

## 4.2 Explanation on Draft Final Report in Cambodia

**Minutes of Discussions**  
**on**  
**the Preparatory Survey**  
**on**  
**the Project for Flood Protection and Drainage Improvement**  
**in the Phnom Penh Capital City (Phase III)**  
**in the Kingdom of Cambodia**  
**(EXPLANATION ON DRAFT REPORT)**

In response to a request from the Government of Cambodia (hereinafter referred to as “the GOC”), the Japan International Cooperation Agency (hereinafter referred to as “JICA”) dispatched the Preparatory Survey Team on the Project for Flood Protection and Drainage Improvement in the Phnom Penh Capital City (Phase III) (hereinafter “the Project”) to the Kingdom of Cambodia (hereinafter referred to as “Cambodia”) from March to May 2010, and through discussion, field survey and technical examination of the results in Japan, JICA prepared a draft report of the survey.

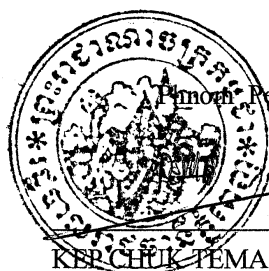
In order to explain and consult with the concerned officials of the GOC on the components of the draft report, JICA sent the Draft Report Explanation Team (hereinafter referred to as “the Team”), which is headed by Mr. Shiro NAKASONE, Director of Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, JICA, and is scheduled to stay in the country from January 10 to 14, 2011.

As a result of discussions and field survey, both parties confirmed the main items described on the attached sheets.

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SHIRO NAKASONE  
Leader  
Draft Report Explanation Team  
Japan International Cooperation Agency



Phnom Penh, January 12, 2011

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KIR CHHUK TEMA  
Governor  
Phnom Penh Capital City  
Kingdom of Cambodia

## ATTACHMENT

### **1. Components of the Draft Report**

The Cambodian side agreed and accepted in principle the components of the draft report explained by the Team. The components of the Project are shown in Annex-1.

### **2. Japan's Grant Aid scheme**

The Cambodian side understood the scheme of Japan's Grant Aid scheme and the necessary measures to be taken by the GOC as explained by the Team and described in Annex-4, Annex-5 and Annex-6 of the Minutes of Discussions signed by the both sides on 11 March, 2010 (hereinafter referred to as "the Previous M/D").

### **3. Schedule of the Survey**

JICA will complete the final report in accordance with the confirmed items and send it to the GOC by March 2011.

### **4. Tentative Schedule of the Project**

The Cambodian side understood the tentative time schedule of implementation stage of the Project as shown in Annex-2. The Cambodian side also understood the time schedule is subject to change, depending on the date of Exchange of Notes(hereinafter referred to as "E/N") and Grant Agreement(hereinafter referred to as "G/A").

### **5. Confidentiality of the Project**

#### 5.1 Detailed Specifications

The both sides confirmed all the information related to the Project including detailed specifications of the facilities, equipment and other technical information shall not be released to any other party(ies) before the signing of all contract(s) for the Project.

#### 5.2 Project Cost Estimation

The Team explained to the Cambodian side the estimated Project cost to be borne by the Government of Japan (hereinafter referred to as "the GOJ") and by the GOC. The Cambodian side agreed to allocate necessary budget in order to bear requested

undertakings as shown in Annex-3. The Team also explained that these costs estimations are subject to change since they are provisional and need to be further examined.

Both sides agreed that the project cost estimation should never be duplicated in any form nor disclosed to any third parties before signing of contract(s) for the Project because this confidentiality of the project cost estimation is essential to ensure fairness of the tender procedure.

## **6. Undertakings of the Cambodian side**

The Team requested and the GOC agreed on the following undertakings in addition to the major undertakings described in the Previous M/D.

### 6.1 Operation and Maintenance of Facilities and Equipment

(1) The Cambodian side agreed to take any necessary measures and allocate necessary budget in order to operate and maintain drainage facilities/cleaning equipments constructed/procured by the Project.

(2) The Project would implement the technology transfer and capacity building (Soft Component) in the areas of drainage pipe cleaning works which Drainage and Sewerage Division (DSD) is responsible to, so that the Cambodian side would be able to carry out the systematic and scheduled management of these works. The Cambodian side committed to utilize the technologies and knowledge acquired as a result of Soft Component for the effective and continuous maintenance of drainage facilities/cleaning equipments constructed/procured by the Project.

### 6.2 Internal Transportation of Cleaning Equipment for Drainage Pipes

Two (2) units of Sludge Sucker and two (2) units of High Water-Jet Machine will be procured as the cleaning equipment for drainage pipes by the Project. Cambodian side agreed that internal transportation cost of procured equipment from disembarkation port (Sihanoukville port) to Phnom Penh shall be borne by the Cambodian side.

### 6.3 Preservation of the Trabek South Regulation Pond

The Team requested the preservation of Trabek South Regulation Pond with present condition again as mentioned on the Previous M/D, because it is indispensable to ensure the effectiveness of present drainage facilities. The Cambodian side shall take necessary countermeasures if necessity arises.

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In addition, both sides also confirmed that there will be no resettlement under the Project, including the area around the Trabek South Regulation Pond. The Team also requested the Cambodian side to explain appropriately about these matters to concerned organizations/groups including residents around the Trabek South Regulation Pond in order to avoid any misunderstanding on the Project.

#### 6.4 Periodical Environmental Monitoring

The Cambodian side (DPWT) shall execute the periodical environmental monitoring during construction to check circumstances of negative impacts derived from construction work and implementation state and effectiveness of countermeasures for the negative impacts in accordance with the Monitoring Plan for the Project described in the draft report. The results will be informed to JICA by filling in the Monitoring Form mentioned in the draft report, as a part of progress reports during the construction phase.

#### 6.5 Establishment of Monitoring System of Inundation Condition

The Cambodian side is required to establish the inundation monitoring system and to carry out inundation monitoring periodically. Inundation monitoring shall be carried out in some locations in the city area where inundation damages are rather heavy, and some data shall be recorded such as date, time, inundation depth, duration of inundation, rainfall data, and so on in each monitoring point. The monitoring locations proposed by the Preparatory Survey Team of JICA are as shown in the draft report.

### **7. Other relevant issues**

#### 7.1 Change the name of the Project

The Cambodian side proposed to change the name of the Project to correspond to the name of capital. Both sides agreed as follows;

Before: the Project for Flood Protection and Drainage Improvement in the Municipality of Phnom Penh (Phase III) in the Kingdom of Cambodia

After: the Project for Flood Protection and Drainage Improvement in **Phnom Penh Capital City** (Phase III) in the Kingdom of Cambodia

END

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## Annex-1

## Tentative List of Components of the Project

Covered by the Japan's Grant Aid			Covered by the Recipient Country
Items	Description	Quantity	
<b>Improvement of Drainage Network (Drainage Pipe Installation)</b>			
Installation of drainage Pipe at locations conforming to following conditions in the Trabek Basin and adjacent area: - Seriously suffers from inundation - Main trunk - Particular construction technique required	Ou Russei Area	3.93 km	- Improvement of branch line of drainage pipe - Operation and maintenance of drainage network
	Boeng Reang Area	2.43 km	
	Monireth Area	2.05 km	
	Tuol Svay Prey Area	2.52 km	
	Tuol Sleng Area	2.47 km	
	Bong Keng Kang Area	3.04 km	
	Tuol Tumpun North Area	1.15 km	
	Tuol Tumpun South Area	3.06 km	
	Total Length	20.65 km	
Reconstruction of Sediment Chamber at R240	Existing big chamber shall be replaced by new sediment chamber.	1 site	- Operation and maintenance of chamber - Clearing/removal/disposal of solid waste/sludge/sediment
Procurement of Cleaning Equipment for Drainage Pipe	- High Water-Jet Machine - Sludge Sucker	2 sets	- Operation and maintenance of equipment - Cleaning work of drainage facilities utilizing equipment procured by the Japan's grant aid
Soft Component (Technical Assistance)	Japanese engineers shall be dispatched to build up the capacity of DSD <sup>(*)</sup> staffs for drainage pipe cleaning and O&M <sup>(*)</sup> of cleaning equipment.	5 M/M <sup>(*)</sup>	- To bear any expenditure except direct expenditure of Japanese Engineer

Note: <sup>(\*)</sup> O&M: Operation and Maintenance, M/M: Man/Month

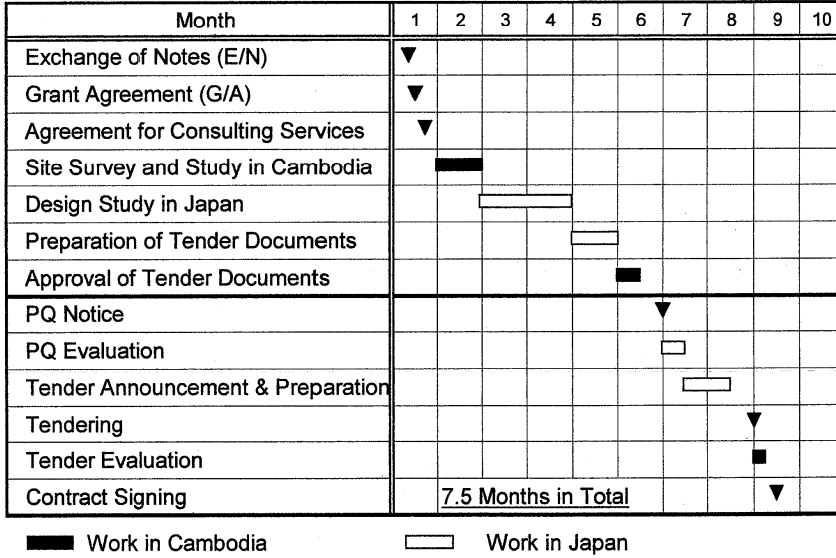
DSD: Drainage and Sewerage Division of Department of Public Works and Transport

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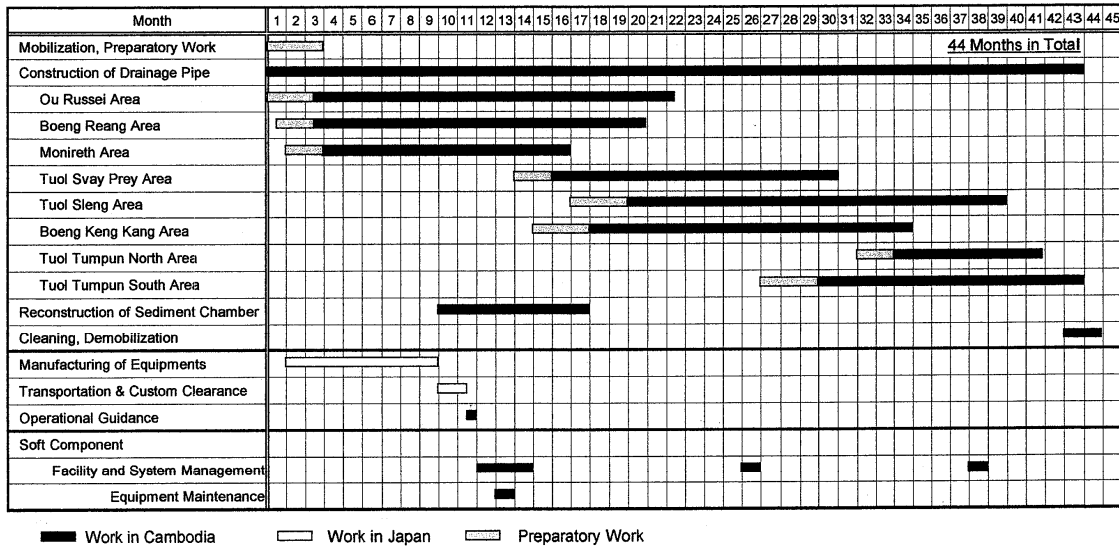
Annex-2

**Tentative Schedule of the Project**

Detailed Design and Tendering Stage



Construction, Procurement and Soft Component Stage



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Annex-3

**Undertakings Borne by Cambodian side**

Item
Advising Commission for Banking Arrangement (B/A) and Authorization to Pay (A/P), and Payment Commission
Periodical Environmental Monitoring Cost during the Construction Stage (14 times in total for 42 months)
Internal Transportation Cost for the Equipment for Drainage Pipe Cleaning Procured by the Project

Note: Approximate cost estimation can be referred in the draft report.

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## Appendix 5. Soft Component (Technical Assistance) Plan

### 1. BACKGROUND OF THE SOFT COMPONENT SERVICE

#### 1.1 Background of the Project

Phnom Penh City, the capital of the Kingdom of Cambodia, is located in the western side of the confluence of Mekong River and Tonle Sap and had the population of about 1.3 million in 2008. In the 1960's, urban drainage facilities with functions of draining storm water and domestic wastewater were gradually improved in line with the development of the city. However, all such drainage facilities constructed since the beginning of the 1900's stopped functioning well due to old age, as well as poor maintenance after the 1970's. As a result, the city suffers from habitual inundation and poor environmental conditions caused by stagnant wastewater in the lowland areas, which are serious constraints to the improvement of residents' living environment as well as social and economic development.

To hasten the rehabilitation and improvement of drainage facilities, the Government of Cambodia had requested technical cooperation from the Government of Japan. In response, the Government of Japan dispatched a study team through the Japan International Cooperation Agency (JICA) to formulate the master plan for flood protection and urban drainage improvement in Phnom Penh City and suburbs and to conduct a feasibility study on priority projects selected from the master plan. The study was carried out from March 1998 to August 1999 and, based on the proposed priority projects, those shown in the following table were carried out under the Japan's Grant-Aid Scheme.

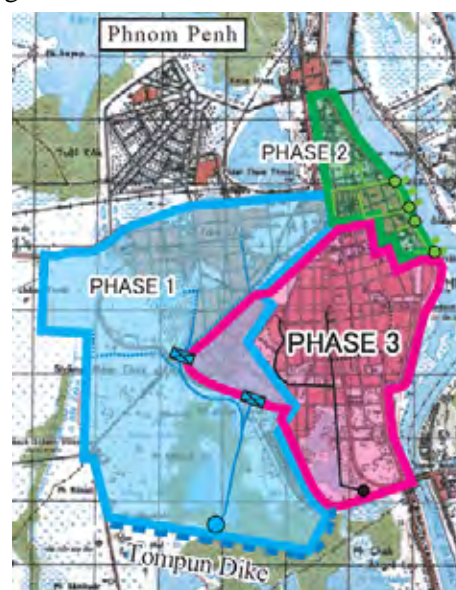


Fig. 1.1 Area of Japan's Grant Aid Project

**Table 1.1 Japan's Grant-Aid Projects Implemented in the Past**

Project	Project Period	Target Area	Project Components
Phase I	2001~2004	Southwest area of the city (Tompun Watershed)	Dike Reinforcement, Drainage Channel, Pumping Station, Sluiceway, Bridge, Road
Phase II	2006~2010	City centre and northeast area of the city (Central Market Area, Royal Palace & National Museum Area, Wat Phnom Basin)	Revetment, Drainage Pipes, Underground Reservoir, Pumping Station

Phase I: The Project for Flood Protection and Drainage Improvement in the Municipality of Phnom Penh (Phase I)

Phase II: The Project for Flood Protection and Drainage Improvement in the Municipality of Phnom Penh (Phase II)

Although drainage conditions in the target areas of Project Phase I and Project Phase II have improved after then, areas in the southeast such as the Trabek Basin and its vicinity are still experiencing serious flooding in the rainy season. Therefore, the Project for Flood Protection and Drainage Improvement in the Phnom Penh Capital City (Phase III) (hereinafter referred to as "the



Project”) was requested for implementation under Japan’s Grant-Aid by the Cambodian Government to improve the drainage condition in the remaining southeast areas.

## **1.2 Overall Goal and Project Objective**

Although the drainage condition in some parts of the city had gradually improved in the past decade, the other areas such as the Trabek Basin and its vicinity still suffer from flooding in the rainy season. As a result, the city is beset with poor environmental conditions caused by stagnant wastewater in the lowland areas, causing deterioration of the residents’ living environment and posing a serious constraint to social and economic development.

To find a solution to these issues, the Government of Cambodia and the Phnom Penh Capital Hall (hereinafter referred to as “PPCH”) had conducted various studies on flood protection and drainage improvement to achieve the overall goals listed below in accordance with basic strategies of the NSDP (National Strategic Development Plan), and the policies of “Rectangular Strategy” of the national government of Cambodia and the CDS (City Development Strategy) of the PPCH:

- Stabilization of livelihood of people in the Phnom Penh City
- Development of the city through the mitigation of flood damage
- Improvement of sanitary and environmental conditions in the city

The Project has the following objective under the overall goals mentioned above:

- To minimize inundation and damage caused by local rainfall by improving the drainage system and providing equipment for cleaning the drainage facilities in the targeted area of the Project (See Fig.1.1).

## **1.3 Basic Concept of the Project**

To achieve the objective of the Project, drainage facilities in the Survey Area, including drainage pipes and sediment chamber, shall be installed or improved at the planning scale of 2-year probability, and cleaning equipment such as Water-Jet Cleaners and Sludge Sucker shall be procured.

**Table 1.2 Contents of Japan's Grant-Aid for the Project (Phase III)**

Covered by the Japan's Grant Aid			Covered by the Recipient Country
Items	Description	Quantity	
Improvement of Drainage Network (Drainage Pipes Installation)			- Improvement of branch line of drainage pipes - Cleaning, operation and maintenance of drainage network
Improvement/Installation of drainage pipes at locations conforming to the following conditions in the Trabek Area and adjacent area: - Serious inundation - Main trunk - Particular construction technique required	Ou Russei Area	3.93 km	
	Boeng Reang Area	2.43 km	
	Monireth Area	2.05 km	
	Tuol Svay Prey Area	2.52 km	
	Tuol Sleng Area	2.48 km	
	Boeng Keng Kang Area	3.05 km	
	Tuol Tumpung North Area	1.15 km	
	Tuol Tumpung South Area	3.06 km	
	Total Length	20.65 km	
Reconstruction of Sediment Chamber at R240	Replacement of existing big chamber with new sediment chamber	1 site	- Operation and maintenance of chamber - Clearing/removal/disposal of solid waste/sludge/sediment
Procurement of Cleaning Equipment for Drainage Pipes	- Water-Jet Machine - Sludge Sucker	2 sets	- Operation and maintenance of equipment - Cleaning of drainage pipes utilizing equipment procured in the Project

#### 1.4 Necessity of the Soft Component (Technical Assistance)

The Department of Public Works and Transport (hereinafter referred to as "DPWT") of the PPCH, the implementation agency of the Project, is mandated with the responsibility to manage the constructed facilities and procured equipment. Based on this responsibility, the cleaning and maintenance of drainage pipes shall be implemented by the Drainage and Sewerage Division (hereinafter referred to as "DSD") of DPWT, utilizing cleaning equipment and funds provided from the cleaning and management budget of PPCH.

DSD staffs possess the basic knowledge and experience in operating and maintaining cleaning equipment for drainage pipes because it presently uses its cleaning equipment (4 combined sludge sucker vehicles with auxiliary equipment) for the cleaning and maintenance of the drainage system. Most of the present cleaning work on drainage pipes is, however, limited to symptomatic treatment, such as cleaning work at site where inundation happens frequently or claimed by the residents. Besides, discrepancy between cleaning work plan and actual work implementation is large because the monthly and annual work plan of DSD includes only pipe length to be cleaned and does not include inspection work plan to be implemented prior to the cleaning work, and also actual cleaning work is symptomatic treatment. In addition, the system to feedback the experience of past cleaning work is not activate because contents of working records are not unified and not enough for the feedback.

It is necessary to enhance the cleaning and management capability of DSD based on the PDCA Cycle (Plan – Do – Check – Action – Plan...) through the technical assistance by the soft component so as to solve the above described capability and management problem of DSD, and to sustainably utilize the drainage facilities and cleaning equipment granted in the Japan's Grant-Aid Projects (Phase-I to III).

It is prospective to utilize the knowledge and methodology through the Soft Component by DSD, to spread the technical know-how to each Khan and Sangkat in charge of local cleaning and maintenance work, and to enhance the proper cleaning and maintenance activities based on the systematic and scheduled action plan in the future.

## **2. OBJECTIVES OF THE SOFT COMPONENT**

The objectives to be achieved by DSD through the soft component service are as follows:

- DSD can compose systematic and scheduled cleaning plan of the drainage system as a part of the total maintenance work of the drainage system.
- DSD can execute appropriate utilization and maintenance of the cleaning equipment procured by the Project.

The achievement of the objectives of the soft component enables the improvement of efficiency and safety management of cleaning work and the keeping of drainage capability of drainage facilities properly. This achievement will provide the sustainability of the project objective “to minimize the inundation and to reduce the damage by improving the drainage system and providing the equipment for cleaning the drainage facilities.”

It is expected that the DSD improves the efficiency and effectiveness of the drainage cleaning and maintenance works with the utilization of new cleaning equipment to be procured by the Project through the acquirement of knowledge provided by the Soft Component for the manners of works and the utilization of the equipment.

## **3. OUTPUT OF THE SOFT COMPONENT PLAN**

### **3.1 Direct Effects of the Soft Component**

The direct beneficiaries of the Soft Component Services are the staffs of DSD including the Chief and Deputy Chief(s) supervising and planning the works and technical engineers/operators conducting the actual cleaning and maintenance works. Through the actual activities of the soft component service, it is necessary to institute the total cleaning and management plan of the whole drainage system, and also to institute detailed daily and weekly activity plans. The prospective outputs after completion of the plan are described below:

- (1) Responsible staffs of DSD (Chief, Deputy Chief and technical staffs) can institute the cleaning and maintenance work plans (annual, monthly and weekly) with the utilization of the procured equipment;
- (2) Responsible staffs of DSD (Chief, Deputy Chief and technical staffs) can execute, review and record the cleaning and maintenance works based on the work plans prepared by utilizing the procured equipment;

- (3) Responsible staffs of DSD (Chief, Deputy Chief and technical staffs) can make the proper working reviews and improvements regarding results and circumstance of the cleaning and maintenance working procedures, safety management plan;
- (4) Responsible staffs of DSD (Chief, Deputy Chief and technical staffs) can review the cleaning and maintenance work plans in consideration of the inspection and maintenance records of past implemented work, and can leverage the records and information to revise and improve the maintenance and reconstruction plan of drainage facilities; and,
- (5) DSD can upgrade the city drainage network diagram map(s) and prepare the database of drainage facilities in the PPCC.

### **3.2 Indirect Effects of the Technical Guidance Service**

In the future, it is desirable that the technology transferred by this soft component services will be established in the whole DPWT and also spread to the Khans and Sangkats, the lower organizational units of the city, in charge of cleaning and maintenance work of local branches of the drainage network as the indirect effects of the technical guidance service.

## **4. CONFIRMATION OF DEGREE OF ACHIEVEMENT**

Prior to the termination of the soft component services, the following activities shall be executed to confirm the effectiveness and achievement of the activities concerned:

- To check the cleaning and maintenance work plans (annual, monthly and weekly plans);
- To check the activity records of the cleaning and maintenance work of the drainage system (daily/weekly working record, monthly report, annual report) and maintenance record of the equipment;
- To compare the instituted work plan with the actual work states (drainage network diagram, and bar-chart indicating sites to be cleaned in the work plan, requested sites to be cleaned and sites actually cleaned);
- To check the composing state of drainage network diagram and drainage network database; and,
- To check the contents of manuals regarding work methodology, safety management and maintenance of the equipment together with the records of revisions and improvement.

## **5. ACTIVITIES OF THE SOFT COMPONENT PLAN**

### **5.1 Dispatch of Experts**

Two (2) Japanese experts, assigned as “Facility and System Management Expert” and “Equipment Maintenance Expert,” respectively, shall be dispatched in the following three (3) terms (See Fig. 7.1):

## *Soft Component Plan*

**Term-1** = 2 experts (Facility and System Management Expert and Equipment Maintenance Expert)  
After initial operation guidance of equipment procured by the Contractor

**Term-2** = 1 expert (Facility and System Management Expert)  
One year later after Term-1 [Intermediate (Second) Technical Guidance Service]

**Term-3** = 1 expert (Facility and System Maintenance Expert)  
One year later after Term-2 (Third Technical Guidance Service)

### **5.2 Activities in Each Term**

The main activities of the Soft Component Service are to support and improve the activities of DSD. The DSD shall conduct the following activities in each term based on the support and advice of the expert(s) under the “Soft Component” in collaboration with the DPWT.

#### **5.2.1 Term-1**

- Preparation of Annual and Monthly Cleaning and Maintenance Plan taking into consideration safety and environmental management methods.
- Preparation of Daily, Weekly and Monthly Work Plans for the pilot works, together with the Experts.
- Preparation of formats of Recording Sheets and tables of contents of the required documentations such as Daily Records, Monthly Reports, Annual Reports, Cleaning Work Plan, Base Map of City Drainage Network Diagram, Drainage Facilities Database including diameter, depth and year of construction, and comparative bar-chart of the works.
- Preparation of Maintenance and Inspection Manual and format of Maintenance/Operation Record Sheet for Equipment.
- Pilot cleaning and maintenance activities using the procured equipment to confirm the actual manner of describing and filling-in of the sheets.

#### **5.2.2 Term-2 and Term-3**

- Confirmation of Records and Reports.
- Confirmation of Actual Cleaning and Maintenance Work Volume.
- Confirmation of Progress of Drainage Network Diagram Map(s) and Drainage Facility Database.
- Evaluation and Review of Cleaning and Maintenance Work Plan.
- Solution of Issues and Problems regarding the Cleaning and Maintenance Work Plan.
- Revision and establishment of next Annual Plans and Record Sheet Formats.
- Revision of Manuals, if any.

Detailed contents of the dispatch of experts during the Soft Component Service are described in the following section. Necessary activity periods in each term are three (3) months for Term-1, one (1) month for Term-2 and one (1) month for Term-3, or a total of five (5) months.

### **5.3 Facility and System Management Expert (“Expert-1”): Five (5) M/M in total**

#### **5.3.1 Term-1: Three (3) months**

##### **(1) First Month**

Expert-1 shall perform the following activities in collaboration with DSD:

- Preparation of base map(s) for drainage network diagram map(s).
- Preparation of format of Drainage Facility Database.

##### **(2) Second Month**

In the Second Month, Expert-1 shall perform the following activities in collaboration with DSD:

- Preparation of Sequence of Drainage Cleaning and Maintenance Work based on the current inundation condition and priority of DSD.
- Preparation of Annual Drainage Cleaning and Maintenance Plan for the First Year after the procurement of the Equipment.
- Review of the current working record manual and procedure for Drainage Cleaning and Maintenance Work and preparation of format of Cleaning Record Sheet, Daily Record, Weekly Report, and Safety Planning, including formulation of summary reporting system.

##### **(3) Third Month**

In the Third Month, Expert-1 shall provide supervision and support/advice for the following activities of DSD:

- Preparation of format of Comparative Chart/Table (such as Bar-Chart) between planned and actual amounts.
- Improvement of Cleaning and Maintenance Work including Planning Methodology and the technique of preparation of Drainage Network Diagram and Database.

#### **5.3.2 Term-2: One (1) month**

DSD will have conducted the actual cleaning and maintenance work for one (1) year after Term-1. Expert-1 shall provide support and advice to DSD in the review and revision of plans and manuals based on the following activities, in collaboration with DSD:

- Review of Cleaning and Maintenance Work Plan taking into consideration the comparison between work plan composed in Term-1 and actual work result for one year after procurement of the equipment.
- Review of Cleaning and Maintenance Work Plan taking into consideration safety management and work effectiveness based on the actual unsafe cases and actual accidents that have happened in cleaning and maintenance works.
- Review of Drainage Network Diagram and Drainage Network Database prepared in Term-1, if necessary.
- Provide advice and suggestions regarding the recording system, working condition and planning of the works.

### **5.3.3 Term-3: One (1) month**

DSD will have conducted the actual cleaning and maintenance works for another one (1) year after Term-2 based on the reviewed and revised plans and procedures for cleaning and maintenance work of drainage facilities. Expert-I will resume providing support and advice to DSD in the review and revision of plans and manuals based on the following activities in collaboration with DSD:

- Provide support on the review and evaluation of actual cleaning and maintenance activities based on the plans and procedures revised in Term-2.
- Review of the Cleaning and Maintenance Work Plan taking into consideration safety management and work effectiveness based on the actual unsafe cases and actual accidents that have happened in cleaning and maintenance works.
- Review of the Drainage Network Diagram and the Drainage Network Database prepared in Term-2, if necessary.
- Provide advice and suggestions regarding the recording system, working condition and planning of the works.

### **5.4 Equipment Maintenance Expert (“Expert-2”): One (1) M/M in total**

Expert-2 shall be dispatched during Term-1 and conduct the following support activities for DSD:

- Support in the preparation of maintenance manuals and check sheets for procured equipment with regards to inspection and repair method, strategy in emergency situations, and safety management method.
- Execution of maintenance work trainings/drills on the procured equipment based on the maintenance manuals and check sheets, and supervision of the pilot activities utilizing the procured equipment. This work shall be implemented with the equipment operators.

- Support in solving problems that happen during the pilot operation activities with the utilization of procured equipment.
- Upgrade and revision of the maintenance manuals and the check sheets.

## **6. ARRANGEMENT AND INPUTS OF DISPATCHED EXPERTS**

For the implementation of the Soft Component in which the activities of DSD will be improved as described in Chapter 5, two (2) Japanese Experts (“Facility and System Management Expert” and “Equipment Maintenance Expert”) shall be arranged and dispatched for the following reasons:

- In Cambodia, there are few experts who have enough experience in managing municipal drainage network systems and in the planning of long-term management strategies and improvement of management skills.
- There are also few experts who may be able to strictly manage the progress of the work based on the planned schedule.

Therefore, the “Facility and System Management Expert” with extensive experience in the maintenance and management of sewerage and drainage facilities shall be dispatched during the Soft Component Service. Likewise, the “Equipment Maintenance Expert” who has extensive experience in the maintenance and management of cleaning equipment shall be dispatched as described in previous chapter.

## **7. IMPLEMENTATION SCHEDULE OF TECHNICAL GUIDANCE SERVICE**

In Term-1, the expert assigned as “Facility and System Management Expert” (Expert-1) shall be dispatched in accordance with the time of arrival of the procured equipment. In the first month, Expert-1 shall compose the base map of drainage network diagram and the form of drainage network database. Expert-1 shall provide support to institute the cleaning and management work schedule in the first year on the basis of recognition by DSD with regards to the importance of drainage network and past inundation damage, and support in composing each working record (daily record, weekly record, monthly report, annual report, etc.) In the second month, the pilot activity based on the instituted work schedule shall be executed. In the third month, problems and points to modify as clarified through the pilot activity shall be reviewed and the cleaning and maintenance system shall be improved.

The expert assigned as “Equipment Maintenance Expert” (Expert-2) shall be dispatched in accordance with the time of commencement of the pilot activity. Expert-2 shall provide guidance and supervision for the pilot activity and compose the maintenance manuals and check sheets of the procured equipment.

The results of activities in Cambodia shall be submitted by Expert-1 and Expert-2 to the JICA office and DPWT.



*Soft Component Plan*

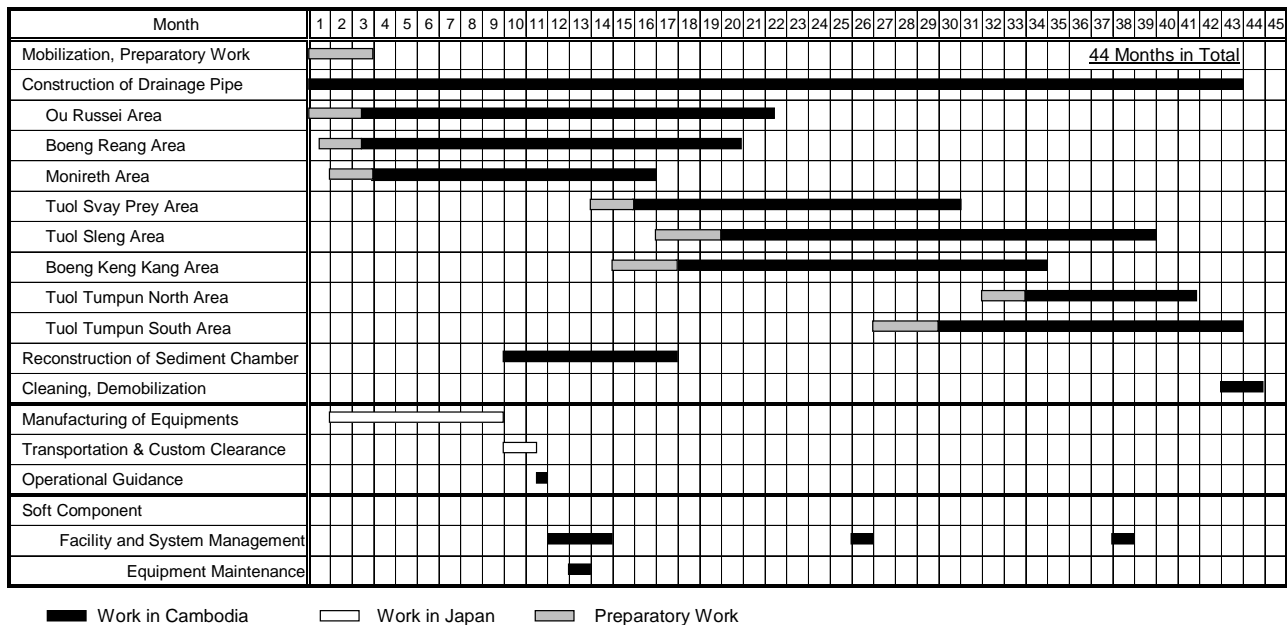
In Term-2, Expert-1 shall be dispatched a year after institution of the cleaning and maintenance work plan by DSD and the activity in Term-1 based on the plan. Expert-1 shall provide support on the review of the cleaning and maintenance work plan instituted in Term-1 in consideration of the comparison between the planning and actual implementation of the cleaning and maintenance work, and actual problems encountered through the activity in the first year. Expert-1 shall also provide support on the modification of the drainage network diagram, drainage network ledger and each manual composed basically in Term-1 in consideration of the actual circumstances of daily activities.

The results of activities in Cambodia shall be submitted by Expert-1 and Expert-2 to the JICA office and DPWT.

In Term-3, Expert-1 shall be dispatched a year after the second dispatch in Term-2 to evaluate the activity state based on the cleaning and maintenance work plan modified in Term-2, and provide support on the establishment of a sustainable cleaning and maintenance work plan. As in Term-2, Expert-1 shall provide support on the review of the cleaning and maintenance work plan and the modification of each management document composed by DSD in consideration of actual circumstances.

Expert-1 has to report to regarding the contents of the activities and the final results shall be submitted by him to the JICA office and DPWT after completion of all activities in Cambodia.

The implementation schedule of the Soft Component Plan is shown in Fig. 7.1.



**Fig. 7.1 Implementation Schedule of the Soft Component Plan**

## **8. OUTPUT OF ACTIVITIES**

The activities of the technical guidance service shall be completed at the end of construction work of the Project; hence, the activities shall be implemented in parallel with the main construction work. Outputs of the activities shall be as follows:

[Term-1]

- Base map of drainage network diagram of Phnom Penh City and format of drainage network database (First Draft)
- Annual cleaning and maintenance work plan of drainage network (work schedule, deployment plan of equipment, output plan of cleaning work)
- Record forms of each cleaning work (daily record, weekly record, safety management record, bar-chart between planning and actual activity, etc.)
- Maintenance manual and check sheet for the procured equipment
- Cleaning work of the pilot activity based on the cleaning and maintenance work plan by DSD

[Term-2]

- Review of cleaning and maintenance work results in the first year and modified work plans based on the PDCA cycle
- Modified drainage network diagram and drainage network database

[Term-3]

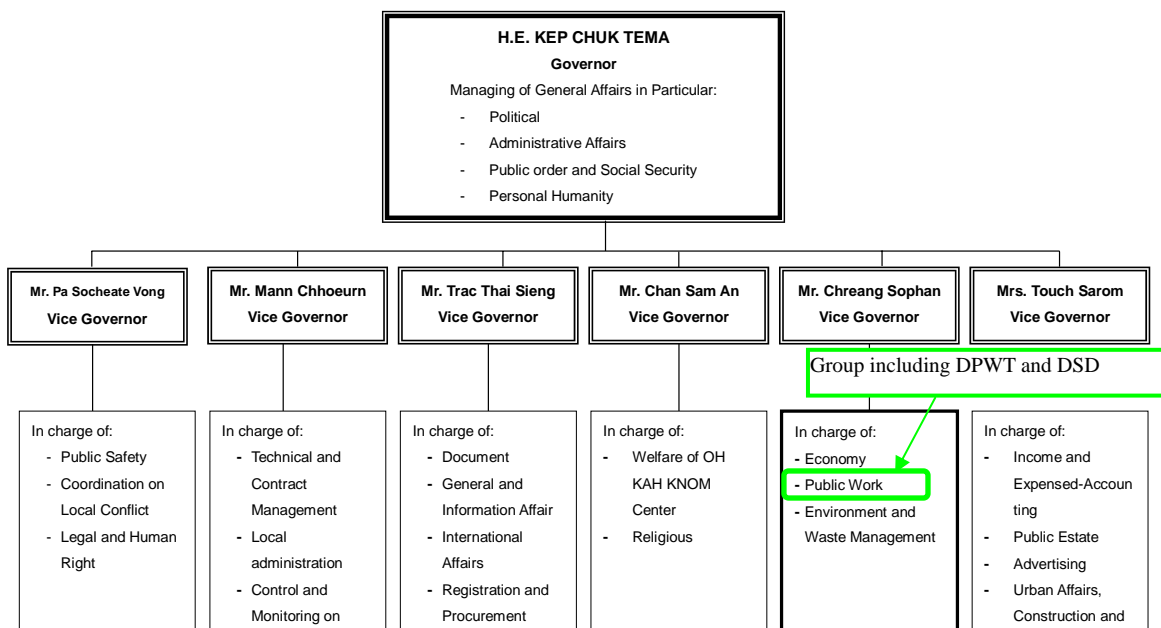
- Review of the cleaning and maintenance work results in the second year and the modified work plan based on PDCA cycle
- Modified drainage network diagram and drainage network ledger
- Proposal of future activity policy of DSD

## **9. RESPONSIBILITY OF CAMBODIAN SIDE**

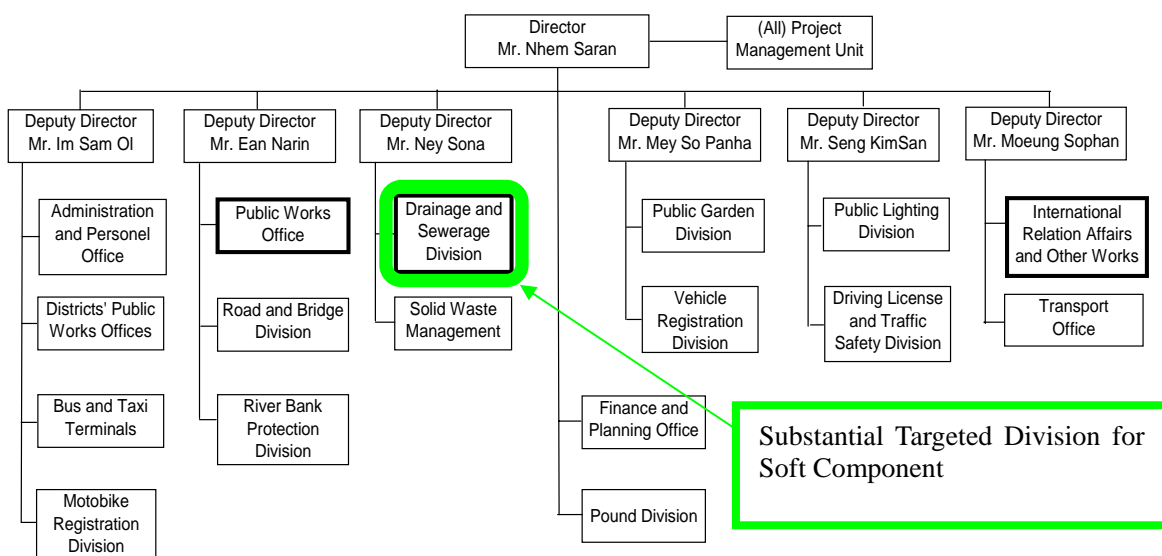
As the minimum requirement for the execution of technical guidance, DSD has to secure necessary budget to implement the adequate cleaning and maintenance work of drainage facilities. Hence, PPCH and DPWT shall also support to secure and implement the budget positively for the smooth implementation of the technical assistance.

The Soft Component activities provided by the Project are limited to initial preparation of the draft plans and procedures of the works (Term--1) and the review, evaluation and revision of their works and plans based on the actual cleaning and maintenance works by DSD, independently. Therefore, management and technical staffs of DSD who will attend and join the activities in the Soft Component Service will acquire knowledge and techniques on the drainage facilities management system in a proactive manner.

Attachment



**Organizational Chart of PPCH and Targeted Group of Soft Component**



**Organizational Chart of DPWT and Targeted Group of Soft Component**

**Table Summary of DSD Staff (Full-time Employees)**

Section	No. of Staff
1. Administration	6
2. Service	8
3. Manufacturing	12
4. Pumping Station	6
5. Technical	17
6. Total	49

Source : DPWT

Targeted Staffs for Soft Component

## Appendix 6. Result of Inundation Condition Survey

Questionnaire (English) (1/4)

### QUESTIONNAIRE FOR PUBLIC AWARENESS AND ENVIRONMENT & SANITARY CONDITION SURVEY RELATING TO FLOODING

No. \_\_\_\_\_

Date: \_\_\_\_\_

Interviewer name: \_\_\_\_\_

#### I. General Questions

1. Type of interviewee: \_\_\_\_\_

- 1 Housewife
- 2 The master
- 3 Children
- 4 Other house member
- 5 Housekeeper (servant)
- 6 Others (please specify): \_\_\_\_\_

2. Address: \_\_\_\_\_  
\_\_\_\_\_

3. Employment of the master: \_\_\_\_\_

- 1 Primary industry (agriculture & mining)
- 2 Secondary industry (manufacturing)
- 3 Tertiary industry (service oriented profession)
- 4 Pensioner (retired)
- 5 Unemployed
- 6 Others (please specify): \_\_\_\_\_
- 7 I don't know

4. Number of persons staying in the house: \_\_\_\_\_

5. Number of dwelling years at this place: \_\_\_\_\_

- 1 Less than 5 years
- 2 5 – 9 years
- 3 10 – 19 years
- 4 20 years or more
- 5 I don't know

6. What type of your dwelling: \_\_\_\_\_

- 1 Own house
- 2 Rental
- 3 I don't know

7. If "Question No.6 answer 2 Rental", how much is your house rent? : \_\_\_\_\_ US\$/month

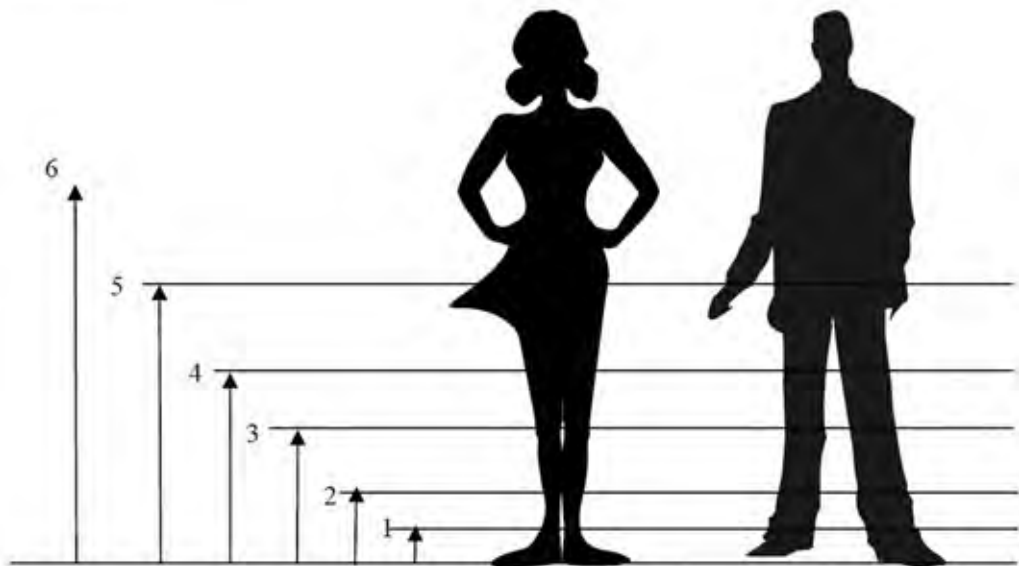
8. Total **expenditure** of your house per month: \_\_\_\_\_
- 1 Less than 100 US\$/month
  - 2 101 – 200 US\$/month
  - 3 201 – 500 US\$/month
  - 4 501 – 1000 US\$/month
  - 5 1001 – 2000 US\$/month
  - 6 More than 2001 US\$/month
  - 7 I don't know

**II. Questions on Inundation Situation**

9. Have you ever had experience in flooding in front of your house? : \_\_\_\_\_
- 1 Yes
  - 2 No
  - 3 I don't know

10. If "Question No.9 answer Yes", how often do you have the flooding? : \_\_\_\_\_
- 1 Once a year
  - 2 2 – 3 times a year
  - 3 More than 4 times a year
  - 4 Once in 2 – 3 years
  - 5 Others (please specify): \_\_\_\_\_
  - 6 I don't know

11. If "Question No.9 answer Yes", how deep was the flooding? : \_\_\_\_\_
- 1 Up to your ankle
  - 2 Up to your shin
  - 3 Up to your knee
  - 4 Up to your thigh
  - 5 Up to your waist
  - 6 Higher than waist
  - 7 I don't know



12. If "Question No.9 answer Yes", how long was the flooding? : \_\_\_\_\_

- 1 Less than 30 minutes
- 2 30 min. to 1 hour
- 3 2 – 3 hours
- 4 Around 4 – 6 hours
- 5 Almost half day
- 6 1 day
- 7 More than 1 day
- 8 I don't know

### **III. Questions on Sanitary Condition**

13. Do you have any trouble after flooding? : \_\_\_\_\_

- 1 Yes
- 2 No

14. If "Question No.13 answer Yes", what kind of trouble did you have due to the flooding? : \_\_\_\_\_

- 1 Cannot go out for business or shopping
- 2 Cannot open for business
- 3 Soil the furniture, merchandize or inside the house
- 4 Smell the house
- 5 Others (please specify): \_\_\_\_\_
- 6 I don't know

15. How do you dispose of your nightsoil? : \_\_\_\_\_

- 1 No treatment (defecate in your backyard)
- 2 Septic tank
- 3 Flowing to a drainage pipe
- 4 Others (please specify): \_\_\_\_\_
- 5 I don't know

16. Have you and your family ever had the following disease after flooding?

(multiple answer acceptable):

- |                  |         |        |                            |
|------------------|---------|--------|----------------------------|
| 1 Skin disease   | Yes ( ) | No ( ) | please tick in the bracket |
| 2 Flu            | Yes ( ) | No ( ) | -ditto-                    |
| 3 Food poisoning | Yes ( ) | No ( ) | -ditto-                    |
| 4 Diarrhea       | Yes ( ) | No ( ) | -ditto-                    |
| 5 Typhoid        | Yes ( ) | No ( ) | -ditto-                    |
| 6 Dysentery      | Yes ( ) | No ( ) | -ditto-                    |
| 7 I don't know   |         |        |                            |

### **IV. Others**

17. Do you agree that the road in front of your house and drainage condition will be improved? : \_\_\_\_\_

- 1 Yes
- 2 No
- 3 I don't know



18. If "Question No.17 answer Yes", do you still agree that the improvement requires construction work in front of your house? : \_\_\_\_\_
- 1 Yes
  - 2 No
  - 3 I don't know
19. If "Question No.17 answer Yes", what kind of benefits do you expect the road and drainage improvement in front of your house? : \_\_\_\_\_ (multiple answer acceptable)
- 1 Better sanitary condition (including outbreak of insects, water-borne disease, etc.)
  - 2 Better environmental condition (air, dust, odor, etc.)
  - 3 Better traffic condition
  - 4 Better business condition
  - 5 Others (please specify)
  - 6 I don't know
20. If "Question No.17 answer No", why do not you agree the improvement in front of your house? : \_\_\_\_\_ (multiple answer acceptable)
- 1 Do not feel the necessity
  - 2 Do not like noise, vibration, dust and so on resulting from the construction work
  - 3 Do not want to interfere with my business
  - 4 Others (please specify): \_\_\_\_\_
  - 5 I don't know
21. Previous land use (if applicable): Do you know (heard) the history of this home land in 30 or 50 year ago?
- Yes or Yes I know some, previously this area is:
- 1 the lake, name
  - 2 the pond, name
  - 3 the wetland, name
  - 4 the Canal/ River, name
  - 5 the paddy field
22. Why you don't know?
- 1 I just live here
  - 2 I am not remember
  - 3 I have no idea

(End of Questions)

**បញ្ជីសំណួរសំរាប់ស្រាវជ្រាវលក្ខខណ្ឌបរិស្ថាន និងម៉ែនស៊ីសសាធារណៈ  
ទាក់ទងនឹងការពិបាកជំងឺកម្រិតខ្ពស់**

លេខ. . . . .

ថ្ងៃទី \_\_\_\_\_ ខែ \_\_\_\_\_ ឆ្នាំ ២០០៦

ឈ្មោះអ្នកផ្តល់បទសំភាសន៍ . . . . .

**ក. ព័ត៌មានទូទៅ**

១- ប្រភេទនៃអ្នកធ្វើសំភាសន៍

- ១.១ ភរិយា
- ១.២ មេត្រីសារ
- ១.៣ កូន
- ១.៤ សមាជិកគ្រួសារផ្សេងទៀត
- ១.៥ អ្នកបំរើ
- ១.៦ ផ្សេងៗទៀត (សូមបញ្ជាក់) . . . . .

២- អាស័យដ្ឋាន ផ្ទះលេខ . . . . . ផ្លូវ . . . . . សង្កាត់ . . . . .  
ទូរស័ព្ទទាក់ទងលេខ . . . . .

៣- មុខរបរ របស់ មេត្រីសារ

- ៣.១ ឧស្សាហកម្មដំបូង (កសិកម្មនិងវិវ)
- ៣.២ ឧស្សាហកម្មទី២ (ផលិតឧស្សាហកម្ម)
- ៣.៣ ឧស្សាហកម្ម ទី៣ (សេវាបំរើមុខរបរ)
- ៣.៤ ចូលនិវត្តន៍
- ៣.៥ គ្មានមុខរបរ

- ៣.៦ ផ្សេងៗទៀត (សូមបញ្ជាក់) . . . . .
- . . . . .
- ៣.៧ ខ្ញុំមិនដឹង

៤- ចំនួនមនុស្សស្នាក់ នៅ . . . . .

៥- ចំនួនឆ្នាំដែលបានស្នាក់ នៅទីនេះ :

- ៥.១ ក្រោម ៥ ឆ្នាំ
- ៥.២ ពី ៥ ដល់ ៩ ឆ្នាំ
- ៥.៣ ពី ១០ ដល់ ១៩ ឆ្នាំ
- ៥.៤ ពី ២០ ឆ្នាំឡើង
- ៥.៥ ខ្ញុំមិនដឹង

៦- លំនៅដ្ឋានស្នាក់នៅជាប្រភេទអ្វី ?

- ៦.១ កម្មសិទ្ធិផ្ទាល់
- ៦.២ ជួលគេ
- ៦.៣ ខ្ញុំមិនដឹង

៧- ប្រសិនបើជាជួលជួលគេ តើល្បួលជួនមួយខែប៉ុន្មាន ? . . . . . \$US ក្នុងមួយខែ



៨- ការចំណាយក្នុងផ្ទះ សរុបប្រចាំខែ(ជាមធ្យម)

- ៨.១ តិចជាង ១០០ \$US ក្នុងមួយខែ
- ៨.២ ពី ១០១-២០០ \$US ក្នុងមួយខែ
- ៨.៣ ពី ២០១-៥០០ \$US ក្នុងមួយខែ
- ៨.៤ ពី ៥០១-១០០០ \$US ក្នុងមួយខែ

- ៨.៥ ពី ១០០១-២០០០ \$US ក្នុងមួយខែ
- ៨.៦ លើសពី ២០០១ \$US ក្នុងមួយខែ
- ៨.៧ ខ្ញុំមិនដឹង

**១- ព័ត៌មានអំពីស្ថានភាពលិចលង់**

៩- អ្នកធ្លាប់( ពិសោធ-ឃើញ) ភាពលិចលង់នៅខាងមុខផ្ទះ ឬទេ ?

- ៩.១ បាទ ឬចាសធ្លាប់
- ៩.២ មិនដែល
- ៩.៣ ខ្ញុំមិនដឹង

១០- បើលោកអ្នក ឆ្លើយថាធ្លាប់ តើពេលណា ប៉ុន្មានដង ? :

- ១០.១ មួយដង ក្នុងមួយឆ្នាំ
- ១០.២ ២-៣ ដង ក្នុងមួយឆ្នាំ
- ១០.៣ លើសពី ៤ដង ក្នុងមួយឆ្នាំ
- ១០.៤ ២-៣ ឆ្នាំ ម្តងម្កង

- ១០.៥ ផ្សេងៗទៀត(សូមបញ្ជាក់)
- .....
- ១០.៦ ខ្ញុំមិនដឹង

១១- ក្នុងរយៈកាលលិចលង់ តើមានជម្រៅប៉ុន្មាន ? :

- ១១.១ ត្រឹម ៣ ជើង
- ១១.២ ត្រឹម ស្ទង់ជើង
- ១១.៣ ត្រឹម ជង្គង់
- ១១.៤ ត្រឹម ក្បៅ
- ១១.៥ ត្រឹម ចង្កេះ
- ១១.៥ លើសពីចង្កេះ
- ១១.៦ ខ្ញុំមិនដឹង



១២- តើការលិចលង់នោះ មានរយៈពេលប៉ុន្មាន ?

- ១២.១ តិចជាងកន្លះម៉ោង
- ១២.២ កន្លះម៉ោងទៅ ០១ ម៉ោង
- ១២.៣ ២-៣ ម៉ោង
- ១២.៤ ប្រមាណ ៤-៦ ម៉ោង
- ១២.៥ ជិតកន្លះថ្ងៃ
- ១២.៦ ០១ ថ្ងៃ
- ១២.៧ លើសពី ០១ ថ្ងៃ
- ១២.៨ ខ្ញុំមិនដឹង

**គ. ព័ត៌មានអំពី លក្ខខណ្ឌ អនាម័យ បរិស្ថាន**

១៣- តើលោកអ្នកមានបញ្ហា ទេ បន្ទាប់ពីការលិចលង់ ?

- មានបញ្ហា
- គ្មានបញ្ហាទេ

១៤- បើមានបញ្ហា តើជាបញ្ហាអ្វី ដែលកើតមានឡើងក្នុងរយៈពេលលិចលង់ ?

- ១៤.១ មិនអាចចេញក្រៅដើម្បីប្រកបមុខរបរ ឬ ទៅផ្សារ
- ១៤.២ មិនអាចបើកទ្វារ ប្រកបមុខរបរ
- ១៤.៣ ធ្វើអោយប្រឡាក់គ្រឿងសង្ហារឹម ទំនិញ ឬក្នុងផ្ទះ
- ១៤.៤ មានក្លិនអាក្រក់ក្នុងផ្ទះ
- ១៤.៥ ផ្សេងៗទៀត ( សូមបញ្ជាក់) . . . . .
- ១៤.៦ ខ្ញុំមិនដឹង

១៥- តើការបង្ហាញរបស់ គ្រួសារលោកអ្នកយ៉ាងម៉េចដែរ ?

- ១៥.១ គ្មានការដោះស្រាយ (បត់ដឹងនៅព្រៃក្រោយផ្ទះ)
- ១៥.២ មានបង្គំអនាម័យប្រកបដោយ អាងចំរោះសិបទឹក
- ១៥.៣ មានបង្គំ បញ្ចេញផ្ទាល់ទៅក្នុងប្រព័ន្ធសុខាភិបាល
- ១៥.៤ ផ្សេងៗទៀត ( សូមបញ្ជាក់) . . . . .
- ១៥.៥ ខ្ញុំមិនដឹង

១៦- តើលោកអ្នកឬគ្រួសារអ្នកធ្លាប់ជួបប្រទះជម្ងឺ ក្នុងឬក្រោយពេលលិចលង់ឬទេ ? ( អាចមានច្រើនឬមួយប្រភេទ)

- |      |              |                                 |                                    |
|------|--------------|---------------------------------|------------------------------------|
| ១៦.១ | រោគសើរស្បែក  | ធ្លាប់ <input type="checkbox"/> | មិនធ្លាប់ <input type="checkbox"/> |
| ១៦.២ | ផ្តាសាយ      | ធ្លាប់ <input type="checkbox"/> | មិនធ្លាប់ <input type="checkbox"/> |
| ១៦.៣ | ពុលចំណីអាហារ | ធ្លាប់ <input type="checkbox"/> | មិនធ្លាប់ <input type="checkbox"/> |
| ១៦.៤ | រាក រុះ      | ធ្លាប់ <input type="checkbox"/> | មិនធ្លាប់ <input type="checkbox"/> |
| ១៦.៥ | គ្រុនពោះវៀន  | ធ្លាប់ <input type="checkbox"/> | មិនធ្លាប់ <input type="checkbox"/> |
| ១៦.៦ | រាកមូល       | ធ្លាប់ <input type="checkbox"/> | មិនធ្លាប់ <input type="checkbox"/> |
| ១៦.៧ | ខ្ញុំមិនដឹង  |                                 |                                    |

**ឃ. ព័ត៌មានផ្សេងៗទៀត**

១៧- តើលោកអ្នកយល់ស្របថា ផ្លូវ និងប្រព័ន្ធបង្ហូរទឹក ខាងមុខផ្ទះលោកអ្នក ត្រូវធ្វើអោយប្រសើរឡើងឬទេ ?

- ១៧.១ ខ្ញុំយល់ស្រប
- ១៧.២ ខ្ញុំមិនយល់ស្រប
- ១៧.៣ ខ្ញុំមិនដឹង

១៨- ប្រសិនបើលោកអ្នកយល់ស្រប(១៧) តើលោកអ្នកនៅតែគាំទ្រថា ការធ្វើអោយប្រសើរឡើង ត្រូវតែធ្វើការងារសំណង់ ខាងមុខជូនលោកអ្នកមែនឬ ?

១៨.១ ខ្ញុំយល់ស្រប

១៨.២ ខ្ញុំមិនយល់ស្រប

១៨.៣ ខ្ញុំមិនដឹង

១៩- ប្រសិនបើ(១៧)ឆ្លើយថា យល់ស្រប : តើផលប្រយោជន៍អ្វីខ្លះដែលលោកអ្នកសង្ឃឹមទុក អំពីការធ្វើអោយប្រសើរឡើងប្រព័ន្ធបង្ការទឹក និងជួរជួរនៅមុខជូនលោកអ្នក ? ( អាចមានចម្លើយច្រើនឬមួយប្រភេទ)

១៩.១ ប្រសើរ លើផ្នែកអនាម័យ (រោគស្នង សត្វល្អិត...)

១៩.២ ប្រសើរ លើផ្នែកបរិស្ថាន (ក្លិន គុណភាពខ្យល់ ចូលី . . .)

១៩.៣ ប្រសើរ លើផ្នែកចរាចរ

១៩.៤ ប្រសើរ លើមុខរបររកស៊ី

១៩.៥ ផ្សេងៗទៀត (សូមបញ្ជាក់) . . . . .

១៩.៦ ខ្ញុំមិនដឹង

២០- ប្រសិនបើ(១៧)ឆ្លើយថា ទេ : ហេតុអ្វីបានជាលោកអ្នក មិនយល់ស្របលើការធ្វើអោយប្រសើរឡើងនៅមុខជូនលោកអ្នក ? ( អាចមានចម្លើយច្រើនឬមួយប្រភេទ)

២០.១ ហាក់ដូចជាមិនចាំបាច់

២០.២ មិនចូលចិត្តឱ្យមានការរំខានដោយសំលេង ឬដោយរំញ័រ និងចូលី ចេញពីការងារសំណង់នៅមុខជូន

២០.៣ មិនចង់អោយរំខានមុខរបរខ្ញុំ

២០.៤ ផ្សេងៗទៀត (សូមបញ្ជាក់) . . . . .

២០.៥ ខ្ញុំមិនដឹង

សូមអរគុណចំពោះការចូលរួមផ្តល់ព័ត៌មានខាងលើ

សំភាសន៍ដោយ លោក :

ហត្ថលេខា

Table 6.1 Result of Stage I Survey (1/6)

No.	Sangkat (Representative)	Result of Interview Survey	Improvement Planning
1	<i>Boeng Trabaek</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 484-99                      10                      a little	
		<b>Total=                      10</b>	
		<b>No Drainage Pipe</b>	
		None	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
None			
2	<i>Tonle Basak</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		41                      800                      Mediem	
		Junction 3-294                      50                      Mediem	
		3                      40                      Mediem	
		41                      100                      Mediem	
		93                      300                      Mediem	
		466                      200                      Mediem	
		<b>Total=                      1,490</b>	
		<b>No Drainage Pipe</b>	
		93                      500	
		93                      200	
		<b>Total=                      700</b>	
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
63                      500			
<b>Total=                      500</b>			
3	<i>Tuol Tumpung 2</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		163                      200                      M	
		432                      100                      L	
		444                      50                      L	
		<b>Total=                      350</b>	
		<b>No Drainage Pipe</b>	
		163                      40	
<b>Total=                      40</b>			
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
None			
4	<i>Phsar Daeum Thkov</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		488                      60                      M	
		<b>Total=                      60</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
488                      900			
<b>Total=                      900</b>			
5	<i>Boeng Keng Kang 1</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		63                      150                      M	
		51                      100                      L	
		93                      200                      L	
		<b>Total=                      450</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
-			
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
334                      330			
<b>Total=                      330</b>			

Table 6.2 Result of Stage I Survey (2/6)

No.	Sangkat (Representative)	Result of Interview Survey	Improvement Planning
6	<i>Tumnob Tuek</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		195                    200                    M	
		193                    200                    M	
		434                    200                    M	
		<b>Total=            600</b>	
		<b>No Drainage Pipe</b>	
		434                    210	
		<b>Total=            210</b>	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
187Z                    220			
430Z                    300			
<b>Total=            520</b>			
7	<i>Boeng Keng Kang 3</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 143-310    50                    I	
		<b>Total=            50</b>	
		<b>No Drainage Pipe</b>	
		None	
		<b>High Priority Area for Improvement</b>	
		Name of Road    Length (m)	
		143                    470	
		95                    770	
245                    860			
310                    810			
<b>Total=            2,910</b>			
8	<i>Oulampik</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		274                    440                    H	
		143                    550                    H	
		286                    150                    H	
		298                    200                    M	
		173                    60                    M	
		<b>Total=            1,400</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
163                    550			
<b>Total=            550</b>			
<b>High Priority Area for Improvement</b>			
None			
9	<i>Tuol Svay Prey 1</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		245                    130                    H	
		348                    20                    M	
		366                    20                    M	
		374                    20                    M	
		<b>Total=            190</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		384                    120	
374                    120			
<b>Total=            240</b>			
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
384                    320			
374                    100			
384                    100			
<b>Total=            520</b>			

Table 6.3 Result of Stage I Survey (3/6)

No.	Sangkat (Representative)	Result of Interview Survey	Improvement Planning
10	<i>Tuol Svay Prey 2</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		217                      500                      M	
		199                      500                      M	
		245                      500                      M	
		<b>Total=                1,500</b>	
		<b>No Drainage Pipe</b>	
		None	
		<b>High Priority Area for Improvement</b>	
		384                      200	
374                      200			
338                      200			
<b>Total=                600</b>			
11	<i>Chey Chummeah</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		184,172                150                      L	
		13,19,3                                             H	
		154                                                   M	
		<b>Total=                150</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
13                      99			
23                      108			
240                      88			
<b>Total=                295</b>			
12	<i>Phsar Kandal 1</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		130                      200                      H	
		136,144                200                      H	
		15                      300                      L	
		<b>Total=                700</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
Junction 136-19      197			
19			
<b>Total=                197</b>			
13	<i>Phsar Chas</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		13                                                   L	
		15                                                   L	
		<b>Total=                0</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		110                      150	
		<b>Total=                150</b>	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
Junction 130-15			
15			
<b>Total=                0</b>			



Table 6.5 Result of Stage I Survey (5/6)

No.	Sangkat (Representative)	Result of Interview Survey	Improvement Planning
19	<i>Veal Vong</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 215-182	H
		161	H
		Junction 211-182	H
		<b>Total= 0</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		134 and 164	
		109	
<b>Total= 0</b>			
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
215			
<b>Total= 0</b>			
20	<i>Boeng Prolit</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 113-274	M
		214 to 161	M
		<b>Total= 0</b>	
		<b>No Drainage Pipe</b>	
		None	
		<b>High Priority Area for Improvement</b>	
		Name of Road    Length (m)	
		None	
21	<i>Ou Russei 4</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 107-182	H
		Junction 166-109	M
		<b>Total= 0</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
		<b>High Priority Area for Improvement</b>	
		Name of Road    Length (m)	
None			
22	<i>Ou Russei 1</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 107-182	100    H
		182	100    M
		Junction 182-11	M
		<b>Total= 200</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
None			
23	<i>Ou Russei 3</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		217	H
		164 to 109	M
		Junction 109-217	M
		166	M
		<b>Total= 0</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
None			



Table 6.6 Result of Stage I Survey (6/6)

No.	Sangkat (Representative)	Result of Interview Survey	Improvement Planning
24	<i>Monourom</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 107-217	M
		Junction 107-140	M
		164	M
		<b>Total=            0</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
None			
25	<i>Ou Russei 2</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		Junction 217-161	H
		Junction 182-141	M
		Junction 164-139	M
		166	M
		<b>Total=            0</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
None			
26	<i>Boeng Keng Kang 2</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		143                    500                    M	
		288                    200                    M	
		292                    200                    M	
		300                    70                     M	
		304                    200                    M	
		276                    200                    M	
		103                    200                    M	
		<b>Total=            1,570</b>	
<b>No Drainage Pipe</b>			
Name of Road    Length (m)			
None			
<b>High Priority Area for Improvement</b>			
Name of Road    Length (m)			
95                    20			
<b>Total=            20</b>			
27	<i>Tuol Tumpang 1</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		None	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
		<b>High Priority Area for Improvement</b>	
		Name of Road    Length (m)	
		155                    239	
		<b>Total=            239</b>	
28	<i>Phsar Kandal 2</i>	<b>Location and Situation</b>	Name of Road    Length (m)
		Name of Road    Length (m)    Inundation Level	
		130                    200                    H	
		136,144              200                    L	
		15                    300                    1	
		<b>Total=            700</b>	
		<b>No Drainage Pipe</b>	
		Name of Road    Length (m)	
		None	
		<b>High Priority Area for Improvement</b>	
Name of Road    Length (m)			
136-19              197			
19			
<b>Total=            197</b>			

Note: (1) The words and values in parentheses are data described in drawings attached to interview survey sheets.

The definitive values are determined by Study Team after careful checking.

(2) The locations and values followed by "(-)" are inundation area identified by Study Team.























Table 6.13 Result of Inundation Condition Survey (Inundation Condition of Each Road)

Area (Area : Street Name)	Question 9 Have you ever had experience in flooding in front of your house?			Question 10 If "Question No.9 answer Yes", how often do you have the flooding?							Question 11 If "Question No.9 answer Yes", how deep was the flooding?							Question 12 If "Question No.9 answer Yes", how long was the flooding?										
	1.Yes	2.No	Total	1.Once a year	2.2-3 times a year	3.More than 4 times a year	4.Once in 2-5 years	5.Others	6.I don't know	Total	1.Up to ankle	2.Up to shin	3.Up to knee	4.Up to thigh	5.Up to waist	6.Higher than waist	7.I don't know	Total	1.Less than 30 min.	2.30 min. to 1 hour	3.2-3 hours	4.Around 4-6 hours	5.Almost half day	6.1 day	7.More than 1 day	8.I don't know	Total	
	Phsar Thmei South : Wat. Phnom	6	0	6	0	0	6	0	0	0	6	0	0	1	5	0	0	0	6	0	0	1	5	0	0	0	0	0
Phsar Thmei South : 13	10	0	10	0	0	10	0	0	0	10	0	0	3	4	3	0	0	10	0	0	1	5	3	0	1	0	0	10
Phsar Thmei South : 15	6	0	6	0	0	6	0	0	0	6	0	0	3	0	0	0	0	6	0	0	1	5	0	0	0	0	0	6
Phsar Thmei South : 19	12	0	12	0	0	12	0	0	0	12	0	0	3	1	0	0	0	12	0	0	8	4	0	0	0	0	0	12
Phsar Thmei South : 63-1	4	0	4	0	0	4	0	0	0	4	0	0	2	0	0	0	0	4	0	0	2	2	0	0	0	0	0	4
Phsar Thmei South : 154	10	0	10	0	0	10	0	0	0	10	0	0	5	2	0	0	0	10	0	0	1	3	4	2	0	0	0	10
Phsar Thmei South : 214	2	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2
Phsar Thmei South : 240-3	4	0	4	0	0	4	0	0	0	4	0	0	1	2	0	0	0	4	0	0	1	3	0	0	0	0	0	4
Ou Russei : 107 (128-217)	6	0	6	0	0	6	0	0	0	6	0	0	1	5	0	0	0	6	0	0	1	5	0	0	0	0	0	6
Ou Russei : 107 (170-182)	4	0	4	0	0	4	0	0	0	4	0	0	3	0	0	0	0	4	0	0	3	1	0	0	0	0	0	4
Ou Russei : 109	6	0	6	0	0	6	0	0	0	6	0	0	2	0	0	0	0	6	0	0	2	1	0	0	0	0	0	6
Ou Russei : 111	2	0	2	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
Ou Russei : 139	4	0	4	0	0	4	0	0	0	4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4
Ou Russei : 141	4	0	4	0	0	4	0	0	0	4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4
Ou Russei : 161	4	0	4	0	0	4	0	0	0	4	0	0	3	1	0	0	0	4	0	0	3	1	0	0	0	0	0	4
Ou Russei : 164	10	0	10	0	0	10	0	0	0	10	0	0	6	4	0	0	0	10	0	0	6	3	0	0	0	0	1	10
Ou Russei : 166	6	0	6	0	0	6	0	0	0	6	0	0	6	0	0	0	0	6	0	0	6	0	0	0	0	0	0	6
Ou Russei : 182	6	0	6	0	0	6	0	0	0	6	0	0	2	0	0	0	0	6	0	0	1	0	0	0	0	0	0	6
Ou Russei : 217	6	0	6	0	0	6	0	0	0	6	0	0	5	1	0	0	0	6	0	0	5	1	0	0	0	0	0	6
Boeung Reang : 51	2	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2
Boeung Reang : 59	4	0	4	0	0	4	0	0	0	4	0	0	4	2	0	0	0	4	0	0	3	1	0	0	0	0	0	4
Boeung Reang : 63-2	6	0	6	0	0	6	0	0	0	6	0	0	1	3	0	0	0	6	0	0	2	2	0	0	0	0	0	6
Boeung Reang : 184	4	0	4	0	0	4	0	0	0	4	0	0	2	0	0	0	0	4	0	0	2	0	0	0	0	0	0	4
Boeung Reang : 200	3	0	3	0	0	3	0	0	0	3	0	0	3	0	0	0	0	3	0	0	1	2	0	0	0	0	0	3
Boeung Reang : 208	4	0	4	0	0	4	0	0	0	4	0	0	2	0	0	0	0	4	0	0	1	2	0	0	0	0	0	4
Boeung Reang : 228	10	0	10	0	0	10	0	0	0	10	0	0	3	6	0	0	0	10	0	0	2	5	0	0	0	0	0	10
Olympic Stadium : 163-1	7	3	10	0	0	7	0	0	0	7	0	0	3	3	0	0	0	7	0	0	3	4	0	0	0	0	0	7
Olympic Stadium : 214	6	0	6	0	0	6	0	0	0	6	0	0	2	0	0	0	0	6	0	0	1	4	0	0	0	0	0	6
Olympic Stadium : 274	6	0	6	0	0	6	0	0	0	6	0	0	4	0	0	0	0	6	0	0	2	4	0	0	0	0	0	6
Olympic Stadium : 286-173	4	0	4	0	0	4	0	0	0	4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4
Olympic Stadium : 298	2	0	2	0	0	2	0	0	0	2	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2
Boeung Keng Kang East : 3 (Sotheareas)	2	2	4	0	0	2	0	1	0	2	0	0	2	0	0	0	0	2	0	0	1	0	0	1	0	0	0	2
Boeung Keng Kang East : 41-1	4	3	7	0	0	4	0	1	0	4	0	0	4	0	0	0	0	4	0	0	1	2	1	0	0	0	0	4
Boeung Keng Kang East : 294-3	4	0	4	0	0	4	0	0	0	4	0	0	2	0	0	0	0	4	0	0	1	2	0	0	0	0	0	4
Boeung Keng Kang East : 63	5	0	5	0	0	5	0	0	0	5	0	0	3	0	0	0	0	5	0	0	3	2	0	0	0	0	0	5
Boeung Keng Kang West : 95-1	2	2	4	0	0	2	0	0	0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2
Boeung Keng Kang West : 95-2	6	2	8	0	0	6	0	1	0	6	0	0	5	1	0	0	0	6	0	0	4	2	0	0	0	0	0	6
Boeung Keng Kang West : 113	6	0	6	0	0	6	0	0	0	6	0	0	5	1	0	0	0	6	0	0	5	1	0	0	0	0	0	6
Boeung Keng Kang West : 143	12	0	12	0	0	12	0	0	0	12	0	0	6	2	0	0	0	12	0	0	3	8	1	0	0	0	0	12
Boeung Keng Kang West : 163-2	8	0	8	0	0	8	0	0	0	8	0	0	3	0	0	0	0	8	0	0	2	1	2	0	0	0	0	8
Boeung Keng Kang West : 276	1	3	4	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
Boeung Keng Kang West : 288	4	0	4	0	0	4	0	0	0	4	0	0	2	0	0	0	0	4	0	0	2	2	0	0	0	0	0	4
Boeung Keng Kang West : 292	4	0	4	0	0	4	0	0	0	4	0	0	3	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4
Boeung Keng Kang West : 300	2	0	2	0	0	2	0	1	0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2
Boeung Keng Kang West : 304	4	0	4	0	0	4	0	0	0	4	0	0	3	1	0	0	0	4	0	0	1	1	1	0	0	0	0	4
Boeung Keng Kang West : 310	8	2	10	0	0	8	0	0	0	8	0	0	5	3	0	0	0	8	0	0	6	0	2	0	0	0	0	8
Tuol Svay Prey : 173	2	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2
Tuol Svay Prey : 185	4	0	4	0	0	4	0	0	0	4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4
Tuol Svay Prey : 193	4	0	4	0	0	4	0	0	0	4	0	0	4	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4
Tuol Svay Prey : 195	4	0	4	0	0	4	0	0	0	4	0	0	3	1	0	0	0	4	0	0	3	1	0	0	0	0	0	4
Tuol Svay Prey : 199	6	0	6	0	0	6	0	0	0	6	0	0	6	0	0	0	0	6	0	0	2	2	0	0	0	0	0	6
Tuol Svay Prey : 217	8	0	8	0	0	8	0	0	0	8	0	0	4	3	0	0	0	8	0	0	2	4	0	0	0	0	0	8
Tuol Svay Prey : 245-1	3	3	6	0	0	3	0	0	0	3	0	0	3	2	0	0	0	3	0	0	2	1	0	0	0	0	0	3
Tuol Svay Prey : 338	3	1	4	0	0	3	0	0	0	3	0	0	3	0	0	0	0	3	0	0	3</							





### Q.9 Have you ever had experience in flooding in front of your house?

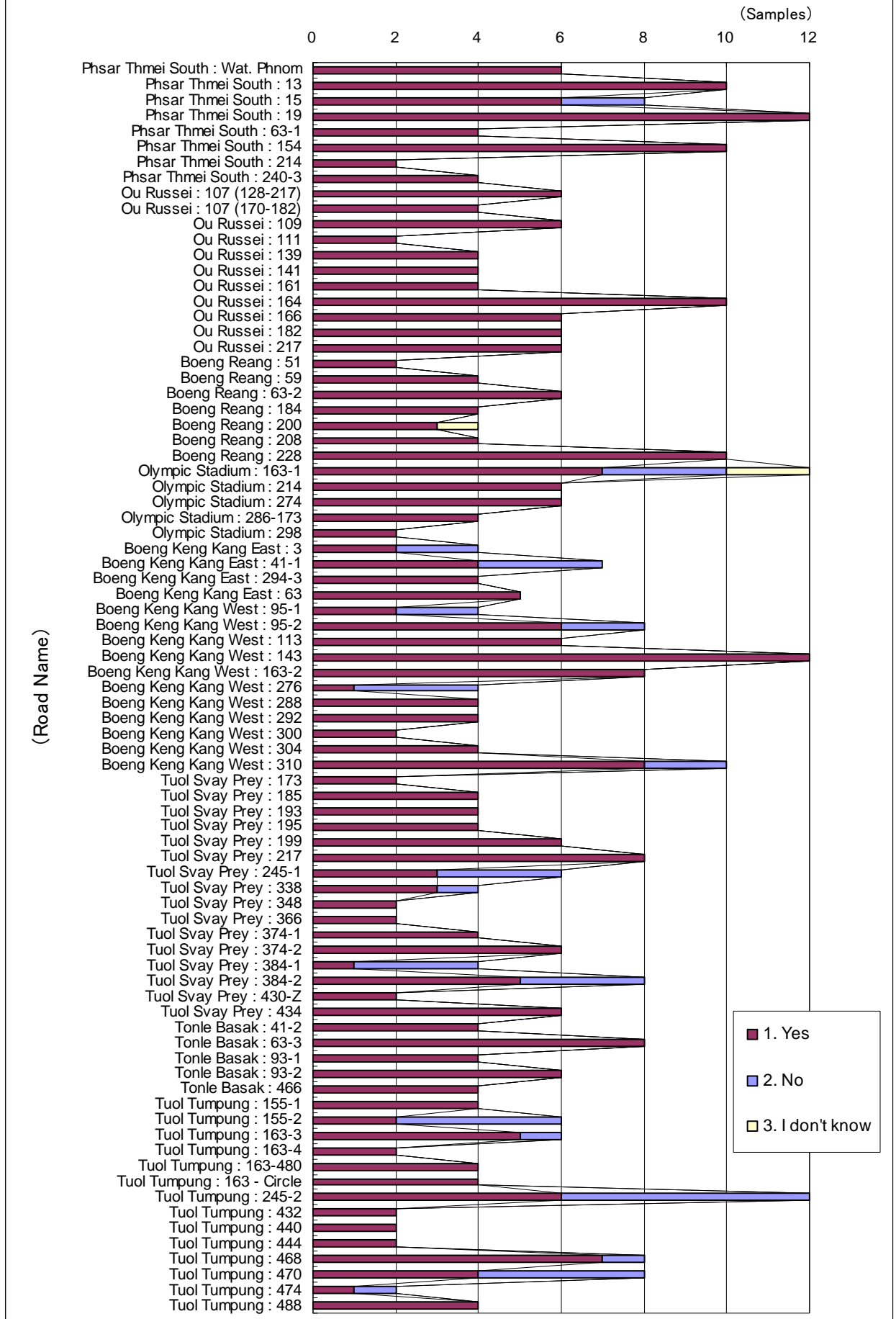


Figure 6.1 Experience of Inundation (Number of Samples)

### Q.9 Have you ever had experience in flooding in front of your house?

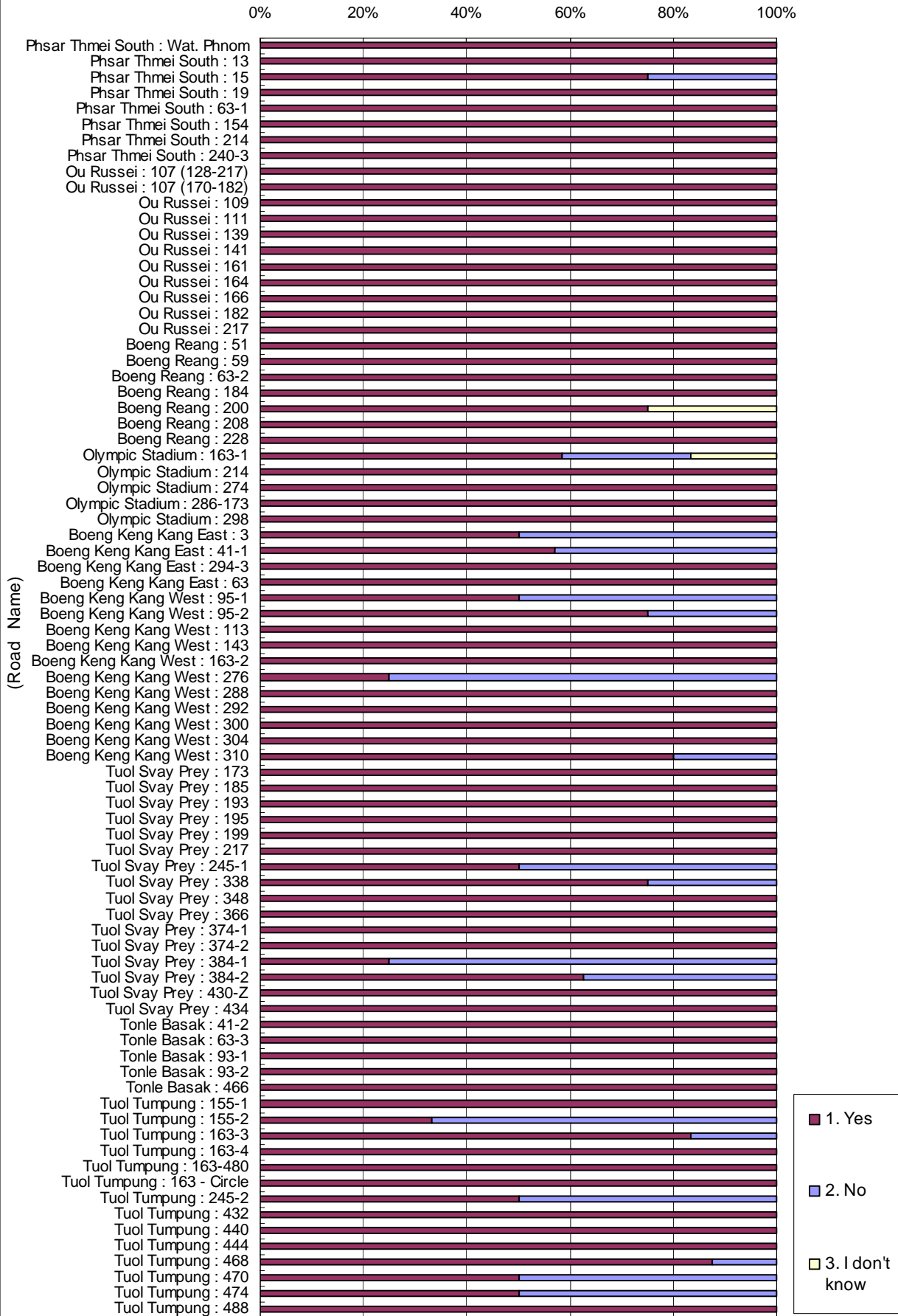


Figure 6.2 Experience of Inundation (Percentage)

**Q.10 If "Q.9 answer Yes", how often do you have the flooding?**

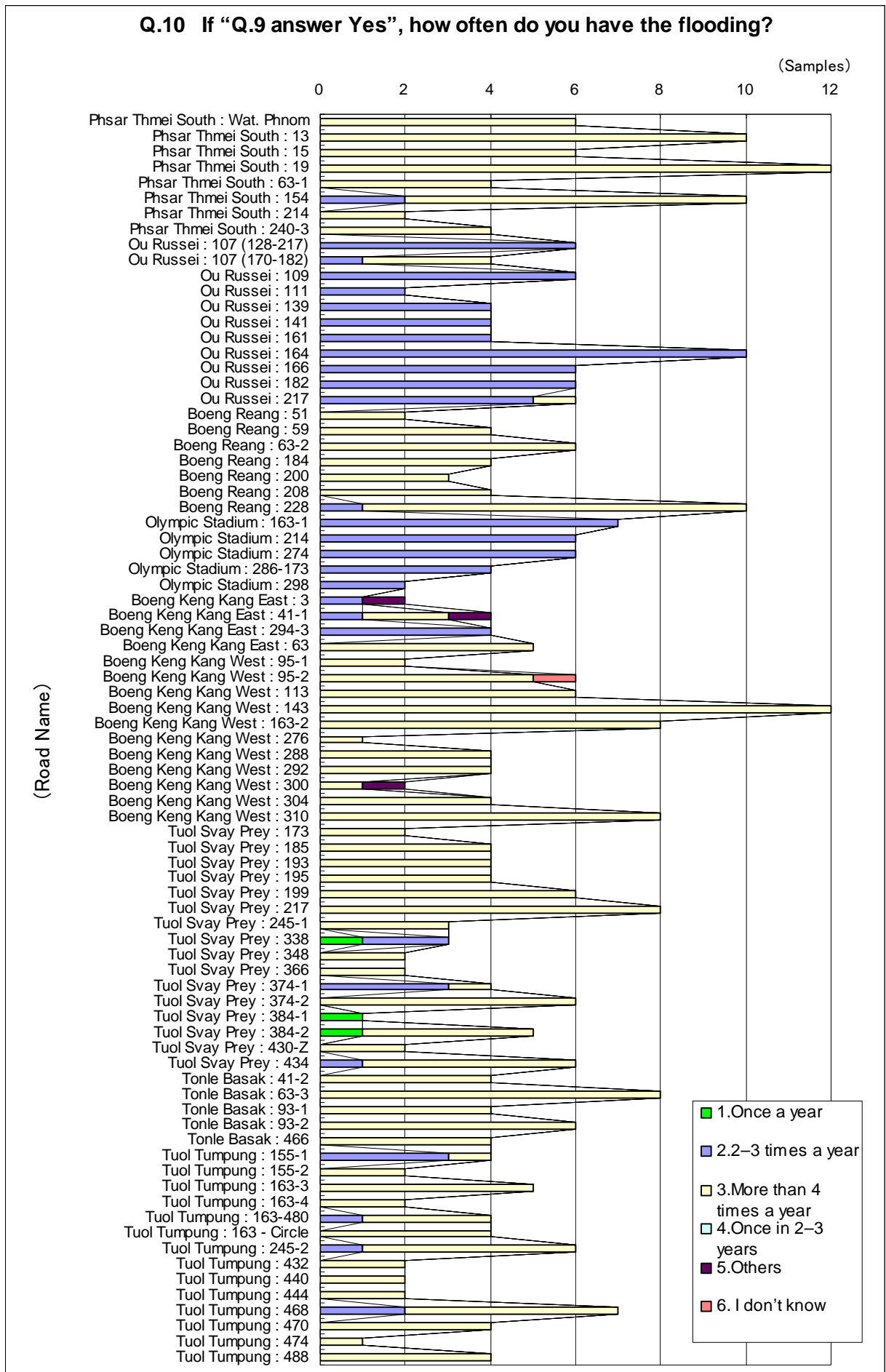


Figure 6.3 Inundation Occurrences (Number of Samples)

**Q.10 If "Q.9 answer Yes", how often do you have the flooding?**

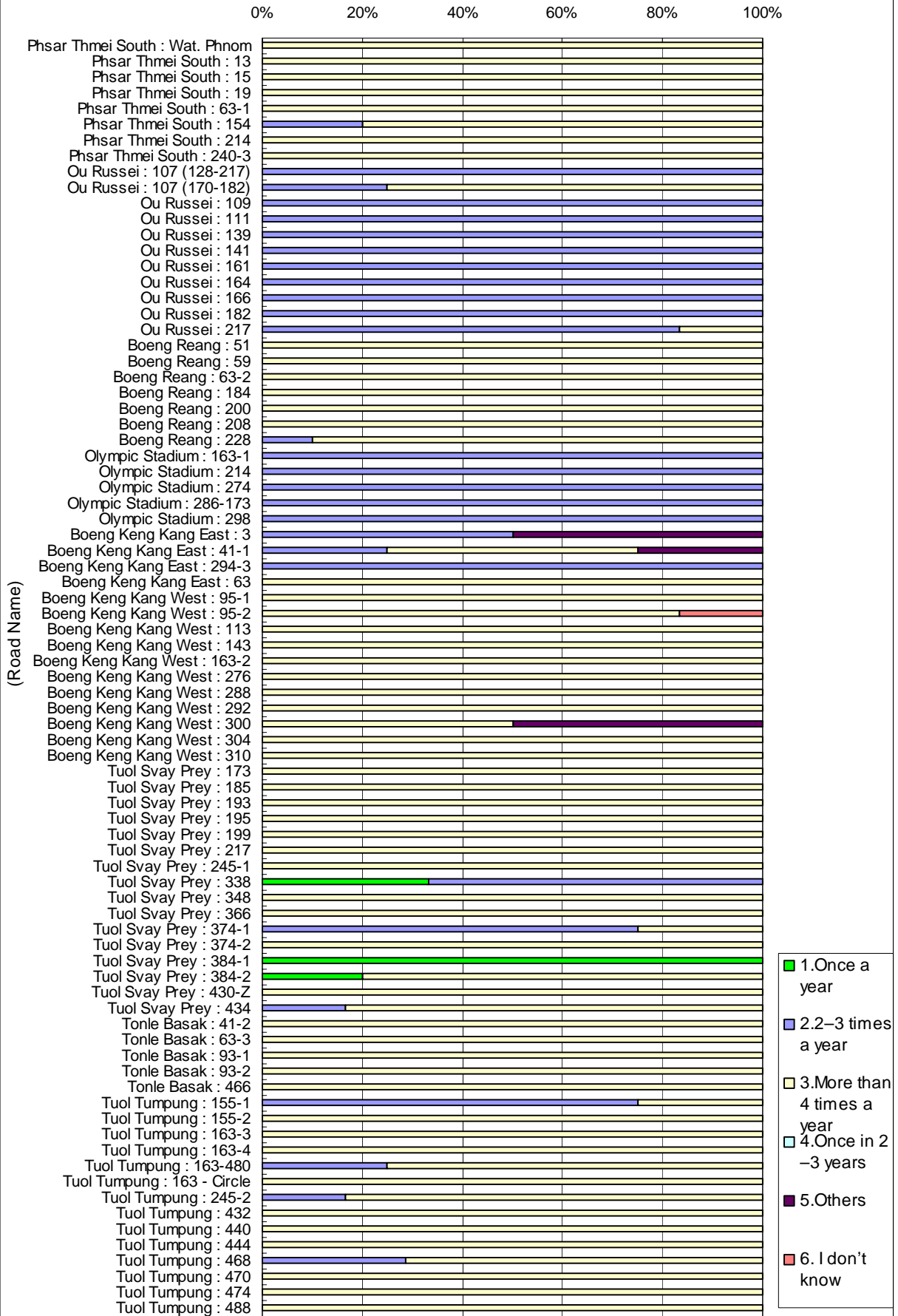


Figure 6.4 Inundation Occurrences (Percentage)

**Q.11 If “Q.9 answer Yes”, how deep was the flooding?**

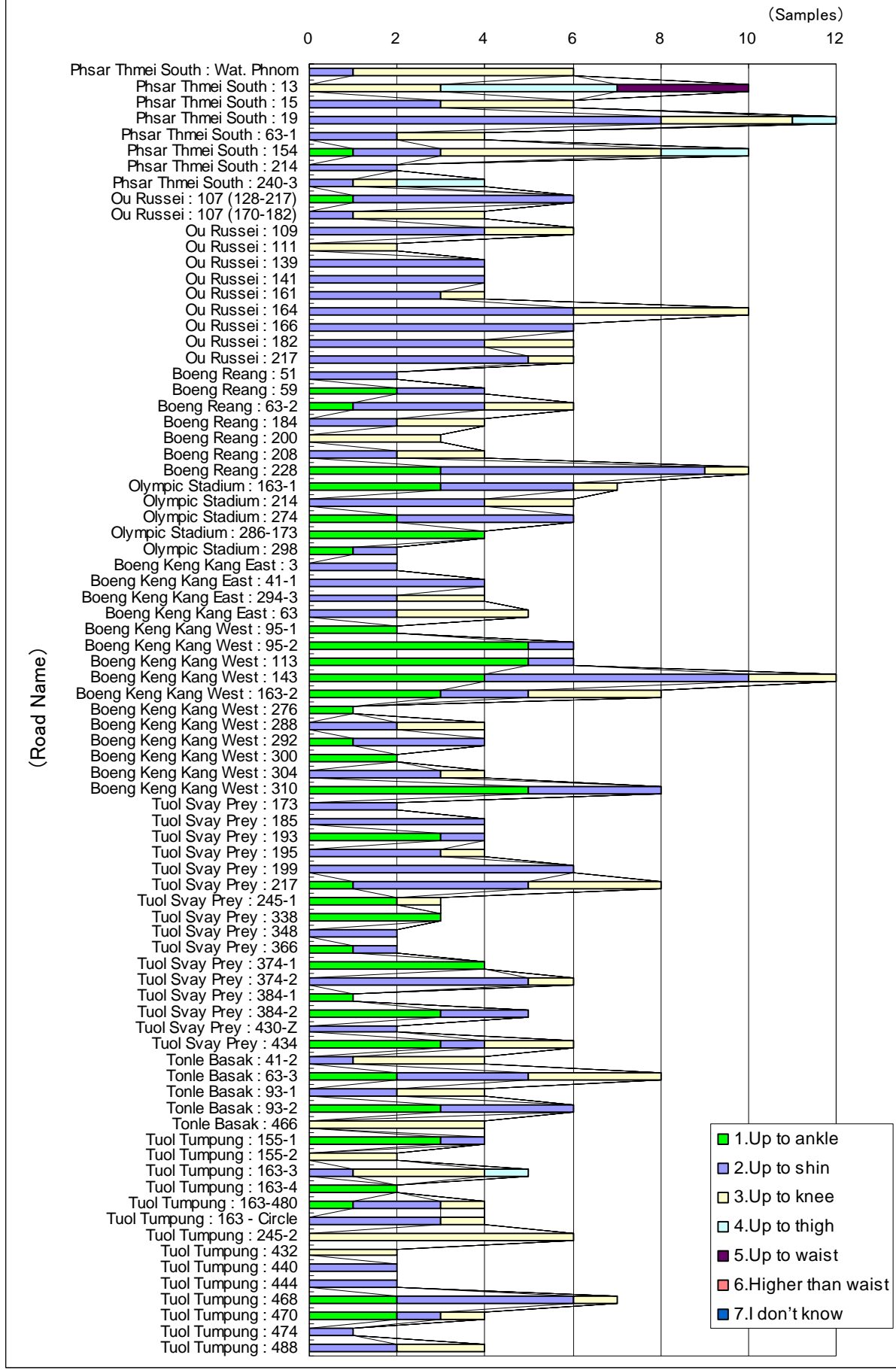


Figure 6.5 Inundation Depth (Number of Samples)

**Q.11 If "Q.9 answer Yes", how deep was the flooding?**

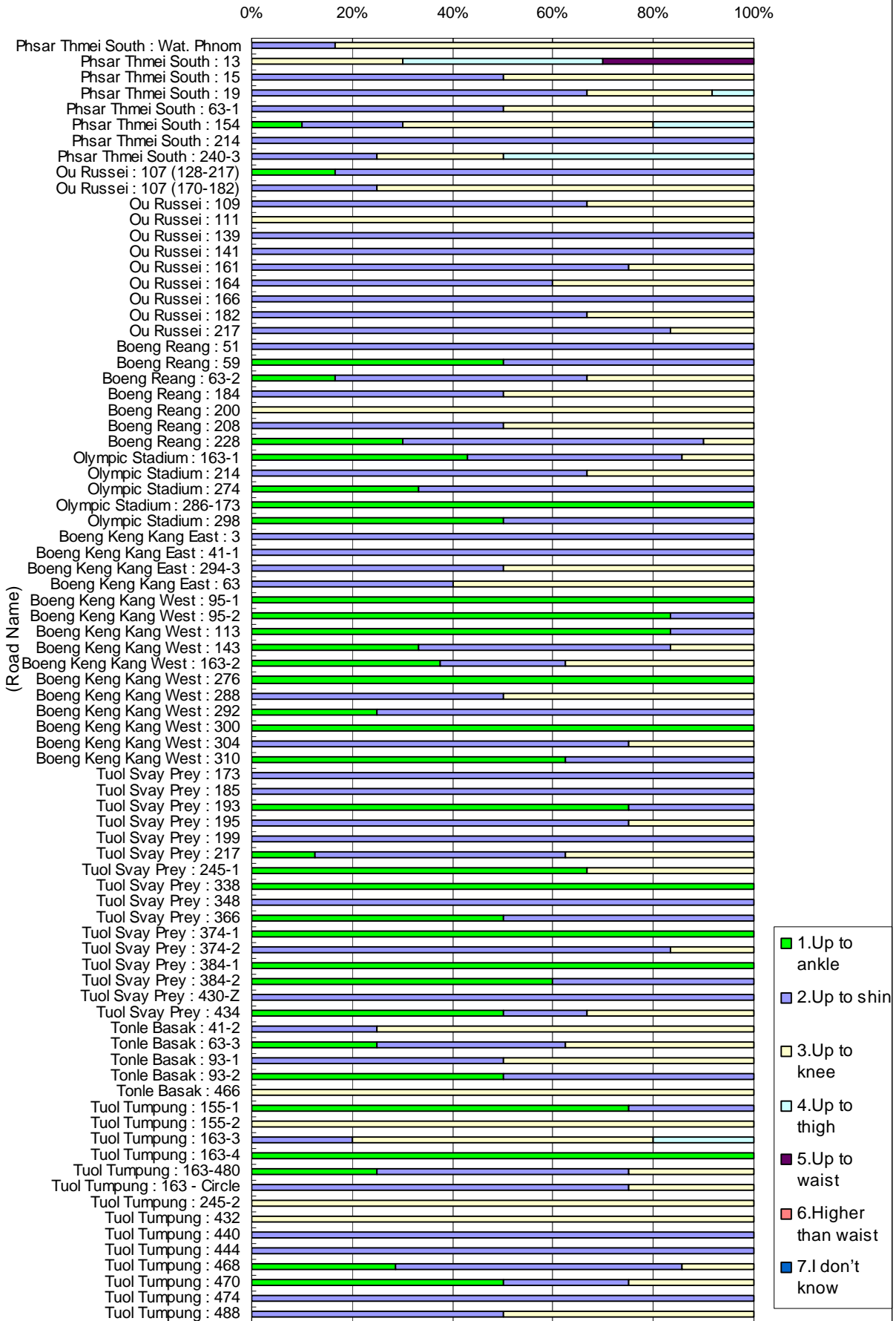


Figure 6.6 Inundation Depth (Percentage)

**Q.12 If "Q.9 answer Yes", how long was the flooding?**

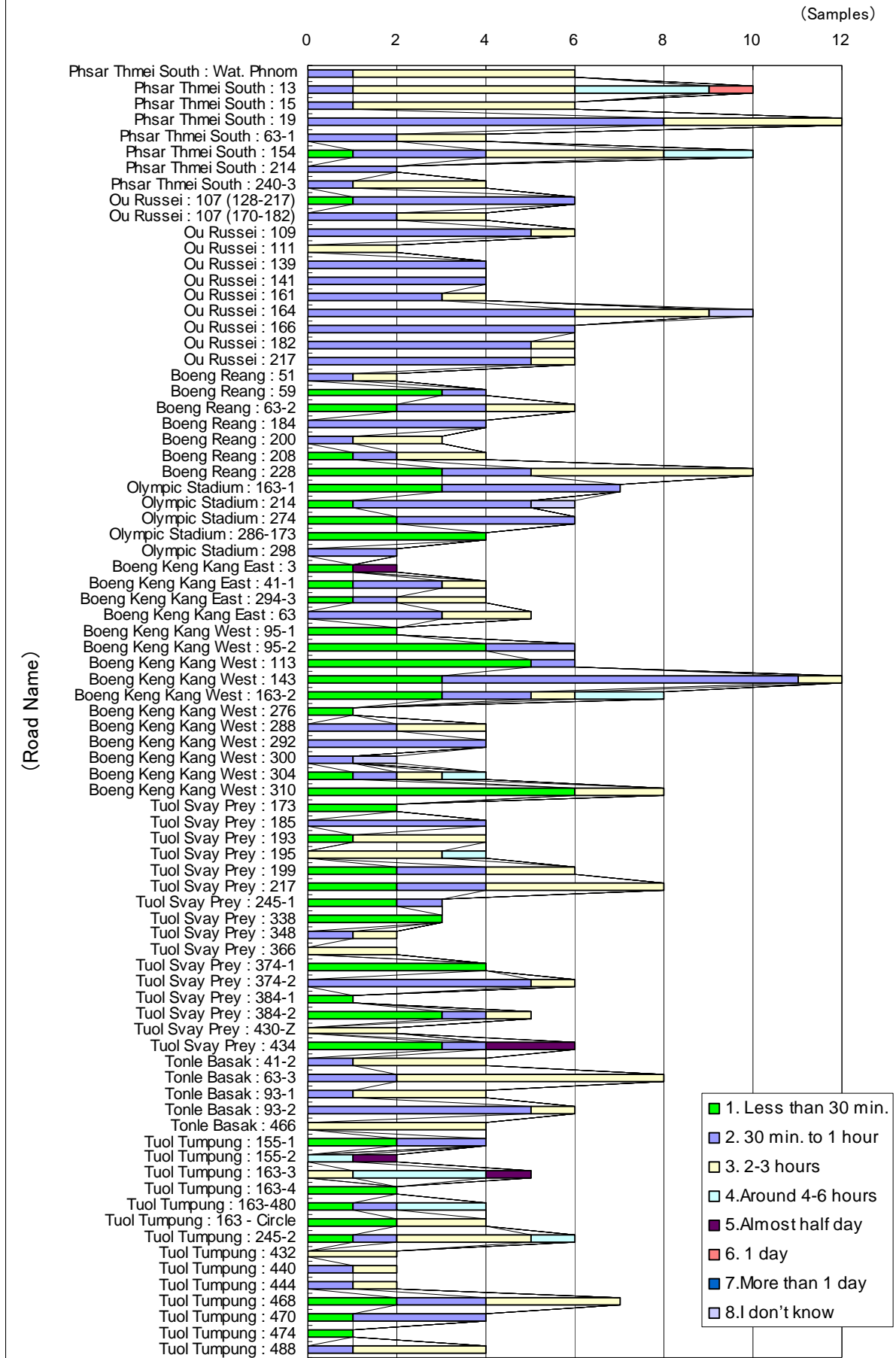


Figure 6.7 Inundation Time (Number of Samples)



Q.11 If "Q.9 answer Yes", how deep was the flooding?

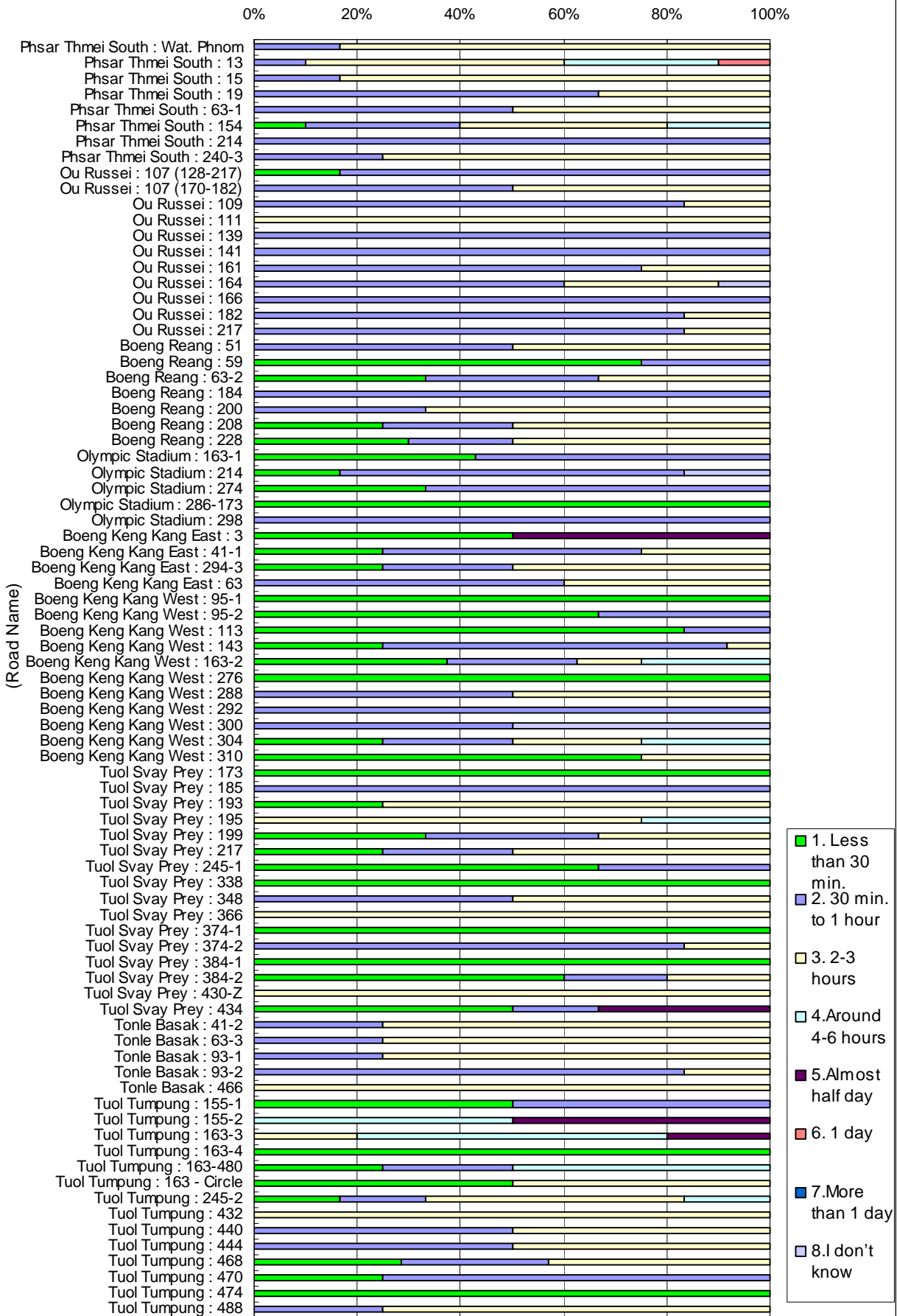


Figure 6.8 Inundation Time (Percentage)