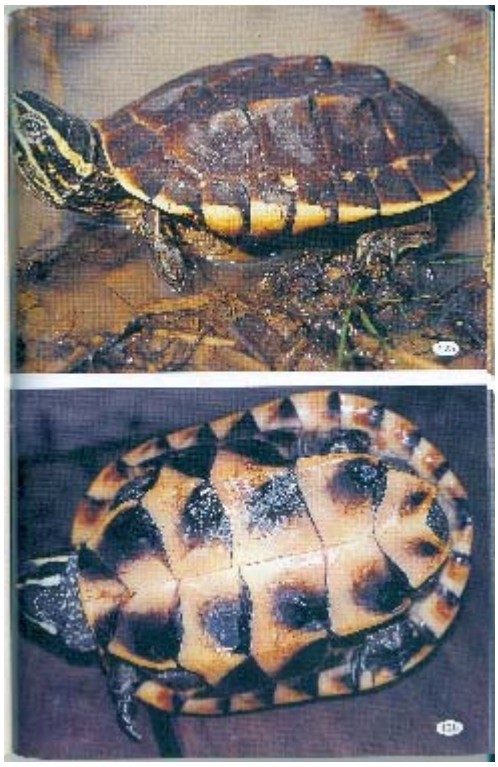


Photo AP7.3.1 Malayan Snail-eating Turtle (*Malayemys subtrijuga,* Stuart. L. et al., 2001)

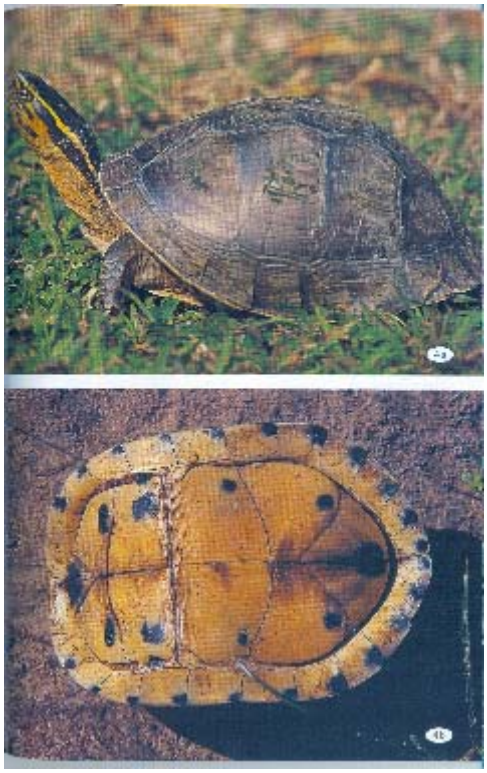


Photo AP7.3.2 Asian Box Turtle (*Cuora amboinensis*, Stuart L. et. al., 2001)

Photo AP7.3.3 Turtle with IUCN “Vulnerable” Status for Sale at Eastside of Neak Loeung

AP7.3.4 Candidate Site for the Conservation Pond for Box Turtle

Note: The site is located at the east side of the Mekong River (ex-old river).

Photo AP7.4.1 Current Condition of the Candidate Site (photo taken at May/05)

Note: The site is located at the east side of the Mekong River (ex-old river).

Photo AP7.4.2 Current Condition of the Candidate Site (photo taken at May/05)

Note: The site is located at the east side of the Mekong River (ex-old river).

Photo AP7.4.3 Current Condition of the candidate site (photo taken at June/05)

AP7.3.5 Flowchart Diagram of Environmental Monitoring System Establishment and Operation.

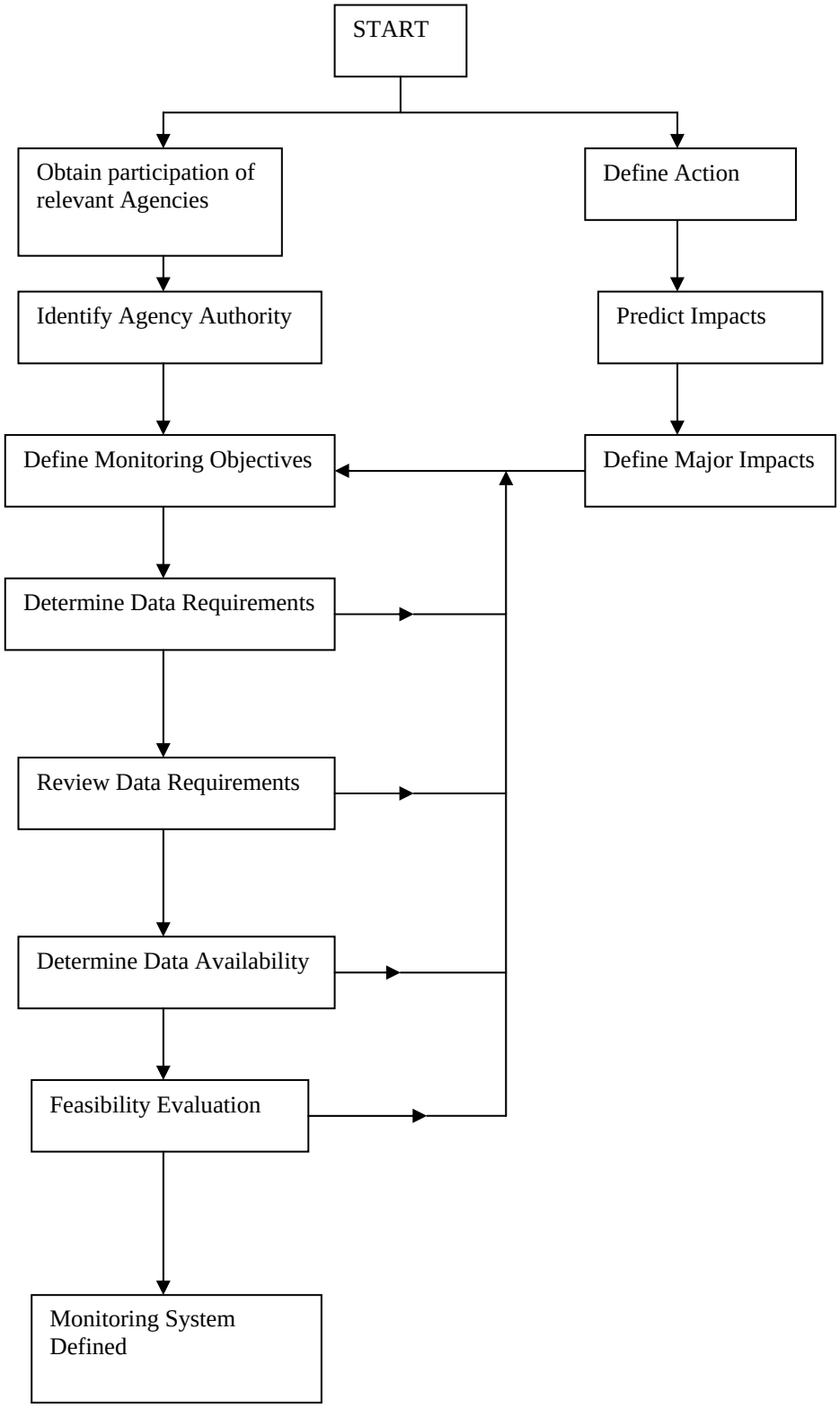


Figure AP7.3.5 Monitoring Methodology Flowchart, Phase I - Development of a Monitoring System (from Canter, 1996)

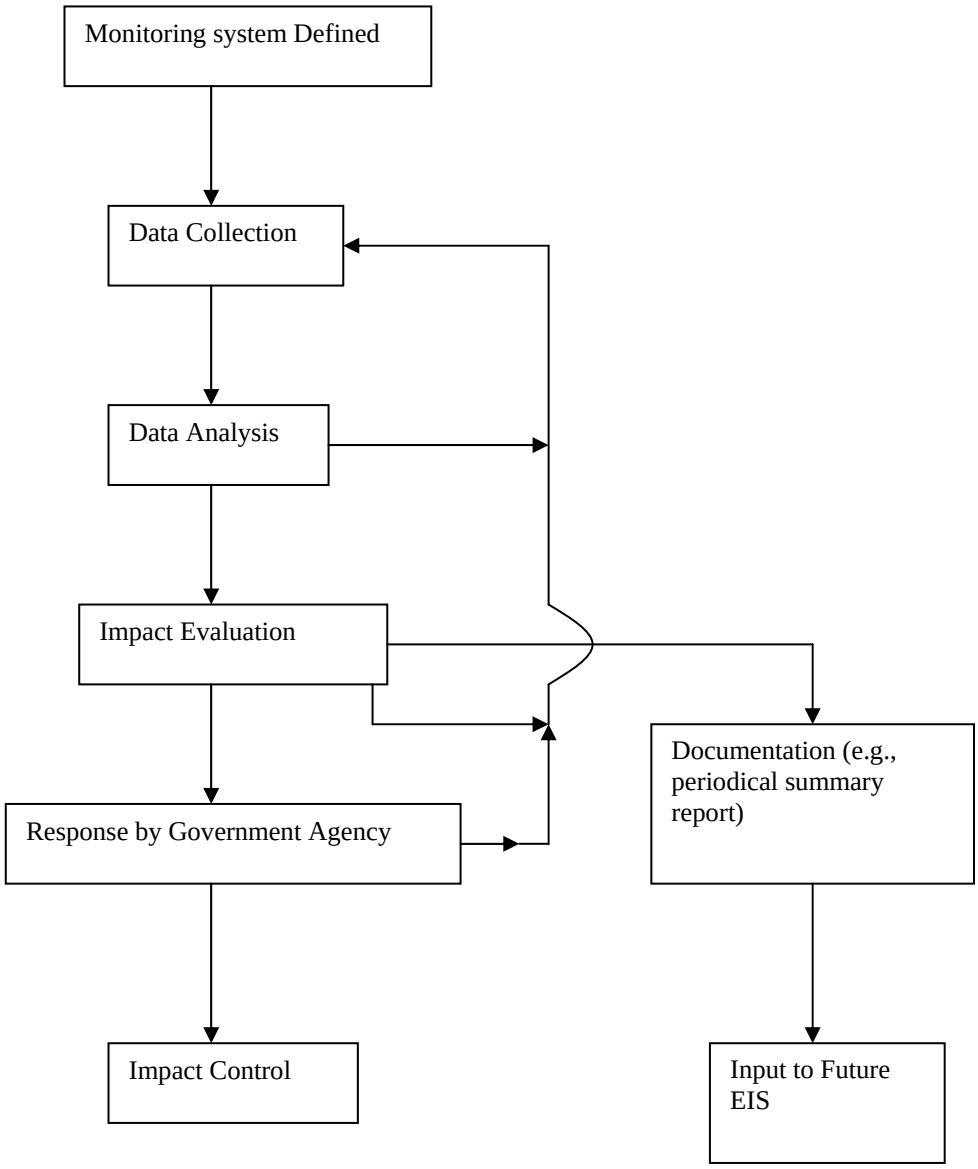


Figure AP7.3.6 Implementation and Operation of Monitoring System (after Canter, 1996)

AP7.4 Impact Assessment of Social Environment

(1) Questionnaire of Interview Survey

- Basic Questionnaire Form for Simple Survey
- Form for Economic Profile Survey
- Questionnaire Form for Children's Mobile Vendors
- Questionnaire Form for Drivers and Passengers
- Questionnaire Form for Restaurants
- Questionnaire Form for Shops
- Questionnaire Form for Locally-employed Neak Loeung Ferry Workers
- Questionnaire Form for Procurement of Goods and Services by Neak Loeung Ferry Company

Figure AP7.4.1(1) Basic Questionnaire Form for Simple Survey

Questionnaire Form for Simple Survey

PAPs No. : (Please refer to the attached form.)

Date of Interview :

Name of Interviewer :

The objective of this interview is to preliminarily confirm the Project Affected Persons' basic agreement to the implementation of the 2nd Mekong Bridge Construction Project in the future. The feasibility study on the construction of the 2nd Mekong Bridge is presently being conducted. During the feasibility study the Simple Survey, which includes the questionnaire to confirm the Project Affected Persons' basic agreement to the Project, is also conducted.

Before starting the questionnaire, I would like to emphasize the following:

a) *The construction of the 2nd Mekong Bridge has not yet been decided by the Royal Government of Cambodia.*
b) *The negotiation process for compensations will start after the official decision to construct the Bridge, properly considering the present transportation capacity (ferry service) at Neak Luoung to the increasing traffic volume, and the Government will secure the fund for the construction of the Bridge.*
c) *The negotiation process for compensations will be sincerely implemented in accordance with the Government's compensation policy.*

I would like to also draw your attention that this interview is not directly related to the specific compensation for the resettlement, and your answers would be strictly confidential and will never be used for other purposes. Also, please note to answer this questionnaire when you fully understand the meaning of the questions and sign it when you fully agree with your answers.

It would be highly appreciated if you would kindly and accurately answer the below questions.

1 Basic Profiles of PAPs :

A) Province :

B) District :

INTER-MINISTERIAL RESETTLEMENT COMMITTEE
Resettlement for the Construction of 2nd Mekong Bridge

Kingdom of Cambodia
Nation Religion King
****

C) Commune :

D) Village :

E) Profiles of Interviewee :

a) Name of Interviewee :

b) Age :

c) Sex :

d) Occupation :

e) Are you a head of the household? Yes No

If Yes, go to Question G

F) (If the interviewee is not a head of the household), please specify the following profiles of the head of household :

a) Relation to the Head of Household

b) Name of head of household :

c) Age :

d) Sex :

e) Occupation :

G) Special Profiles of Households (Please check.) :

☐ Household with Physically-Handicapped Family Members
☐ Female headed (Widow) Household
☐ Household under Poverty Line
☐ Landless Household
☐ Household in Flood-prone Area

2 Type of PAPs

A) Which assets will be affected? (Please check.)

☐ House
☐ Land
☐ Others
  ☐ Tree
  ☐ Fence
  ☐ Well
  ☐ Others (Please specify :)

B) To which area do those assets belong?

☐ Construction Areas for Bridges and Approach Roads
☐ Construction Yards

C) (In case of land ownerships) What is the legal status? :

- ☐ Own with Title
- ☐ Own without Title
- ☐ Rent from the Private Owner
- ☐ Borrow (without Fee) from the Private Owner
- ☐ Rent from the Government
- ☐ Borrow (without Fee) from the Government
- ☐ Illegal Status
- ☐ Others : (_____)

3. Basic Agreement

To the surveyor : Before starting this section, please repeat the explanation to the interviewee in the box.

A) If the Bridge is constructed in near future, will you be pleased?

- ☐ Pleased
- ☐ Not pleased
- ☐ No comments

B) Will you agree to remove full or some part of houses and land for the construction of the Bridge in accordance with the Government's compensation policy?

- ☐ Agree
- ☐ Not agree
- ☐ No answer

C) If you do not agree, what is the reason? :

_____

_____

4. Open Questions :

Are there any comments or questions you want to raise to IRC?

_____

_____

5. Confirmation:

Please sign below when you fully understand the meaning of the questions and confirm your answers.

Surveyor's Name:_____ PAP's Name:_____

Signature:_____ Signature:_____

Figure AP7.4.1(2) Basic Questionnaire Form for Simple Survey

Code: □□ □□

Code: □□ □□

Economic Profile Survey for Households (PAPs)

Date of Interview :

Name of Interviewer :

1. Basic Profiles of Households

A) Type of Households:

- □ 1: Average Household
- □ 2: Households under Poverty Line
- □□ 3: Female-headed Households
- □□ 4: Landless Households
- □□ 5: Households with Physically-handicapped Family Members
- □□ 6: Households in Flood-prone Area

B) Province :

C) District :

D) Commune :

E) Village :

2. Profiles of Interviewee and Family Members :

No.	Relation to Interviewee	Sex	Age	Marital Status	Occupation	Average Monthly Income (Riel/Month)	Physically handicapped? Yes / No
1	Interviewee						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

* If she is a widow, please check as "widow".

3. General Assets :

No.	Kind of Assets	Unit	Amount of Assets

No.	House	1st category	Thatched or Wall (Screen), Bamboo Floor, and Thatched or Roof	M2
2		2nd Category	Wood Wall, Wood Floor, and Zinc Roof	M2
3		3rd Category	Concrete Wall and Concrete Roof (Plasticem)	M2
4			Two-storey Concrete House (Ground and First Floor)	M2
a	Well		Dig Well	1
6	Fence		Pump Well	1
7			Wood Stand, Barbed Wire	1 m
8			Bush (Concrete)	1 m
9	Fruit Tree		Mango Tree	1
10			Tamarind Tree	1
11			Palm Tree	1
12			Coconut Tree (Milk Fruit Tree)	1
13			Durukoo	1
14			Jackfruit	1
15			Star Soup Tree	1
16			Custard Tree	1
17			Papaya	1
18			Wood Tree	1
19			Banana	1
20			Lemon / Lime Tree	1
21			Guava Tree	1
22	Grave	Cemetery	Grave	1
23			Cemetery	1

4. Household Budget

A) Income :

Income Source	Annual Income in 2004 (Riel)
Rice Production	
Vegetable and Fruit Production	
Other Crop Production	
Livestock and Animal Husbandry	
Fishing and Aquaculture	
Trading	
Wage Labor	
Cottage Craft	
Forestry	
Other Income ( )	
Total Income	

B) Expenditure :

Expenditure Item	Annual Expenditure in 2004 (Riel)
Input for Production Activities	
Food and Drinks	
Maintenance and Housing	
Transportation and Communication	
Education and Cultural Services	
Clothes and Shoes	

Figure AP7.4.2(1) Form for Economic Profile Survey

Figure AP7.4.2(2) Form for Economic Profile Survey

Code: □□ — □□

Medical and Health Services	
Household Goods	
Personal Goods	
Other Expenses	
Total Expenditure	

C) Household Assets :

Asset Item	No.	Estimated Total Value (Riel)
Car		
Motor Bike		
TV		
Radio		
Other Household Assets		
Horse		
Ox		
Pig		
Chicken		
Duck		
Other Livestock		
Total Assets		

D) Total Annual Saving (Riel)

b. Agriculture

A) Type of Land Ownership for Farmland

- ☐ 1: Own with Title
- ☐ 2: Own without Title
- ☐ 3: Rent with Fee from the Private Owner
- ☐ 4: Rent without Fee from the Private Owner
- ☐ 5: Rent with Fee from the Government
- ☐ 6: Rent without Fee from the Government
- ☐ 7: Illegal Status
- ☐ 8: Others:

B) Production :

Kind of Crop	Total Area (ha)	Irrigated Area (ha)	Total Production (kg)
Rice			
Crop 1 ( )			
Crop 2 ( )			
Crop 3 ( )			
Crop 4 ( )			
Crop 5 ( )			
Livestock/ Animal			
Fish/Aquaculture			
Forestry Products			

Code: □□ — □□

C) Consumption and Marketing

Kind of Crop	Total Production (%)	Family Use (%)	Surplus (%)	Sales (Marketed) (%)	Sales to Market by Myself (%)	Sales to Middleman (%)
	A=B+C+D	B	C	D=E+F	E	F
Rice	100					
Crop 1 ( )	100					
Crop 2 ( )	100					
Crop 3 ( )	100					
Crop 4 ( )	100					
Crop 5 ( )	100					
Livestock/ Animal	100					
Fish/Aquaculture	100					
Forestry Products	100					

D) Transport Mode of Agrien Rural Products:

Use Own (Pick-up) Trucks :	1
Hire (Pick-up) Trucks :	2
Use Ox Cart :	3
Use Horse Cart :	4
Traders' (Pick-up) Trucks Coming to Farm Gates :	5
Other Modes :	6

6 Transport

A) Transport in Normal Conditions

Destination	Wet Season			Distance (km)
	Average Time per Trip (minute)	Frequency 1: /1 Day 2: /2-3 days 3: /1 Week 4: /2 Weeks 5: /1 Month 6: /2 Months 7: /6 Months 8: /1 Year	Mode 1: Foot 2: Bicycle 3: Ox Cart 4: Horse Cart 5: Motor Bike 6: Car 7: Bus 8: Others	
Provincial Center				
District Center				
Large Market				
Small Market				
High School				
Secondary School				
Primary School				
Rice Field				
Fire Wood				
Pharmacy				

Code: □□ — □□

Health Clinic			
Hospital			
Religious Center			

B) Transport in Abnormal Conditions (such as heavy rain)

Destination	Dry Season			Distance (km)
	Average Time per Trip (minutes)	Frequency 1: /1 Day 2: /2 3 days 3: /1 Week 4: /2 Weeks 5: /1 Month 6: /3 Months 7: /6 Months 0: /1 Year	Mode 1: Foot 2: Bicycle 3: Ox Cart 4. Horse Cart 5. Motor Bike 6: Car 7. Bus 0. Others	
Provincial Center				
District Center				
Large Market				
Small Market				
High School Secondary School				
Primary School				
Rice Field				
Fire Wood				
Pharmacy				
Health Clinic Hospital				
Religious Center				

C) How many times have any of your family members encountered traffic accidents for the last 5 years? : _____ times

7. Education

A) What education level does your head of family reach?

Limited Primary Education : 1

Completed Primary Education : 2

Secondary Education : 3

High School Education or More : 4

Educated by Monks : 5

No education : 6

B) Number of family members (over 6 years old) without education : ____ persons

8. Health

A) Have you or any of your family member had an illness in the past 5 years?

Code: □□ — □□

Yes : 1 No : 2

B) If Yes, please specify kind of diseases, total incidence and frequency of hospitalization for the last 5 years.

Kind of Diseases	Total Incidence for the last 5 Years	Frequency of Hospitalization for the last 5 Years
Malaria Cholera		
Typhoid Fever		
Dengue Fever Chronic Diarrhea		
Hepatitis		
Other Diseases		

C) Immunization

Have your children under 12 years of age been immunized?

Yes : 1 No : 2

9 Utilities

A) Do you have any indoor toilet facilities in your house?

Yes : 1 No : 2

B) Can you access to safe and clean potable water?

Yes : 1 No : 2

C) Are you connected to electric power line?

Yes : 1 No : 2

Figure AP7.4.2(3) Form for Economic Profile Survey

Figure AP7.4.3 Questionnaire Form for Children's Mobile Vendors

Code: MV □□

Questionnaire Form for Children's Mobile Vendors

Date of Interview :

Name of Interviewer :

1. Basic Profiles

A) You are working at :

Eastern Terminal Office : 1

Western Terminal Office : 2

B) You live in :

a) Inside Project Area: 1

Village Name :

Commune Name :

b) Outside Project Area: 2

Village Name :

Commune Name :

District Name

C) How many years have you been doing business here? :

D) What is your transportation method from your living place to here? :

E) How many days are you doing business per week?

F) When you are doing business, you work :

from AM / PM

to AM / PM

G) How many years will you be doing business in future?

H) Profiles of Interviewee and Family Members :

No.	Relation to Interviewee	Sex	Age	Marital Status	Occupation	Average Monthly Income (Riel / Month)	Physically handicapped? Yes / No
1	Interviewee						
2							
3							
4							
5							
6							
7							
8							
9 10							
Total							

Code: MV □□

2. Business Information

A) What kinds of goods are you selling? :

No.	Sold Items	Unit Price (Riel)	% of Sales in Value
1			
2			
3			
4			
5			
6			
7 8			
9			
10 Total			100%

B) Your business amount :

a) Your average daily sales is : Riel

b) Your average daily cost to buy goods is : Riel

c) Your average daily profit is : Riel (a−b)

C) Other Income :

a) Apart from these sales, your additional income per day from other income sources is : Riel

b) Other income sources are :

3. Open Question 1

If the ferry terminals are abolished, what are you concerned about?

4. Open Question 2

When the bridge is constructed and a roadside station (a service station) near the planned bridge is available in future, do you want to sell at these facilities? If yes, what kind of goods and services do you want to sell at these facilities?

Code: DP □□

Questionnaire Form for Drivers and Passengers

Date of Interview :

Name of Interviewer :

Ferry Terminal :

Eastern Terminal : 1

Western Terminal : 2

1. Basic Questions

A) You are :

driver :

passenger :

B) You go

from :

to :

C) Type of Car :

D) Frequency of Crossing River :

E) When you stop over at the ferry terminal, what kind of goods do you buy from mobile vendors? How frequently do you buy from them? If you buy goods from them, how much do you spend per one crossing? :

F) When you stop over the ferry terminal, do you use, do you eat at the restaurants near the ferry terminal? If so, How frequently do you eat there? If you eat there, how much do you spend per one time?

2. Open Question 1

When the bridge is constructed and a roadside station (a service station) near the planned bridge is available in future, do you want to use these facilities?

3. Open Question 2

What kind of goods and services do you want to buy at this roadside station?

Figure AP7.4.4 Questionnaire Form for Drivers and Passengers

Figure AP7.4.5 Questionnaire Form for Restaurants

Questionnaire Form for Restaurants

Date of Interview :

Name of Interviewer :

1. Basic Profiles
   - A) Your restaurant is located at :
     - near the Eastern Terminal : 1
     - near the Western Terminal : 2
   - B) Your basic profiles:
     - a) You live in:
       - Village Name :
       - Commune Name :
     - b) Your age : years old
     - c) Your sex :
     - d) Your nationality?
     - d) You are married? :
     - e) How many family members do you have? : persons
   - C) How many years have you been doing business here? : years
   - D) How many days are you doing business per week?
   - E) When you are doing business, you work :
     - from AM / PM
     - to AM / PM
   - F) How many years will you be doing business in future?

2. Business Information
   - A) What kind of cuisines are you serving? :
   - B) Your business amount
     - a) Your average daily total sales is : Riel
     - b) Your average daily total cost is : Riel
     - c) Your average daily profit is : Riel (a−b)
   - C) How many guests do you have per day? : persons
   - D) How much is the average sales per guest? : Riel per guest
   - E) Please guess the percentage % of sales by the following type of guests
     - a) Local people : %
     - b) Drivers and passengers who stop over the terminal : %

   - F) Other Income :
     - a) Apart from these sales, your additional average income per day from other income sources is : Riel
     - b) Other income sources are :
       - i)
       - ii)
       - iii)

3. Open Question 1

   If the ferry terminals are abolished, what are you concerned about?

4. Open Question 2

   When the bridge is constructed and the ferry terminals are abolished, what will you do to keep the number of guests?

Figure AP7.4.6 Questionnaire Form for Shops

Code: S- □□

Questionnaire Form for Shops

Date of Interview :

Name of Interviewer :

1. Basic Profiles

A) Your shop is located at :

near the Eastern Terminal : 1

near the Western Terminal : 2

B) Your basic profiles:

a) You live in:

Village Name :

Commune Name :

b) Your age : years old

c) Your sex :

d) Your nationality?

d) You are married? :

e) How many family members do you have? : persons

C) How many years have you been doing business here? : years

D) How many days are you doing business per week?

E) When you are doing business, you work :

from AM / PM

to AM / PM

F) How many years will you be doing business in future?

2. Business Information

A) What kind of goods are you mainly selling? :

B) Your business amount

a) Your average daily total sales is : Riel

b) Your average daily total cost is : Riel

c) Your average daily profit is : Riel (a – b)

C) How many guests do you have per day? : persons

D) How much is the average sales per guest? : Riel per guest

E) Please guess the percentage % of sales by the following type of guests

a) Local people : %

b) Drivers and passengers who stop over the terminal : %

Code: S- □□

F) Other Income :

a) Apart from these sales, your additional average income per day from other income sources is : Riel

b) Other income sources are :

i)

ii)

iii)

3. Open Question 1

If the ferry terminals are abolished, what are you concerned about?

4. Open Question 2

When the bridge is constructed and the ferry terminals are abolished, what will you do to keep the number of guests?

Code NF ☐☐

Questionnaire Form for Locally-employed Neak Loeung Ferry Workers

Date of Interview :

Name of Interviewer :

1. Basic Profiles

A) You are working at :

Eastern Terminal Office : 1

Western Terminal Office : 2

On Ferry Boats : 3

B) Department at Neak Loeung Ferry (NF) Company :

C) Position at NF Company :

D) Employment Status at NF Company :

E) How many years have you working for NF Company? :

F) What was the previous job before NF Company? :

G) Profiles of Interviewee and Family Members :

No.	Relation to Interviewee	Sex	Age	Marital Status	Occupation	Average Monthly Income (Riel / Month)	Physically handicapped? Yes / No
1	Interviewee						
2							
3							
4							
5							
6							
7							
8							
9							
10							
Total							

2. Open Question 1

When the Neak Loeung Ferry Company moves to other crossing points, what do you concern about?

3. Open Question 2

What is your request for the Neak Loeung Ferry Company, if the Neak Loeung Ferry is abolished due to the construction of the Bridge?

Figure AP7.4.7 Questionnaire Form for Locally-employed Neak Loeung Ferry Workers

Code NFC ☐☐

Questionnaire Form for Procurement of Goods and Services by Neak Loeung Ferry Company

Date of Interview :

Name of Interviewer :

1. Actual Budget of Neak Loeung Ferry Company for Fiscal Year 2004

No	Budgetary Items	Actual Budget in FY 2004 (Riel)	% of Procurement or Consumption at Neak Loeung	% of Procurement or compensation in other places
1	Oil, Gasoline and Spare Parts			
2	Repairing and Maintenance			
3	Procurement of Services			
4	Taxes			
5	Salaries and Wage for Staff and Workers *			
6	Special Payment			
7	Payment for Management *			
8	Installment			
Total Budget				

* In case of salaries, wage and payment for staff, workers and management, approximately how much is the percentage of consumption at Neak Loeung and how much is the percentage of consumption at other places such as Phnom Penh?

2. Open Question

When the Bridge is constructed, how will the Neak Loeung Ferry Company and its Staff and Workers be?

Figure AP7.4.8 Questionnaire Form for Procurement of Goods and Services by Neak Loeung Ferry Company

(2) Result of Economic Profile Survey

Q1 C)&D) No of Households unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
No of Households	29	19	5	30	1	38	122

Q1 A) Type of Households unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Average Household	19	14	3	16		26	78
2: Households under Poverty Line	10	5		14		12	41
3: Female-headed Households	3	3	2	6		4	18
4: Landless Households	2	1		4		7	14
5: Households with Physically-handicapped Family Members	2	1		1		3	7
6: Households in Flood-prone Area	9	11	3	24	1	32	80
Sub-total	45	35	8	65	1	84	238

Q2) Profile of Family - Family Members unit:family members

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Total Number of Family	152	105	20	167	10	203	657
Average Number of Family	5.2	5.5	4.0	5.6	10.0	5.3	5.4

Q2) Profile of Family - Sex unit:family members

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Male	81	42	11	80	6	108	328
2: Female	71	63	9	87	4	95	329
Sub-total	152	105	20	167	10	203	657

Q2) Profile of Family - Age

unit:family members

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: 0-9 Year Old	31	8	2	40	0	31	112
2: 10-19 Year Old	38	27	7	45	2	54	173
3: 20-29 Year Old	25	19	3	27	4	44	122
4: 30-39 Year Old	23	14	0	22	2	34	95
5: 40-49 Year Old	14	15	5	19	1	20	74
6: 50-59 Year Old	12	9	2	7	1	13	44
7: Over 60 Year Old	7	13	1	6	0	7	34
Sub-total	150	105	20	166	10	203	654

Q2) Profile of Family - Marrital Status

unit:family members

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Married	57	48	6	60	3	85	259
2: Single	87	46	10	100	7	112	362
3: Widow	7	11	4	7	0	4	33
4: Divorced	1	0	0	0	0	2	3
Sub-total	152	105	20	167	10	203	657

Q2) Profile of Family - Occupation

unit:family members

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Agriculture and Fishing	35	19	9	2	4	6	75
2: Whole Sale & Retail	20	22	0	10	0	35	87
3: Transportation	5	2	0	4	0	11	22
4: Manufacturing	3	3	0	0	0	4	10
5: Officials	2	0	0	1	1	8	12
6: No job	32	27	1	13	0	9	82
7: Others	55	32	10	137	5	130	369
Sub-total	152	105	20	167	10	203	657

Q2) Profile of Family - Monthly Income (in Riel) unit:Riel

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Total Income	21,761,700	21,998,000	7,231,500	23,330,000	440,000	37,855,600	112,616,800
No of Households	29	19	5	30	1	38	122
Average Income per Household	750,403	1,157,789	1,446,300	777,667	440,000	996,200	923,089

Q2) Profile of Family - Handicapped unit:number

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Total Number of Handicapped	7	1	1	1	0	9	19

Q3) Area of Affected Houses unit:m2

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
House (1st Category)	156.8	100.0		318.5		170.0	745.3
House (2nd Category)	744.3	602.0	398.3	974.5	72.0	1,842.9	4,633.9
House (3rd Category)	120.5	72.0		201.0			393.5
House (4th Category)							0.0
Sub-total	4,918.0	3,243.6	1,528.0	5,094.3	247.0	8,619.6	23,650.5

Q3) No. of Wells of Affected Houses unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Dig Well	1					5	6
Pump Well	5	3	1	2	1	14	26
Sub-total	6	3	1	2	1	19	32

Q3) Length of Fences of Affected Houses unit:m

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Fence (Wood Stand, Wire)	903.0	13.0		786.0		200.0	1,902.0
Fence (Rock)		84.0		30.0			114.0
Sub-total	903.0	97.0	0.0	816.0	0.0	200.0	2,016.0

Q3) No. of Affected Trees unit:trees

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Fruite Tree (Mango)	361	218	139	34		59	811
Fruite Tree (Tamarind)	7	5	4			5	21
Fruite Tree (Palm)	34	3				2	39
Fruite Tree (Coconut)	119	106	7	24	3	5	264
Fruite Tree (Bamboo)	611	665	107	80			1463
Fruite Tree (Jackfruit)	92	163	15	15		3	288
Fruite Tree (Sour Soup)	7	16	12	11		4	50
Fruite Tree (Custard)	32	20				3	55
Fruite Tree (Papaya)	96	623	4	37		15	775
Fruite Tree (Wood)	7	19	2	2		3	33
Fruite Tree (Banana)	867	6760	120	567		11	8325
Fruite Tree (Lemon)	15	17				4	36
Fruite Tree (Guava)	133	581	579	8		30	1331

Q3) No. of Grave/Cemetary unit:graves

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Grave	2	3	1	2		1	9
Cemetary	1					2	3

Q4 A) Total Income unit:Riel

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Annual Income of Rice Production	367,400,000	11,600,000	3,130,000	1,500,000	48,000,000	3,100,000	434,730,000
of Vegetable and Fruit Production	33,287,000	47,000,000	9,550,000	9,460,000		7,070,000	106,367,000
of Other Crop Production	4,201,000	530,000	14,900,000		13,500,000	100,000	33,231,000
of Liveshock	16,570,000	9,870,000	3,900,000	1,510,000		11,300,000	43,150,000
of Fishing	9,907,000	24,220,000		5,305,000	2,000,000	15,595,000	57,027,000
of Trading	35,155,000	76,090,000		153,120,000		276,518,000	540,883,000
of Wage Labor	82,055,000	37,360,000	2,000,000	89,782,000	1,320,000	190,180,000	402,697,000
of Cottage Craft	6,365,000					4,810,000	11,175,000
of Forestry	500,000			600,000		24,000	1,124,000
of Others	17,387,500	2,825,000	89,400,000	54,240,000		32,496,000	196,348,500

Q4 A) No of Households unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Annual Income of Rice Production	4	4	5	2	1	4	20
of Vegetable and Fruit Production	20	14	5	9		5	53
of Other Crop Production	6	2	5		1	1	15
of Liveshock	10	8	4	6		8	36
of Fishing	6	3		4	1	5	19
of Trading	10	8		10		28	56
of Wage Labor	8	5	2	23	1	23	62
of Cottage Craft	4					2	6
of Forestry	1			1		1	3
of Others	6	2	4	1		6	19

Q4 A) Average Annual Income unit:Riel

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Annual Income of Rice Production	91,850,000	2,900,000	626,000	750,000	48,000,000	775,000	21,736,500
of Vegetable and Fruit Production	1,664,350	3,357,143	1,910,000	1,051,111		1,414,000	2,006,925
of Other Crop Production	700,167	265,000	2,980,000		13,500,000	100,000	2,215,400
of Liveshock	1,657,000	1,233,750	975,000	251,667		1,412,500	1,198,611
of Fishing	1,651,167	8,073,333		1,326,250	2,000,000	3,119,000	3,001,421
of Trading	3,515,500	9,511,250		15,312,000		9,875,643	9,658,625
of Wage Labor	10,256,875	7,472,000	1,000,000	3,903,565	1,320,000	8,268,696	6,495,113
of Cottage Craft	1,591,250					2,405,000	1,862,500
of Forestry	500,000			600,000		24,000	374,667
of Others	2,897,917	1,412,500	22,350,000	54,240,000		5,416,000	10,334,132

Q4 B) Total Expenditure unit:Riel

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Annual Expenditure of Production Activities	33,929,000	7,200,000	5,400,000	5,000,000	14,000,000	15,388,300	80,917,300
of Food and Drinks	80,790,000	55,102,000	11,170,000	106,910,000	4,800,000	154,205,000	412,977,000
of Maintenance and Housing	31,608,000	27,660,000	3,000,000	26,650,000	3,000,000	104,780,000	196,698,000
of Transportation and Communication	31,720,500	11,512,000	3,220,000	15,262,000	2,500,000	45,751,000	109,965,500
of Education and Cultural Services	25,456,000	14,928,000	5,400,000	20,046,500	15,200,000	93,215,000	174,245,500
of Clothes and Shoes	38,010,000	7,890,000	1,000,000	12,709,000	2,000,000	31,030,000	92,639,000
of Medical and Health Services	19,270,000	13,167,000	9,800,000	15,120,000	1,000,000	34,725,500	93,082,500
of Household Goods	11,790,000	8,651,000	2,050,000	43,500,000	400,000	26,942,000	93,333,000
of Personal Goods	4,595,000	5,876,500	4,300,000	10,173,000	400,000	25,929,000	51,273,500
of Other Expenses	1,180,000	3,496,000	3,900,000	18,610,000	400,000	14,308,000	41,894,000

Q4 B) No of Households unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Annual Expenditure of Production Activities	18	9	5	7	1	13	53
of Food and Drinks	28	18	5	30	1	37	119
of Maintenance and Housing	18	13	4	18	1	21	75
of Transportation and Communication	26	15	5	18	1	32	97
of Education and Cultural Services	22	9	5	25	1	31	93
of Clothes and Shoes	28	17	5	29	1	36	116
of Medical and Health Services	26	18	5	28	1	34	112
of Household Goods	26	17	5	29	1	28	106
of Personal Goods	21	13	5	25	1	34	99
of Other Expenses	4	5	5	19	1	21	55

Q4 B) Average Annual Expenditure unit:Riel

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Annual Income of Rice Production	1,884,944	800,000	1,080,000	714,286	14,000,000	1,183,715	1,526,742
of Vegetable and Fruit Production	2,885,357	3,061,222	2,234,000	3,563,667	4,800,000	4,167,703	3,470,395
of Other Crop Production	1,756,000	2,127,692	750,000	1,480,556	3,000,000	4,989,524	2,622,640
of Liveshock	1,220,019	767,467	644,000	847,889	2,500,000	1,429,719	1,133,665
of Fishing	1,157,091	1,658,667	1,080,000	801,860	15,200,000	3,006,935	1,873,608
of Trading	1,357,500	464,118	200,000	438,241	2,000,000	861,944	798,612
of Wage Labor	741,154	731,500	1,960,000	540,000	1,000,000	1,021,338	831,094
of Cottage Craft	453,462	508,882	410,000	1,500,000	400,000	962,214	880,500
of Forestry	218,810	452,038	860,000	406,920	400,000	762,618	517,914
of Others	295,000	699,200	780,000	979,474	400,000	681,333	761,709

Q4 C) No of Households with Assets unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Car					1	2	3
Motor Bike	12	14	4	15	1	33	79
TV	19	13	5	23	1	27	88
Radio	13	14	5	19	1	22	74
Other Household Assets	5	6	1	9	1	7	29
Horse	2	2				1	5
Ox	8	6	3	1		1	19
Pig	4	1	2			10	17
Chicken	9	11	5	14		24	63
Duck		3		5		6	14
Other Livestock		1	1	1			3

Q4 D) Average Annual Saving unit:Riel

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Annual Saving per Household	2,214,412	1,118,400	1,750,000	5,779,286	8,000,000	3,858,125	3,305,063

Q5 A) Land Title unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Own with Title	15	15		11	1	5	47
2: Own without Title	20	4	10	4		12	50
3: Rent with Fee from the Private Owner	3			3			6
4: Rent without Fee from the Private Owner				8			8
5: Rent with Fee from the Government							0
6: Rent without Fee from the Government	6						6
7: Illegal Status							0
8: Others	16	16		112		216	360

Q5 B) Rice Production unit:ha

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Total Area (ha)	9,000	15,000	4,250	11,000	100,000	13,600	15,474
Irrigated Area (ha)	8,500	10,000	3,500	9,250	100,000	13,600	16,464

Q5 B) Livestock Production unit:ha

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Total Area (ha)	48	910		8		354	309
Irrigated Area (ha)							0

Q5 B) Fish Production unit:ha

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Total Area (ha)		180	18,700		800	875	5,139
Irrigated Area (ha)							0

Q5 B) Forestry Production unit:ha

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
Total Area (ha)							0
Irrigated Area (ha)							0

Q5 D) Transport for Agriculture unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Use Own (Pick-up) Trucks		1		1			2
2: Hire (Pick-up) Trucks	1			1			2
3: Use Ox Cart	3	7		1			11
4: Use Horse Cart	2	4		1	1	5	13
5: Traders' (Pick-up) Trucks Coming to Farm Gates	3	4		1		3	11
6: Other Modes	15		5	9		2	31

Q6 A) Frequency unit:households

Destination	1: Provincial Centre	2: District Centre	3: Large Market	4: Small Market	5: High School	6: Secondary School	7: Primary School	8: Rice Field	9: Fire Wood	10: Pharmacy	11: Health Clinic	12: Hospital	13: Religious Centre
1: 1 Day	6	8	82	4	15	15	27	18	26	8			1
2: 2-3 days	4	3	15	5	2		1	6	10	13	1		3
3: 1 Week	2	5	4						8	24	4		37
4: 2 Weeks	2	2	3						3	13	2	1	13
5: 1 Month	6	5	4	1	1				7	12	3	5	10
6: 2 Months	12	9	1	1					3	18	5	3	20
7. 6 Months	9	1	2		2				1	3	3	1	15
8: /1 Year	6	7	2		2			1	4		2	5	10

Q6 A) Mode unit:households

Destination	1: Provincial Centre	2: District Centre	3: Large Market	4: Small Market	5: High School	6: Secondary School	7: Primary School	8: Rice Field	9: Fire Wood	10: Pharmacy	11: Health Clinic	12: Hospital	13: Religious Centre
1: Foot			4	4	1	2	14	20	51	4	1		21
2: Bicycle		3	17	1	10	10	10	1	2	11	1	1	8
3: Ox Cart			2					1	3	3			1
4: Horse Cart			9	1			1		1	4	1		
5: Motor Bike	27	32	68	3	7	1	1	3	2	58	12	5	64
6: Car	19	3	1									9	1
7. Bus													
8. Others	1	2	12	2	4	2	2		3	11	5		14

Q6 B) Frequency unit:households

Destination	1: Provincial Centre	2: District Centre	3: Large Market	4: Small Market	5: High School	6: Secondary School	7: Primary School	8: Rice Field	9: Fire Wood	10: Pharmacy	11: Health Clinic	12: Hospital	13: Religious Centre
1: 1 Day	5	8	79	4	13	15	25	15	20	8			
2: 2-3 days	4	3	17	5	2		1	6	5	9	1		3
3: 1 Week	2	5	7	1					6	22	3		39
4: 2 Weeks	2	2	3						4	15	2		11
5: 1 Month	4	4	3	1	1				6	11	2	3	8
6: 2 Months	11	8	2	1					2	17	4	4	20
7. 6 Months	8	1	1		2				1	3	3	1	15
8: /1 Year	5	4	1		2			1	3		2	3	11

Q6 B) Mode

unit:households

Destination	1: Provincial Centre	2: District Centre	3: Large Market	4: Small Market	5: High School	6: Secondary School	7: Primary School	8: Rice Field	9: Fire Wood	10: Pharmacy	11: Health Clinic	12: Hospital	13: Religious Centre
1: Foot			3	3	1	3	14	17	36	3			20
2: Bicycle		2	13	1	8	7	9	1	2	12			5
3: Ox Cart			1					1	3	2			1
4: Horse Cart			9	1			1		1	4			
5: Motor Bike	26	29	71	1	7	1	1	3	2	51	9	4	64
6: Car	14	3	1								1	7	
7. Bus													
8. Others	1	1	15	6	4	4	1		3	13	7		17

Q6 A) Transport in Normal Condition - Average Travel Time

unit: minutes

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Provincial Centre	113.3	108.0	90.0	68.1	60.0	58.9	74.9
2: District Centre	65.6	36.7	60.0	22.5	15.0	23.6	38.1
3: Large Market	12.0	17.9	54.0	10.4	5.0	8.3	13.2
4: Small Market	11.3	10.0	23.3		5.0		13.9
5: High School	15.0	12.5		20.0	20.0	27.0	19.1
6: Secondary School	7.5		50.0	42.5	5.0	35.4	32.5
7: Primary School	14.1	25.0	53.3	16.4		27.0	23.2
8: Rice Field	42.4	21.7	8.3	30.0	30.0	12.5	25.7
9: Fire Wood	42.1	83.3	65.0	30.3	5.0	38.5	41.9
10: Pharmacy	11.9	22.1	64.0	9.6	5.0	10.2	14.9
11: Health Clinic	23.3	60.0	64.0	12.1	5.0		30.5
12: Hospital	7.3	6.0		6.0		5.7	6.3
13: Religious Centre	9.7	14.9	62.0	15.0	10.0	15.3	16.0

Q6 A) Transport in Normal Condition - Average Distance unit: km

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Provincial Centre	69.8	63.0	60.0	31.6	30.0	33.9	41.3
2: District Centre	12.8	6.8	12.0	6.5	6.0	10.0	9.3
3: Large Market	3.0	2.0	3.0	2.0	0.5	1.4	2.0
4: Small Market	1.0	3.0	1.0		0.5		1.2
5: High School	3.5	2.8		4.5	6.0	4.6	4.1
6: Secondary School	1.0		1.5	3.5	1.0	4.4	3.2
7: Primary School	1.4	2.8	1.9	1.7		2.8	2.0
8: Rice Field	3.7	2.8	0.4	0.8	2.0	0.8	2.2
9: Fire Wood	2.4	2.8	3.0	1.5	0.1	1.6	1.9
10: Pharmacy	1.9	2.0	3.0	1.8	0.1	1.4	1.8
11: Health Clinic	13.3	2.0	3.0	1.9	0.3		5.5
12: Hospital	66.3	40.4		44.0		22.6	44.4
13: Religious Centre	1.5	2.4	1.5	1.0	0.2	1.7	1.6

Q6 B) Transport in Heavy Rain - Average Travel Time unit: minute

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Provincial Centre	160.0	106.7	120.0	88.6	70.0	76.8	94.0
2: District Centre	53.8	30.0	92.5	29.9	25.0	30.0	38.8
3: Large Market	22.0	31.8	81.0	15.9	15.0	11.8	21.5
4: Small Market	16.3	20.0	50.0		15.0		27.8
5: High School	24.0	20.0		25.8	30.0	33.0	26.7
6: Secondary School	15.0		90.0	35.0	15.0	28.1	36.0
7: Primary School	21.4	30.0	37.5	22.9		31.2	26.6
8: Rice Field	57.9	27.5	18.3	55.0	40.0	20.0	38.0
9: Fire Wood	63.7	97.5	97.5	42.3	15.0	25.3	55.0
10: Pharmacy	13.8	37.7	99.0	14.7	15.0	13.1	22.4
11: Health Clinic	15.0		99.0	10.4	15.0	15.0	38.4
12: Hospital	73.8	83.3		150.0		52.5	86.4
13: Religious Centre	13.2	19.9	84.0	20.5	20.0	18.8	21.2

Q6 B) Transport in Heavy Rain - Average Distance unit: km

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Provincial Centre	70.4	65.0	60.0	30.0	30.0	34.1	39.9
2: District Centre	12.8	6.3	12.0	6.5	6.0	9.4	9.0
3: Large Market	2.9	2.0	3.0	2.0	0.5	1.3	2.0
4: Small Market	1.0	3.0	1.3		0.5		1.2
5: High School	4.4	2.8		4.5	6.0	4.7	4.4
6: Secondary School	1.0		1.5	2.7	1.0	4.4	3.2
7: Primary School	1.5	2.8	2.1	1.7		2.8	2.1
8: Rice Field	4.9	2.8	0.4	0.8	2.0	2.2	2.8
9: Fire Wood	3.0	2.8	3.0	1.5	0.1	1.0	2.1
10: Pharmacy	1.9	2.0	3.0	1.8	0.1	1.4	1.8
11: Health Clinic	1.9		3.0	2.0	0.3	0.7	2.1
12: Hospital	49.3	46.7		65.0		33.5	48.5
13: Religious Centre	1.5	2.3	1.5	1.0	0.2	1.9	1.6

Q6 C) Traffic Accidents unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
No of Accidents	21	7	1	20		46	95

Q7 A) Education unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Limited Primary Education	11	6	2	10		14	43
2: Completed Primary Education	14	8	2	8	2	14	48
3: Secondary Education	12	3		18		15	48
4: High School Education or More	12	4		16		28	60
5: Educated by Monks		15				15	30
6: No education	24	24	12	36		12	108

Q7 B) Education unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
No of Family without Education	11	8		6		5	30

Q8 A) Illness

unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Yes	26	14	5	23	1	24	93
2: No	3	4		7		12	26

Q8 B) Illness - Total Incidence

unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Malaria	7	5		6		5	23
2: Cholera		1		1			2
3: Typhoid Fever	20	6	6	39		18	89
4: Dengue Fever	17		2	3		10	32
5: Chronic Diarrhea	5	3		6		1	15
6: Hepatitis	12		4			5	21
7: Others	23	77	10	58	3	167	338

Q8 B) Illness - Frequency of Hospitalization

unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Malaria	11	3		6		6	26
2: Cholera		1		1			2
3: Typhoid Fever	38	7	8	49		18	120
4: Dengue Fever	19		2	3		8	32
5: Chronic Diarrhea	15	3		4		1	23
6: Hepatitis	14		4			5	23
7: Others	19	41	100	62	3	103	328

Q8 C) Immunization

unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Yes	19	7	2	19		20	67
2: No	10	12	1	10		18	51

Q9 A) Indoor Toilet unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Yes	11	6	1	6		17	41
2: No	18	13	4	24	1	21	81

Q9 B) Clean Water unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Yes	11	2		2		5	20
2: No	18	17	5	28	1	33	102

Q9 C) Electricity unit:households

Commune	1: Kampong Phnom			2: Preak Khsay Ka		3: Preak Khsay Kha	Sub-total
Village	1: Ampil Toeuk Krao	2: Ampil Toeuk Knong	3: Koh ChamReoun	4: Preak Khsay	5: Udom	6: Phum 1	
1: Yes		9		11		14	34
2: No	29	10	5	19	1	24	88








Photograph AP7.4.1(1) Description of Projected Affected Persons








Photograph AP7.4.1(2) Description of Projected Affected Persons








Photograph AP7.4.1(3) Description of Projected Affected Persons








Photograph AP7.4.1(4) Description of Projected Affected Persons








Photograph AP7.4.1(5) Description of Projected Affected Persons








Photograph AP7.4.1(6) Description of Projected Affected Persons








Photograph AP7.4.1(7) Description of Projected Affected Persons






Photograph AP7.4.1(8) Description of Projected Affected Persons