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Japan International Cooperation Agency

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**River Basin Water Resources Utilization Project** (**RBWRU**)

> MANUAL ON RAINFALL AND WATER LEVEL OBSERVATIONS

> > **SEPTEMBER 2015**

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# THE RIVER BASIN WATER RESOURCES UTILIZATION PROJECT (Support to Improvement and Reinforcement in Meteorological and Hydrological Observation Network)

# MANUAL ON

# **RAINFALL AND WATER LEVEL OBSERVATIONS**

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#### **References**

- Ref. 1 Technical Criteria for River Works: Practical Guide for Survey, Ministry of Land, Infrastructure, Transport and Tourism
- Ref. 2 Hydrological Observation Illustration Japanese version", Chubu Construction Incorporated Association

Ref. 3 Manual on Stream Gauging Volume I-Field Work, World Meteorological Organization WMO-No.1044

Ref.4

ເສາຍສະຍາຍ ເຈນຍາເຮັ ແຂະງຄາຍເຂົ້າຍ ແມ່ນເມືອງ ເຊຍູແລະ ເອັດ ເລາຍາເຮັ້າ ພຣະເຊີ່ອ ເລາຍາເຮັ້າ ພຣະເຊີ່ອ ເລາຍາເຮັ້າ ພຣະເຊີ່ອ ເລາຍາເຮັ້າ ພຣະເຊີ່ອ ເລາຍາເຮັ້າ ພຣະເຊີ່ອ ເລາຍາເຮັ້າ ພຣະເຊີ່ອ ເລາຍາເຮັ້າ

(Temporary English interpretation: Principle for Water Gauge Survey July 1998, Department of Hydrology, General Department of Irrigation, Meteorology and Hydrology)

#### CHAPTER I GENERAL

#### **1.1** Authority, Objective and Notification

This manual has been prepared by Kodama Masayuki, a short-term expert to the River Basin Water Resources Utilization Project under Japan International Cooperation Agency in the Ministry of Water Resources and Meteorology in Cambodia. The manual has prepared aiming to reinforce the capacity of Cambodian counterpart personnel in carrying out observation of rainfall and water level at the target observation stations, and maintenance of the target stations.

This manual has been made referring to the publications and documents listed in the last part of table of contents in this manual.

#### **1.2 Target Rainfall and Hydrological Stations**

#### **1.2.1** Target River Basins

The project of River Basin Water Resources Utilization (herein after called as "the Project") aims to improve and reinforce in meteorological and hydrological observation network in the following six river basins, i.e. Sangkae, Moung Russei, Pursat, Boribo, Prek Thnot and Slakou River Basins. These rivers are located in Battambang, Pursat, Kompong Chhnang, Kompong Speu, Kandal, and Takeo provinces.

Rainfall and hydrological stations have been constructed in those river basins by the Project based on the Plan for Improvement and Reinforcement of Hydrological Network prepared in September 2014 by the Project. The plan proposed to construct water level and rainfall stations in Sangkae, Moung Russei and Pursat river basins for the first step of the implementation.

#### 1.2.2 Target Rainfall and Hydrological Stations

Three automatic rainfall stations and 15 hydrological stations have been constructed by the Project in 2015 in the Sangkae, Moung Russei and Pursat river basins. The construction work has been substantially completed in August 2015.

The stations can be classified into two types i.e. called in this manual as AUTO station and MANUAL station. The AUTO station has recorder instruments. Daily observation, record and transmission are performed by instruments, not by manpower. The MANUAL station has staff gauges only which are installed at river/channel side. The daily observation has to be carried out by man power.

Tables 1-1 and 1-2 summarized main information of rainfall and hydrological stations constructed by the Project in 2015. Further, some 18 hydrological stations will be constructed by the Project in 2016 and 2017.

No.	Name of station	East	North	River basin	Province	District	Commune	Village	Name of observer	Telp. No.	Type of station	Brand name of gauges	Data record & trans- mission
1	Samlot	268266	1411436	Sangkae	втв	Somlout	Mean Chey	Sre Sdao	Suon Cheat	92752017	Auto∕ Manual	RG600	LOGGER & TEME
2	Chrang Khpos	314166	1388184	Moung Russei	втв	Rokha Kiri	Bassa	Chrang Kpos	Kom Thoeut	89617969	Auto	RG600	Logger & TEME
3	Ta Lou	353453	1383181	Svay Dankeo	Pursat	Bakan	Ta Lou	Prey Tao	Sim Yam	92993103	Auto	RG600	Logger & TEME

#### Table 1-1 Target Rainfall Stations of the Project in 2015

Note: ARG: Automatic Rain Gauge

AUTO; Automatic water level sensor and rain gauge with data logger

AWL: Automatic Water Level Gauge

LOGGER & TEME; Data logger iLOGS46, Masermic, and sent by GPRS (General Packet Radio Service)

MANUAL; Reading and writing by human

RG600; Rain gauge, Global Water

SMS; Short message serivices

STG; Staff gauges

WL450; Watre level sensor, Global Water

#### Table 1-2 Target Hydrological Stations of the Project in 2015

No.		Name of station	East	North	River/ stream	Province	District	Commune	Village	Name of observer	Telp. No.	Type of station	Brand name of gauges	Data recording & trans- mission
1	Andaek	Herb	279091	1420160	Sangkae	BTB	Ratanak Mondul	Ornderk Heb	Thvak	Hang Heng	088 9666767 / 092 442720	AUTO	WL450, RG600	LOGGER & TEME
2	Bassac	Reservoir	318121	1389897	Moung Russei	BTB	Rokha Kiri	Bassac	Bassac	You Ras	092 548911	AUTO	WL450, RG600	LOGGER & TEME
3	Dam	Spillway	318151	1389977								AUTO	WL450	LOGGER & TEME
4	Prek Cł	nik Left Canal	324982	1398220	Moung Russei	втв	Rokha Kiri	Prek Chik	Prek Chik			MANUAL	STG	Manual writing
5	Prek Ch	nik Right Canal	325448	1398381	Moung Russei	втв	Rokha Kiri	Prek Chik	Prek Chik			MANUAL	STG	Manual writing
6	Prek An	n	329953	1410653	Moung Russei	втв	Moung Russei	Robos Mongkol	Kon Ka enk pi	You Sokhoeun	017 478997	AUTO	WL450, RG600	LOGGER & TEME
7	Prek An	n Canal	329882	1410972	Moung Russei	втв	Moung Russei	Robos Mongkol	Kon Ka enk pi	You Sokhoeun	017 478997	MANUAL	STG	Manual writing
8	Tades		354882	1360537	Pursat	Pursat	Phnum Kravanh	Som Raong	Tades			AUTO	WL450, RG600	LOGGER & TEME
9	Bak Tra	koun	364762	1366129	Pursat	Pursat	Phnum Kravanh	Prongil	Ou Bak Tra	Choeung Chan	097 2483032	AUTO	WL450, RG600	LOGGER & TEME
10	Khum V	/eal	384090	1388529	Pursat	Pursat	Kandieng	Veal	Kracher badach	Sok Makara	092 927727	MANUAL	STG	Manual writing
11	Charek	Left Canal	390148	1394343	Pursat	Pursat	Kandieng	Sya	Kompong Sambour	Sam Yoeun	097 5082229	MANUAL	STG	Manual writing
12	Ptes Ko	or Canal	389851	1392666	Pursat	Pursat	Kandieng	Onlong Verl	Beng Chhouk			MANUAL	STG	Manual writing
13	Peam		360645	1357558	Steung Arai	Pursat	Phnom Krovanh	Somraong	Peam Hav	Kry Marady	096 6556647	MANUAL	STG	Manual writing
14	Santre		372418	1355284	Prey Khlong	Pursat	Phnom Kravanh	Santre	Kaset borey			MANUAL	STG	Manual writing
		In the Damnak Ampil canal	351574	1389524								MANUAL	STG	Manual writing
		Inlet at gate, Damnak Ampil side	351574	1389524								MANUAL	STG	Manual writing
15	Svay Daun	Gate, Damnak Ampil side	351574	1389524	Svay	Pursat	Bakan	Ta Lou	Thmey			MANUAL	STG	Manual writing
	Keo	Overflow crest of spillway	351596	1389514	Don Keo		2 and 1					MANUAL	STG	Manual writing
		Inlet at gate, Prek Chik side	351596	1389514								MANUAL	STG	Manual writing
		Gate, Prek Chik side	351508	1389550								MANUAL	STG	Manual writing

Note: refer to the note in Table 1-1

#### **1.2.3** Facilities of the Stations

#### (1) **Rainfall Stations**

The principal facilities of a rainfall station consists of net fence, an automatic rain gauge (ARG), a data logger and a solar panel which are constructed at site altogether. Standard design is presented in Appendix-5.

Principal instrument of each rainfall station is summarized as follows. There is a manual rainfall gauge at Samlot rainfall station which was installed by Dept. of Meteorology, MOWRAM under the UNDP's project a few years ago.

No.	Name of station	Instruments (the figure after x means quantity of instruments)
1	Samlot	Data Logger, ARG, Solar panels, Battery 26Ah (for ARG),
		Manual rain gauge (installed by Dept. Meteorology)
2	Chrang Khpos	Data Logger, ARG, Solar panels, Battery 26Ah (for ARG)
3	Ta Lou	Data Logger, ARG, Solar panels, Battery 26Ah (for ARG)

#### **Table 1-3 Instruments of Rainfall Stations**

Note: refer to the note in Table 1-1

#### (2) Hydrological Stations

There are two types of hydrological station. One type is expressed as "AUTO" in Table 1-2. The AUTO station has automatic instruments such as a water level sensor (AWL), a data logger powered by a solar panel, recorder's house and staff gauges (STG). The data logger is stored in the recorder's house. Of 15 hydrological stations, six stations are classified into AUTO stations. However, Bassac Dam Spillway station does not have a data logger since the station shares data logger with Bassac Dam Reservoir station. AUTO station has staff gauges at river/channel side. Five AUTO stations have an automatic rainfall gauge (ARG).

The other type is MANUAL stations in Table 1-2. It has staff gauges only which are installed at river/channel side. The water level is observed and recorded on the data sheet by an observer. Nine stations are classified by MANUAL stations.

#### (i) Instruments

Principal instruments of the hydrological stations are presented as follows:

No.	Na	ame of station	Instruments				
1	Andaek Herb		Data Logger, AWL, ARG, Solar panels, Batteries 26Ah (for ARG)+ 12Ah(for AWL & DL). STG (0-9m)				
2	Bassac Dam	Reservoir	Data Logger, AWLs x2 (Cable:180F), ARG, Solar panels,				
3		Spillway	Batteries 26Ah (for ARG)+ 26Ah(for 2AWLs, DL), STG (0-6m)				
4	Prek Chik Left Ca	anal	STG (0-4m)				
5	Prek Chik Right (	Canal	STG (0–6m)				
6	Prek Am		Data Logger, AWL, ARG, Solar panels, Batteries 26Ah (for ARG)+ 12Ah (for AWL, DL), STG (0-				
7	Prek Am Canal		STG (0-6m)				
8	Tades		Data Logger, AWL (Cable:234F), ARG, Solar panels, Batteries 26Ah (for ARG)+ 12Ah (for AWL & DL), STG (0-16m)				
9	Bak Trakoun		Data Logger, AWL, ARG, Solar panels, Batteries 26Ah (for ARG)+ 12Ah (for AWL & DL), STG (0-8m)				
10	Khum Veal		STG (0-7m)				
11	Charek Left Cana	al	STG (0–3m)				
12	Ptes Kor Canal		STG (0-3m)				
13	Peam		STG (0-8m)				
14	Santre		STG (0–6m)				
15		In the Damnak Ampil canal	Staff gauge #1 (0−3m)				
		Inlet at sluice gate, Damnak Ampil side	Staff gauge #2 (0−1.3m)				
	Svay Daun Keo	Sluice gate, Damnak Ampil side	Staff gauge #3 (0-1m)				
		Overflow crest of spillway	Staff gauge #4 (0−2m)				
		Inlet at sluice gate, Prek Chik side	Staff gauge #5 (0−1.3m)				
		Sluice gate, Prek Chik side	Staff gauge #6 (0−1m)				

# Table 1-4 Instruments of Hydrological Stations

Note: refer to the note in Table 1-1



Svay Daun Keo station has staff gauges at six locations nearby. Running numbers have been given to avoid confusion as shown in the Photo-2.

#### (ii) Benchmarks

A benchmark (BM) has been installed by the contractor in accordance with the contract. Coordinate and elevation have been surveyed by him too. The results are presented in Table 1-5.



Photo-2 Staff Gauges at Svay Daun Keo Station

No. of BM	Station name	Coordin	ate and Elevation	on
1	Damnak Ampil Left Main Canal	370337.071	1380714.4	20.155
2	O Rokar Canal	371121.097	1379747.7	19.529
3	Tades	354879.22	1360575.9	33.771
4	Bak Trakoun	364764.114	1366125.6	27.826
5	Bassac	318150.748	1389950.4	41.119
6	Prek Chik Left Canal	324959.844	1398250	28.167
6A	Prek Chik Right Canal	325471.006	1398174	28.629
7	Santre	372378.316	1355283.3	43.366
8	Steung Arai (New Peam)	360641.926	1357561.1	30.885
9	Khum Veal	384041.028	1388553.4	13.84
10	Charek left Canal	390147.846	1394351.5	9.602
11	Ptes Kor Canal	389869.119	1392652.9	10.648
12	Svay Don Keo (Upstream of Spillway)	351603.579	1389504.7	11.704
13	Andaek Herb	279129.328	1420101.7	32.136
14	Prek Am Canal	329863.614	1410963.3	13.392
14A	Prek Am	329929.432	1410664.6	13.346

#### **Table 1-5 List of Benchmarks**

Surveyed by the Contractor

#### (iii) Cross Section of River/canal at Station

Cross section of rivers/canals at each hydrological station was surveyed and presented by the

#### **1.3** Purpose of Rainfall and Water Level Observations

#### 1.3.1 General

To study and develop models of rainfall and river runoff is one of the outputs of the project. The models will be used for estimation of water resources. To know the amount of water taken for irrigation is an important factor to manage water resource in the region. To provide data of rainfall and water level is one of the basic activities to support the said studies. Therefore, observation of rainfall and water level is an essential activity of the project.

Records of water level are followed by calculation of discharge. The calculation of discharge is discussed in another manual i.e. "Manual on Discharge Measurements by Current Meter and Floats".

#### **1.3.2** Target of Observations

Table 1-6 shows target of observation at each station.

	Table 1	<b>-6</b>	Target	of	Observation	at	Each	Station
--	---------	-----------	--------	----	-------------	----	------	---------

No.		Name of station	Target of observation
	Rainfall Stati	ons	•
1	Samlot		Rainfall at the station
2	Chrang Khpo	S	Rainfall at the station
3	Ta Lou		Rainfall at the station
	Hydrological	Stations	
1	Andaek Herb		Discharge in the Sangkae River,
			Rainfall at the station
2	Bassac	Reservoir	Volume of water stored in the reservoir,
	Dam		Rainfall at the station
3		Spillway	Discharge to the Moung Russei River
4	Prek Chik Le	ft Canal	Water taken from Moung Russei River for irrigation
5	Prek Chik Ri	ght Canal	Water taken from Moung Russei River for irrigation
6	Prek Am		Discharge in the Moung Russei River,
			Rainfall at the station
7	Prek Am Car	nal	Water taken from Moung Russei River for irrigation
8	Tades		Discharge in the Pursat River,
			Rainfall at the station
9	Bak		Discharge in the Pursat River
	Trakoun		Rainfall at the station
10	Khum Veal		Discharge in the Pursat River
11	Charek Left	Canal	Water taken from Pursat River for irrigation
12	Ptes Kor Car	nal	Water taken from Pursat River for irrigation
13	Peam		Discharge in the Arai River
14	Santre		Discharge in the Prey Khlong River
15	Svay	SDK#1; In the Damnak Ampil canal	Water depth in the upstream (below overflow crest)
	Daun Keo	SDK#2; Inlet at gate, Damnak Ampil side	Water depth in front of the sluice gate
		SDK#3; Opening of gate, Damnak Ampil	Opening of the sluice gate
		side	
		SDK#4; Overflow crest of spillway	Overflow depth on the broad-crested weir
		SDK#5; Inlet at gate, Prek Chik side	Water depth in front of the sluice gate
		SDK#6; Opening of gate, Prek Chik side	Opening of the sluice gate

As shown above, river discharges are to be observed at nine stations i.e. Andaek herb, Bassac Dam Spillway, Prek Am, Tades, Bak Trakoun, Khum Veal, Peam, Santre, Svay Daun Keo. At Svay Don Keo hydrological station staff gauges have been installed at six sites (SDK#1-SDK#6) aiming to observe discharge in the Svay Don Keo River including water supplied by Damnak Ampil main canal and Prek Chik Canal. They are located within 100 m and thus counted to be one station. Bassac Dam Reservoir Station aims to know amount of water stored in the reservoir.

Five stations i.e. named Prek Chik Left Canal, Prek Chik Right Canal, Prek Am Canal, Charek Left Canal, Ptes Kor Canal have been constructed to know intake water from river to irrigation canal.

#### 1.3.3 Record and Transfer of Data

#### (1) **AUTO stations**

A data logger is installed at three rainfall stations each. Rainfall is recorded every 15 minutes and sent to the master PC in the office of THE PROJECT by GPRS (General Paket Radio Service) modem.

Each hydrological station also has a data logger except for Bassac Dam Spillway station which the data logger is shared by Bassac Dam Reservoir station. The data (water level and rainfall) are recorded every 15 minutes and sent to the master PC in the main office of the Project by GPRS modem.

Immediately after receiving data from data loggers, there is practically a time lag, the master PC sends all data to two computers named the sub-master PC by GPRS.

#### (2) MANUAL stations

The water level at a MANUAL station which has only staff gauges is observed and recorded by an observer at 7:00 am and 7:00 pm every day. He records the data in the data sheet and be collected by the Project every month. The staff gauges at an AUTO station is also observed and recorded by an observer in the same way as mentioned above.

There is a manual rain gauge at Samlot rainfall station. An observer measures and records the rainfall every day. The data sheet of rainfall is delivered by the Project and filled by the observer.

#### CHAPTER II OBSERVATION OF RAINFALL AND WATER LEVEL

#### 2.1 Rainfall

#### 2.1.1 Rainfall Recorder

#### (1) Conversion of Data

As shown in Tables 1-1 and 1-2 there are eight rainfall recorders (RG600) in the project. The recorder contains a tipping bucket and lead switch which generates a pulse every 0.25 mm of rainfall. The pulse is sent to the data logger (iLOGS46 mad by Masermic). The data logger counts the number of pulse and sums up every 15 minutes. The logger converts the summed pulse to a depth of rainfall in 15 minutes and stores. The records of 15-minute rainfall are sent to the master PC of the Project every one hour. So, the master PC receives four records in one hour.

The rainfall records received in the master PC can be presented in the display in the master PC through the following procedure. The result is shown in Figure 2-1.

Start iSOFT  $\rightarrow$  Data History  $\rightarrow$  Links  $\rightarrow$  Select a station "Bak Trakoun" e.g.  $\rightarrow$  Signals "Rainfall"  $\rightarrow$  Initial date 8/14/2015  $\rightarrow$  Final date 8/15/2015  $\rightarrow$ Initial time 07:15:00  $\rightarrow$  Final time 07:15:00  $\rightarrow$  Click "Visualize graphics"  $\rightarrow$  to acquire the tabulated data Click another icon at left bottom.





8/14/2015       07:16:01       09_BAKTrakoun       RainFall       0         1/14/2015       07:46:01       09_BAKTrakoun       09_BAKTrakoun       RainFall       0         8/14/2015       07:46:01       09_BAKTrakoun       09_BAKTrakoun       RainFall       0         8/14/2015       08:00:01       09_BAKTrakoun       09_BAKTrakoun       RainFall       0         8/14/2015       09:00:01       09_BAKTrakoun       09_BAKTrakoun       RainFall       0         8/14/2015       09:00:01       09_BAKTrakoun       09_BAKTrakoun       RainFall       0         8/14/2015       09:00:01       09_BAKTrakoun       09_BAKTrakoun       RainFall       0         8/14/2015       10:00:01       Click here to back to       m RainFall       0       0         8/14/2015       10:00:01       09_BAKTrakoun       09_BAKTrakoun       RainFall       0         8/14/2015       10:00:01	Date	< ID	Site	Signal	Value	
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Figure 2-1 (1/3, 2/3 & 3/3) Visualizing and Tabulating Rainfall Record

The 15-minute rainfall tabulated in Figure 2-1 (3/3) can be converted to Figure 2-2 in EXCEL format through the following procedure.

Following to the above procedure, Click an icon "Export data table"  $\rightarrow$  Click "Yes"  $\rightarrow$  Select desktop e.g.  $\rightarrow$  Input the file name 20150814bb e.g.  $\rightarrow$  Save as "CSV Files (\*.csv)"  $\rightarrow$  Click "Save"  $\rightarrow$  Confirm the information shows "Data exported correctly"  $\rightarrow$  Close iSOFT,

Excel-Select blank Workbook  $\rightarrow$  File-Open  $\rightarrow$  Specify "All Files"  $\rightarrow$  File name "20150814bb"  $\rightarrow$  Open  $\rightarrow$  Text Import Wizard - Step 1 of 3  $\rightarrow$  Click "Delimited"  $\rightarrow$  Click "Next"  $\rightarrow$  Click "Semicolon"  $\rightarrow$  "Comma"  $\rightarrow$  "Space"  $\rightarrow$  Click "Next"  $\rightarrow$  To confirm the continuous data is divided by type of data i.e. Date, ID (time), Site, Signal, Value, etc.  $\rightarrow$  Click "General" & "Finish", File name "20150814", Save as type "Excel workbook". The Excel file converted is presented in Table 2–1.

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	ter 🕨 KODAMA 4GB (F:)	
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🔚 Recent Places 🔺	Name	Date modified Type
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📜 Libraries	20150814bbb	8/17/2015 3:01 PM Microsoft Excel Worksheet
Documents	20150814bb	8/17/2015 2:52 PM Microsoft Excel Comma Separated Valu
J Music ≡	20150814bb	8/17/2015 2:45 PM Microsoft Excel Worksheet
Pictures	20150807bb	8/17/2015 2:33 PM Microsoft Excel Worksheet
🛃 Videos	20150814b	8/17/2015 11:26 AM Microsoft Excel Worksheet
	20150807	8/17/2015 11:07 AM Microsoft Excel Comma Separated Valu
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Computer	20150814	8/16/2015 5:02 PM Microsoft Excel Comma Separated Valu
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Figure 2-2 (1/3, 2/3, 3/3) Conversion of Rainfall Record from iSOFT to Excel File

Date	ID	Site	Signal	Value		
2015/8/14	7:15:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	7:30:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	7:45:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:00:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	3:45:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	4.572
2015/8/14	4:00:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	1.524
2015/8/14	4:15:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	4:30:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	4:45:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	1.016
2015/8/14	5:00:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	10.414
2015/8/14	5:15:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	2.54
2015/8/14	5:30:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0.508
2015/8/14	5:45:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
	-					
2015/8/15	6:15:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	6:30:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	6:45:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	7:00:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
			Тс	otal/One day rai	nfall (mm)	20.828
			Maximur	<u>n 15-minute rai</u>	nfall (mm)	10.414

 Table 2-1 Spreadsheet Converted from iSOFT to Excel Format (FORM-12)

The two rows should be added at the bottom to the FORM-12 by manual as discussed in the following paragraph.

#### (2) Calculation of Daily Rainfall

Using Table 2-1 i.e. FORM-12 a daily rainfall can be calculated by sum up the 15-minute rainfall from 7:00 am on the previous day until 7:00 am next day provided that the data logger is set to reset its counter every 15 minutes. Two rows have to be added at the bottom of FORM-12. Two functions of summation and maximum should be inserted to the bottom of the table. The value obtained should be recorded as the rainfall on the previous day in accordance with the standard of MOWRAM.

A total rainfall in 24 hours (irrespectively change of the date) has to be calculated by examining rainfall in two continuous days. This value and 15-minute rainfall will be used in the Depth-Duration-Area analysis (DDA analysis) in the flood runoff analysis. Therefore Table 2-1 or FORM-12 should be kept in the nominated PC for future use after changing the file name e.g. <Form-12 20150815.xlsx>.

The important values can be seen from the above table as follows:

Description	Unit	Value	Remarks
Daily rainfall	mm		The definition of daily rainfall is the summation of all rainfall observed from 7:00 am on the previous day to 7:00am on the next day. The value should be regarded as the rainfall on the previous day in accordance with the standard of MOWRAM.
Maximum rainfall in 15 minutes	mm		The definition of the maximum rainfall intensity is the maximum value of 15-minute rainfall in a day.
24-hour rainfall	mm		The definition of 24-hour rainfall is the total rainfall between the beginning and end of rainfall in 24 hours (irrespectively change of the date) because a rain frequently continues extending in two days. A Meteo/hydrologist has to look all daily rainfall data in FORM-1 every month through and to calculate 24-hour rainfall.

**Table 2-2 Important Daily Rainfall Values** 

The calculated daily rainfall should be input to the FORM-15 as presented in Table 2-3.

				0	bservatio	n of Rainfa	all FORM-	15				
				Tabl	e 2-3 D	aily Rai	nfall Re	ecord				
River:				Station:						E:		
Year:				District:						N:		
Input by:				Province:						Alt.(amsl):		
												(Unit: mm)
Day	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1												
2												
3												
4												
14								20.83				
27												
28												
29												
30												
31												
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.83	0.00	0.00	0.00	0.00
Max.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.83	0.00	0.00	0.00	0.00
Rainy days R>=0.5mm	0	0	0	0	0	0	0	1	0	0	0	0
Annual rainf	all:	20.8	mm	Annual ma	x. daily rain	fall:	20.83	mm	Annual ma	x. 24-hour r	ainfall:	

The cells not shadowed are for input daily rainfall data. Attention has to be paid not to change unnecessarily the cells shadowed which contain functions. Spread sheets of the FORMs are available in the server computer.

#### (3) Calculation of Monthly and Annual Values

Adding a few functions in MSExcel to the bottom of each column of month in FORM-15 (colored cells), i.e.

"=SUM(C9:C39)",

"=MAX(C9:C39)",

"=COUNTIF(C9:C39,">=0.05")"

(a) monthly rainfall, (b) monthly maximum daily rainfall, rainy day (e.g. R>=0.5mm) can be obtained.

The important following values should be calculated in FORM-15, by adding other functions in MSExcel.

- (c) "=SUM(C40:N40)" to calculate annual rainfall The total of all daily rainfall for the year;
- (d) "=MAX(C41:N41)" to calculate annual maximum daily rainfall The highest daily rainfall for the year.
- (e) "=SUM(C42:N42)" to calculate total rainy days in a year (e.g. R>=0.5mm)

#### 2.1.2 Manual Rainfall Gauge

#### (1) **Recording in Data Sheet**

There is only one manual rainfall gauge installed by Dept. of Meteorology at Samlot station. An observer is expected to continue measuring and recording rainfall two times in a day i.e. at 7:00 am and 7:00 pm in accordance with the standard of MOWRAM. The data sheet of manual rainfall gauge has been made by the Rroject in accordance with standard form of MOWRAM, and has been delivered to all observers of which the station has a manual rainfall gauge as shown Figure 2-3 (FORM-11).

#### (2) Calculation of Daily Rainfall from Data Sheet

Inputting all recorded data to FORM-11 a daily rainfall can be calculated by sum up the two data i.e. 7:00 am to 7:00 pm and 7:00 pm to 7:00 am. FORM-11 has a same style with FORM-11b is used for calculation of a daily rainfall by inputting rainfall data recorded in FORM-11 by an observer.

Since the Samlot station has an automatic rainfall gauge the result has to be collated with the daily rainfall obtained from data logger as discussed in the previous sections.

In collation, there will be a difference between two data of rainfall recorder (AUTO) and of MANUAL. In the checking, the actual time of observation of MANUAL should be

confirmed because the observer will frequently observe the rainfall at not the ruled time (7:00 pm and 7:00 am) due to several reasons. On the other hand the AUTO works very punctual. One day rainfall may not same with each other by this or other reason. Accordingly it is necessary to collate rainfall not only sole day but also continuous two or three days as a whole.

If the rainfall record was not much difference from the data obtained by AUTO, the data by AUTO can be regarded as the daily rainfall at Samlot.

If the rainfall record was not obtained by data logger due to some reason, the daily rainfall data obtained by MANUAL can be used as the data at Samlot.

#### (3) Calculation of Monthly and Annual Values

If the data by MANUAL is used as the record at Samlot, the calculated daily rainfall should be input to the FORM-15. Further process should be performed as discussed in the previous section.

		Royal Ki [pt:n:	ingdom of ( ഷമ്പല്പന്ദ	Cambodia 특별없	Nation Religion King ងាគិ សាសនា ព្រះមហាក្សព្រ	ſſ			Royal Ki ln:n	ngdom of Ca കമ്പല്പന്നും	<b>mbodia</b> 읽었	1	Nation ឃាកិសាស	Religion K នា ព្រះមហ	ing ngjj	
Ministry E	of Water Resol	rrees and Mete ន និងឧតុនិយ	sorology Jef	FORM-11 Rainfall	Japan International Coop River Basin Watte Resources Util គម្រោងការប្រើក្រាស់ជនជាន	eation Agency zation Project (RBW RU) ទីកានៅកាមអាណ្នឹង	1	Ministry o	f Water Resour Meteorology মোর রী মার	ces and កុនិយាម			Japan River Bas लाम्जिक्षल	n Internationa sin Watre Res التالية التالية	I Cooperation / sources Utilizat នយានទីការនៅទ	gency on Project ាយកាងស្ទឹង
			כ	រិមាណទឹកក្លៀង				Ξ	Y DROLOGI	CAL OBSER	VATION BOO	Ч.		IGHT IN N	IETERS (FO	RM-21)
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Capital City c រាជបោនី.ខេត្ត	f Province:			Month: ĭa	Year: Type of Se تونا المناطقة	eason: ស្ងោយក្រុ		River:		Station:				Zero G.H.:		M.S.L.
Observer/널 『	ពិនិក្យ:						מט נ	12° 12°		ស្ថានីយ៉			100	ะค่าเปลิงสู	Putteller	ធៀបនឹងនឹស្រម្យ
Date 124년	Measu 1 tit-non Sie	rement បញ្ចាំអង់វាស់វ	Total (24hr) 1 1 Filter	Descriptions (1)	(Started and Stopped Rainfall) আনগাইলকলক্ষ্যটের্যান্দা হে.ল.		Date 7.2.6	Tme	H.(m) កំពស់ទឹក	H.average (m) ਜਾਂਸ਼ਿਪਾਂ ਤੌਂ ਜ	Phenomena	Date ĭ~.ă	Jue Jue	H.(m)	H. average (m) កំពស់ទីកា	Phenomena
j.	Time: 07-19	Time: 19-07	(២៤១៩២៨)	ורשויוטר)	មកប្រធានក្មេកក្មេក រង្គើម និងម៉ោងបញ្ហប់)		а 20	3	ងាម៉ែត្រ 1	ചപ്പല്പവുള	ungonugua	م ت	3	witelen t	ചപ്പല്പറവ്വ്	ตเปลี่ยาที่ใ
-							-	00:20				17	07:00			
2							¢	00:00				8	00:61			
3							4	19:00				2	19:00			
4 1							e	00:20				19	07:00			
<u>م</u>								19:00					19:00			
2							4	02:00				20	02:00			
8							ų	19:00				ţ,	19:00			
6							0	19:00				- -	19:00			
							9	00:20				22	00:20			
Sub-total						Number of Rainfall Days បំឌួនថ្ងៃដែលភ្លៀង		19:00					19:00			
11						(2) (R.) < 1.0mm	7	02:00				23	02:00			
12						(R)≤10.0mm		19:00					19:00			
13						(R)≤ 30.0mm	œ	02:00				24	07:00			
14						(R) ≥ 50.0mm	c	19:00				36	19:00			
15						Total/United	n	10.00				0	00.00			
16						Note/កំណត់ថំណាំ	10	00:20				26	00:20			
18						(1) Type of Rainfall Thunder, etc.	2	19:00				2	19:00			
19						(a) ប្រភេទនៃញៀងផ្ទះ	5	00:20				27	00:20			
20						សារ "ស្រុកមន្លរ នេះ		19:00					19:00			
Sub-total							12	02:00		1		28	02:00			
คาแก							1	19:00				1	19:00			
21							2	19:00				R7	19:00			
23						(2) ග්යෙල වැකාකා. (ළා, පාඩංගා දීපයාමය	14	00:20				30	07:00			
24								19:00					19:00			
25 26							15	00:20					02:00			
27							1	19:00					19:00			
28							2	19:00					19:00			
29							Obser	ver:				Checke	d by:			
30							មួកជំន	[La				ເພສເມ	Er			
C h tatal																
oup-total																
Total/Month Urgurguo																
Seen and ar បានឃើញ និ	roved ដងកងាព				Date: Month: ໄຮູຮິ ເຂ	Year: ឆ្នាំ២០										
Meteorology പ്രമാഭാപ്പ്	Chief Office: 1ល័យ ឧតុនិយា	***			Chief of Rainfall Collector: ប្រធានប៉ុណ្តិ៍											

លាកុភូកាល្ងេង១ M.S.L. ជៀបនឹងនីវ៉ែសម៉ទ្រ Phenomena

Figure 2-3 FORM-11 and FORM-21 for Recording Daily Rainfall and Staff Gauge Height by an Observer

#### 2.1.3 Filing Structure for Rainfall Record

The electronic files of rainfall record have to be saved in the master PC of Team-1 of the Project/MOWRAM. Name of folders and files have to contain name of station, year, month, date so that users can retrieve record at the target station and target period can find out easily. On the contrary the name of folders and files should be short to ease creating/retrieving the name of the folder/file. A temporary code is given to each station to shorten the name of folders and Excel files as shown in Table 2-4. The structure for folders and file name for rainfall record in the master PC is proposed as Figure 2-4.

In this context, the date of record is recommendable to be contained in the following order i.e. yyyymmdd (year, month, date in 8 figures, e.g. 20150815) so that the files can be sorted in order of date.

Name of station	Code
Samlot	SAM
Chrang Khpos	СНК
Ta Lou	TAL
Andaek Herb	ADH
Bassac Dam Reservoir	BAR
Prek Am	PRA
Tades	TAD
Bak Trakoun	BKT

**Table 2-4 Temporary Code of Rainfall Stations** 



Figure 2-4 Filing Structure for Rainfall Data

#### 2.2 Water Level

#### 2.2.1 Water Level Recorder

#### (1) Conversion of Data

As shown in Table 1-2 there are six water level sensors (WL450) installed by the Project. A water level sensor reads water level every 15 minutes. The value is stored in data logger (iLOGS). The data stored are sent to the master PC of the Project in Phnom Penh every one hour. So, the master PC receives four records in one hour.

The water level records received by the master PC can be presented in the display in the master PC through the following procedure. The process and result is shown in Figure 2-5.

Start iLOG  $\rightarrow$  Data History  $\rightarrow$ Links  $\rightarrow$  Select a station "Bak Trakoun" e.g.  $\rightarrow$ Signals "WaterLevel"  $\rightarrow$  Initial date  $8/10/2015 \rightarrow$  Final date  $8/11/2015 \rightarrow$ Initial time 07:15:00  $\rightarrow$  Final time 07:15:00  $\rightarrow$  Click "Visualize graphics"  $\rightarrow$  to acquire the tabulated data Click another icon at left bottom.





Figure 2-5 (1/5 & 2/5) Visualizing and Tabulating Water Level Record

Date	- ID	Site	Signal	Value			
8/10/2015 07:15:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.004			
8/10/2015 07:30:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.03291			
8/10/2015 07:45:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.05603			
8/10/2015 08:00:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.08493			
8/10/2015 08:15:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.11961	i de la companya de la		
8/10/2015 08:30:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.14852			
8/10/2015 08:45:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.1832			J
8/10/2015 09:00:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.21788			
8/10/2015 09:15:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.25256	10		
8/10/2015 09:30:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.29303			
8/10/2015 09:45:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.32771			1
8/10/2015 10:00:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.36239			
8/10/2015 10:15:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.39708			1. Sec. 1
8/10/2015 10:30:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.43176			
8/10/2015 10:45:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.46644	8		
8/10/2015 11:00:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.49534			
8/10/2015 11:15:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.53003			(1257)
8/10/2015 11:30:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.55893			
8/10/2015 11:45:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.58783			1.00
8/10/2015 12:00:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.61095			
8/10/2015 12:15:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.63986			· @
8/10/2015 12:30:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.66298			100 million 100
8/10/2015 12:45:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.6861			
8/10/2015 13:00:01	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.715			
8/10/2015 13-15-01	09 RakTrakoun	09 RakTrakoun	Waterl evel	1 73812			
11					Graphic initial date	Graphic final date	
		_			8/10/2015 7:15:00 AM	8/11/2015 7:15:00 AM	~ ~
					511012010 7.10.00 AM	GTTT20107.10.00 AW	l,

Figure 2-5 (3/5) Visualizing and Tabulating Water Level Record

If you need to look the record during the long continuous days, input Initial date 8/07/2015 and Final date 8/18/2015 e.g.  $\rightarrow$  "Visualize graphics".





Figure 2-5 (4/5 & 5/5) Visualizing and Tabulating Water Level Record

The records by water level recorder have to be checked as follows:

(i) Visual check

The consistency or variation of water level has to be checked by eyes first time. The water level usually rises and falls with a smooth line not a zigzag line. Figure 2-5 (5/5) shows a smooth line except that on 17<sup>th</sup> August. A zigzag line means data missing due to some reasons such as the sensor does not work well, transmission was not made due to internet disconnection, etc.

The water level record shown in Figure 2-5 (3/5) can be converted to Table 2-5 (FORM-21, MSEXCEL format) by the following procedure.

Following to the above procedure, Click an icon "Export data table"  $\rightarrow$  Click "Yes"  $\rightarrow$  Select desktop e.g.  $\rightarrow$  Input the file name 20150810 e.g.  $\rightarrow$  Save as "CSV Files (\*.csv)"  $\rightarrow$  Click "Save"  $\rightarrow$  Confirm the information shows "Data exported correctly"  $\rightarrow$  Close iSOFT,

Excel-Select blank Workbook  $\rightarrow$  File-Open  $\rightarrow$  Specify "All Files"  $\rightarrow$  File name "20150810"  $\rightarrow$  Open  $\rightarrow$  Text Import Wizard – Step 1 of 3  $\rightarrow$  Click "Delimited"  $\rightarrow$  Click "Next"  $\rightarrow$  Click "Semicolon"  $\rightarrow$  "Comma"  $\rightarrow$  "Space"  $\rightarrow$  Click "Next"  $\rightarrow$  To confirm the continuous data is divided by type of data i.e. Date, ID (time), Site, Signal, Value, etc.  $\rightarrow$  Click "General" & "Finish", File name "20150814", Save as type "Excel workbook". The Excel file converted is presented in Table 2–5 (FORM-21).

Open			Sec. 1	-		×
Com	nputer	<ul> <li>KODAMA 4GB (F:)</li> </ul>		<b>-</b> <sup>€</sup> <del>)</del>	Search KODAMA 4GB (F:)	۶
Organize 👻 New	folder	r			ŧ≡ <b>-</b> □	0
🖭 Recent Places	^	Name	Date modified	Туре		Size
Contraction		Book1	8/18/2015 8:53 AM	Microsoft E	xcel Worksheet	
Cibraries		20150810	8/18/2015 8:50 AM	Microsoft E	xcel Comma Separated Valu	
Documents		20150814bb Table 2-1	8/17/2015 10:26 PM	Microsoft E	xcel Worksheet	
		20150810	8/17/2015 7:00 PM	Microsoft E	xcel Worksheet	
Pictures	=	20150807	8/17/2015 6:44 PM	Microsoft E	xcel Comma Separated Valu	
Videos		8_17_2015 6_33_26 PM	8/17/2015 6:34 PM	Microsoft E	xcel Comma Separated Valu	
		😰 20150814ЬЬ	8/17/2015 6:26 PM	Microsoft E	xcel Comma Separated Valu	
Nomegroup		🖬 20150807ьь	8/17/2015 2:33 PM	Microsoft E	xcel Worksheet	
Complete		20150814b	8/17/2015 11:26 AM	Microsoft E	xcel Worksheet	
Computer		PDF files	8/16/2015 9:55 AM	File folder		
Local Disk (C:)						
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KODAMA 40B (						
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Data <u>p</u> review	Foreral.	hanar		tanara1	Formers 1	kanana 1		
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Data <u>p</u> review General Date 8/10/2015	<u>Seneral</u> ID 7:15:01	<u>Gener</u> Site AM	General Signal 09_BakTrakoun	General Value 09_BakTrakoun	General WaterLevel	General		
Data <u>p</u> review <u>Seneral</u> Date 8/10/2015 8/10/2015	General ID 7:15:01 7:30:01 7:45:01	Gener Site AM AM	General Signal 09_BakTrakoun 09_BakTrakoun	General Value 09_BakTrakoun 09_BakTrakoun	General WaterLevel WaterLevel	General 1.004 1.03291		
Data <u>p</u> review <u>Seneral</u> Date 8/10/2015 8/10/2015 8/10/2015 8/10/2015	General ID 7:15:01 7:30:01 7:45:01 8:00:01	Sener Site AM AM AM AM	General Signal 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun	Zeneral Value 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun	General WaterLevel WaterLevel WaterLevel WaterLevel	General 1.004 1.03291 1.05603 1.08493		
Data <u>p</u> review <u>Ceneral</u> Date 8/10/2015 8/10/2015 8/10/2015 4/10/2015 4/10/2015	General ID 7:15:01 7:30:01 7:45:01 8:00:01	Gener Site AM AM AM AM	General Signal 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun	Zeneral Value 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun	General WaterLevel WaterLevel WaterLevel WaterLevel	General 1.004 1.03291 1.05603 1.08493		
Data preview Ceneral Date 8/10/2015 8/10/2015 8/10/2015 8/10/2015	General ID 7:15:01 7:30:01 7:45:01 8:00:01	Gener Site AM AM AM AM	General Signal 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun	Zeneral Value 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun 09_BakTrakoun	General WaterLevel WaterLevel WaterLevel WaterLevel	General 1.004 1.03291 1.05603 1.08493	F	

Figure 2-6 (1/3, 2/3 & 3/3) Conversion of Water Level Record from iSOFT to Excel File

Date	ID	Site	Signal	Value		
2015/8/10	7:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.004
2015/8/10	7:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.03291
2015/8/10	7:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.05603
2015/8/10	8:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.08493
2015/8/10	8:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.11961
2015/8/10	8:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.14852
2015/8/10	8:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.1832
2015/8/10	9:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.21788
2015/8/10	9:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.25256
2015/8/10	9:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.29303
2015/8/10	9:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.32771
	-					
2015/8/11	5:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.52425
2015/8/11	5:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.51268
2015/8/11	6:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.50112
2015/8/11	6:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.48956
2015/8/11	6:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.48956
2015/8/11	6:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.478
2015/8/11	7:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.46644
					Average	1.660
					Maximum	1.923
					Minimmum	1.004

Table 2-5 Calculation of Daily Mean Water Level (FORM-22)

The three rows are to be added at the bottom of the table by the operator in manual as discussed in the following paragraph.

#### (2) Calculation of Daily Mean Water Level

Using FORM-22 a daily mean water level can be calculated by average the 15 minute's water level from 7:00 am on the previous day until 7:00 am next day. Three rows have to be added at the bottom of FORM-22 in order to calculate and find out mean water level, maximum water level and minimum water level in the relevant day.

The important values can be seen from the above table as follows:

Description Unit Valu			Remarks
Daily mean water level	m	1.660	The definition of daily mean water level is the arithmetic mean of all water levels in the relevant day
Daily maximum water level	m	1.923	The definition of daily maximum water level is the maximum value of all water levels in the relevant day
Daily minimum water level	m	1.004	The definition of daily minimum water level is the minimum value of all water levels in the relevant day

 Table 2-6 Important Daily Water Level Values

The calculated daily mean water level should be input to the FORM-25 to ease calculation of daily mean discharge by applying H-Q curve(s) as discussed in the Manual of Discharge Measurement by Current Meter and Floats".

The FORM-22 has to be kept in the nominated PC for further process. The name of electronic file should be <Form-22\_20150810.xlsx>. The file should be stored in the folder which is named by station. The structure of folders and files is discussed in the following sections.

				0	bservatio	n of Rainfa	all FORM-	25				
				Table	2-7 Dail	ly Mean	Water	Levels				
Dian				Otations						E.		
River:				Station:						E:		
Year:				District:						N:		
Input by:				Province:						Alt.(amsI):		
												(Unit: m)
Day	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1												
2												
3												
4												
10								1.660				
27												
28												
29												
30												
31												
Average	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.66	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Max.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66	0.00	0.00	0.00	0.00
Min.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Annual mea	n:	1.7	Mar	Annual ma	x.:	1.66	m		Annual mi	n.:	0.00	m

#### 2.2.2 Water Level Recorded by Staff Gauge

#### (1) **Reading Staff Gauge**

All AUTO stations and nine MANUAL stations have staff gauges at river/canal bank. The water level is expected to be read by an observer at each station two times in a day and recorded in the data sheet as shown in Figure 2-3 (FORM-21).

The proper way and matters that require attention in the reading staff gauge are shown in Figure 2-7.

#### (2) Record of Staff Gauge at AUTO Stations

The records of staff gauges at AUTO station are used to check and collate with the record by water level sensor. If there is a large difference between two records in time and or in water level, the Project staff has to request the observer to read staff gauge and send it to him by sms so that he can get water level data from staff gauge and from sensor in real time. The data have to be collated and the causes of difference have to be clarified. After clarification of the causes, the Project will adjust values in the data logger or go to the field for repair as discussed in the following Chapter.

Should the record from data logger is missing due to internet condition or other causes, the record in the data sheet should be used for interpolation.



Figure 2-7 Proper Way for Reading Staff Gauge and Matters Require Attention

#### (3) Record of Staff Gauge at MANUAL Stations

The records at MANUAL station have to be input to FORM-21b for calculation of daily mean value every day.

(i) Visual check

The consistency of record has to be checked by eyes at first (refer to 2.2.1 (1)). FORM-21b can prepare a water level curve for visual check.

(ii) Calculation of daily mean water level

A daily mean water level can be obtained by average of two records i.e. at 7:00 am and 7:00 pm in FORM-21b in the relevant month. The result should be input FORM-25 (Table 2-7).

(iii) Saving FORM-21b in the nominated PC

The FORM-21b should be stored in the nominated PC. The file name should be <"Station code" FORM-21b.xlsx>.

#### 2.2.3 Filing Structure for Water Level Record

The electronic files of water level record have to be saved in the master PC of Team-1. Name of folders and files have to contain name of station, year, month, date so that users can retrieve record at the target station and target period can find out easily. On the contrary the name of folders and files should be short to ease creating/retrieving the name of folder/file. A temporary code is given to each station to shorten the name of folders and Excel files as shown in Table 2-8. The structure for folders and file name for rainfall record in the Master PC is proposed as Figure 2-8.

Table 2-8 Temp	orary Code of Hydrological S	tations		
Na	me of station	Code		
Andaek Herb		ADH		
Bassac Dam Res	servoir	BAR		
Bassac Dam Spil	lway	BAS		
Prek Chik Left C	anal	PCL		
Prek Chik Right	Canal	PCR		
Prek Am		PRA		
Prek Am Canal		PAC		
Tades		TAD		
Bak Trakoun		BKT		
Khum Veal		KHV		
Charek Left Cana	al	CLC		
Ptes Kor Canal		PKC		
Peam		PEA		
Santre		SAN		
Svay Daun Keo	In the Damnak Ampil canal	SDK#1		
	Inlet at sluice gate, Damnak Ampil side	SDK#2		
	Opening of sluice gate, Damnak Ampil side	SDK#3		
	Overflow crest of spillway	SDK#4		
	Inlet at sluice gate, Prek Chik side	SDK#5		
	Opening of sluice gate,, Prek Chik side	SDK#6		



Figure 2-8 Filing Structure for Water Level Data

#### CHAPTER III OPERATION AND MAINTENANCE OF STATIONS

#### 3.1 Automatic Water Level and Rain Gauge Stations

#### 3.1.1 Work by Observers

The daily work to operate and maintain a station such as reading staff gauge and rainfall gauge, cleaning gauges, and so on requires someone who stays near the station and has an easy access to the station. The Project contracts an observer at each station to entrust the following works. A few observers cover more than two stations if stations are located closely.

- i) To read and record water level at staff gauge at 7:00 and 19:00 every day;
- ii) To measure and record manual rain gauge(s), if any, at 7:00 and 19:00 every day;
- iii) To keep the data sheets of water level and rainfall in the safety place;
- iv) To present and submit data sheets to the Project/MOWRAM every month or at the time as requested by the Project/MOWRAM;
- v) To keep staff gauges in secure and clean condition all the time, to remove any debris stuck on the staff gauge, to clean stains on the staff gauge, if any;
- vi) To check rainfall gauge, solar panel and data logger, and to remove any objects/debris on these instruments;
- vii) To check if cables which run from rain gauge, solar panel, lightning to the recorder's house are in secure condition;
- viii) To cut branch(s) of tree if it covers or makes shadow the rainfall gauge or solar panel;
- ix) To keep the station(s) as a whole in secure and clean condition;
- x) To inform promptly to the Project/MOWRAM, if any work appears to exceed his ability;
- xi) To participate in executing discharge measurement and other work by the Project/MOWRAM such as cleaning water level sensor, removing sediment/debris/garbage from the sensor well, and so on.

Some principal works to be executed by observers are illustrated as follows:



Remove objects/debris/trash on the rain gauge



Inform to the project office immediately if the rain gauge was deformed, leaned, or bend.



Check if trees/buildings which cover or affect air current near the rain gauge.



#### Figure 2-9 Some Principal Works to be Performed by Observers

In this regards Dept. of Hydrology and River Works has a booklet "Principle for Water Survey". Some part of the booklet is still useful to guide observers in executing maintenance work at hydrological stations as attached in Appendix- 5.

#### 3.1.2 Work By The Project/MOWRAM

The office of the Project/MOWRAM has to conduct the following works.

#### (1) Daily Work

- i) To acquire the received data in MSEXCEL format and process it as described in Chapter II every day, and to check if the data observed is reasonable or not;
- ii) To process data in data sheets as described in the previous chapter;
- iii) To check if acquired data shows unusual situation, to take necessary action to improve or repair the automatic gauges, if there is trouble;

#### (2) Regular and Irregular Work

- i) To dispatch staff regularly to collect data sheets filled by observers and to check the condition of stations;
- To do necessary action to improve or repair the instruments and surrounding conditions of stations, including checking if the tipping bucket and reed switch function well; this work should be executed before a start of rainy season;

iii) To check and clean rainfall gauge, staff gauges and recorder's house, to cut grass and trees, if any, before start of rainy season as shown below;



## Figure 2-10 Cleaning the Station and Checking Rainfall Recorder before Rainy Season by the Project/MOWRAM

iv) To conduct discharge measurement and other work such as cleaning water level sensor, removing sediment/debris/garbage from the sensor well, and so on;

Discharge measurements should be carried out at various water levels so that various discharge data can be obtained. The number of discharge measurements at automatic stations is tentatively proposed as follows. However, it does not limit the number of measurements.

One time at least in a month in five stations i.e. Andaek Herb, Bassac Dam Spillway, Prek Am, Tades and Bak Trakoun.

#### 3.2 Manual Water Level Stations

#### 3.2.1 Work by Observers

The daily work to operate and maintain a manual station such as reading staff gauge and, cleaning gauges, and so on requires someone who stays near the station and has an easy access to the station. The Project contracts an observer at each station to entrust the following works. A few observers cover more than two stations if stations are located closely.

- i) To read and record water level at staff gauge at 7:00 and 19:00 every day;
- ii) To keep the data sheets of water level in the safety place;
- iii) To present and submit data sheets to the Project/MOWRAM every month or at the time as requested by THE PROJECT/MOWRAM,
- iv) To keep the staff gauge in secure and clean condition all the time, to remove any debris stuck on the staff gauge, to clean stains on the staff gauge, if any,

- v) To keep the station(s) as a whole in secure and clean condition,
- vi) To inform promptly to the Project/MOWRAM, if any work appears to exceed his ability,
- vii) To participate in executing discharge measurement and other work by the Project/MOWRAM.

#### 3.2.2 Work by the Project/MOWRAM

The office of the Project/MOWRAM has to conduct the following works regularly or occasionally.

- To dispatch staff regularly to collect data sheets filled by observers and to check the condition of stations;
- To do necessary action to improve or repair the staff gauges surrounding conditions of stations;



Remove objects/debris from staff gauge Figure 2-11 Cleaning Staff Gauges by an Observer



iii) To conduct discharge measurement and other

works such as cleaning, repair, replace staff gauges, and so on.

The number of discharge measurements at manual station is tentatively proposed as follows. However, it does not limit the number of measurements as discussed in the previous section.

One time at least in a month in three stations i.e. Santre, Peam and Khum Veal;

Three times at least in a year in six stations i.e. Prek Chik Left Canal, Prek Chik Right Canal, Preka Am Canal, Charek Left Canal, Ptes Kor Canal and Svay Daun Keo (downstream several ten meters from overflow spillway in the Svay Daun Keo River).

#### **3.3 Rain Recorder Stations**

#### 3.3.1 Work by Observers

- i) To check rainfall gauge, solar panel and data logger, and to remove any objects/debris on these instruments;
- ii) To check if cables which run from rain gauge, solar panel, lightning to the recorder's house are in secure condition;
- iii) To cut branch(s) of tree if it covers or makes shadow the rainfall gauge or solar panel;

- iv) To keep the station(s) as a whole in secure and clean condition;
- v) To inform promptly to the Project/MOWRAM, if any work appears to exceed his ability;

(The followings are to be applied to the station which has a manual rain gauge e.g. Samlot);

- vi) To measure and record manual rain gauge, if any, at 7:00 and 19:00 every day;
- vii) To keep the data sheets of manual rainfall gauge in the safety place;
- viii) To present and submit data sheets to the Project/MOWRAM every month or at the time as requested by the Project/MOWRAM.



Figure 2-13 Some Principal Works by an Observer at Rain Recorder Stations

#### 3.3.2 Work by the Project/MOWRAM

#### (1) Daily Work

- i) To acquire the received data in MSEXCEL format and process it as described in Chapter II every day, and to check if the data observed is reasonable or not;
- ii) To process data in data sheets as described in the previous chapter;
- iii) To check if acquired data shows unusual situation, to take necessary action to improve or repair the automatic gauges, if there is trouble;

#### (2) Regular or Irregular Work

- i) To dispatch staff regularly to collect data sheets filled by observers and to check the condition of stations;
- ii) To do necessary action to improve or repair the instruments and surrounding conditions of stations.



# FORMS

# Royal Kingdom of Cambodia ព្រះរាជាណាចក្រកម្ពុជា

Nation Religion King ជាតិ សាសនា ព្រះមហាក្សត្រ

Ministry of Water Resources and Meteorology Japan International Cooperation Agency River Basin Watre Resources Utilization Project

ក្រសួងធនធានទឹក និងឧតុនិយម

កម្រោងការប្រើប្រាស់ធនធានទឹក នៅតាមអាងស្ទឹង

# Rainfall Book សៀវភៅកត់ត្រាបរិមាណទឹកភ្លៀង

#### **Royal Kingdom of Cambodia**

FORM-11

ព្រះរាជាណាចក្រកម្ពុជា

Ministry of Water Resources and Meteorology

ក្រសួងជនជានទឹក និងឧតុនិយម

#### **Nation Religion King**

ជាតិ សាសនា ព្រះមហាក្សត្រ

Japan International Cooperation Agency River Basin Watre Resources Utilization Project (RBWRU) គម្រោងការប្រើប្រាស់ធនធានទឹកនៅតាមអាងស្ទីង

		បរិ	Rainfall មាណទឹកភ្លៀង	កម្រោងការច្រេ	ប៊ីប្រាស់ជនជានទី	វិកនៅតាមអាងស្ទឹង	
Station: ស្ថានីយ				North: ខ្សែស្របខាងជើង៖	Ea ĭe	ist: រ្យស្របខាងកើត៖	Elevation in meter: ಗೆಗನುಃ
Capital City of រាជធានី-ខេត្ត	Province:			Month: ខែ	Year: ឆ្នាំ	Type of Se ប្រភេទនៃវ	eason: ស្យាមាក្រ
Observer/날帘	ពិនិក្យ:						
Date ថ្លៃទី	Measu បរិមាណទីរ	rement កក្លៀងវាស់	Total (24hr) បូករួម	Descriptions (1) សេចក្តីកត់ហេតុទេ	(Started and Stopp ជ្បូងៗនៃបាតុភូត	ed Rainfall) ដែលមាន(១)	
Ū.	Time: 07-19	Time: 19-07	(២៤ម៉ោង)	(ម៉ោងចារ	រ់ផ្តើម និងម៉ោង	រញ្ចប់)	
1							
2							
3							
4							
5							
6							
7							
8							
9							
Sub-total ປຕາປ							Number of Rainfall Days ចំនន៤ម៉ែលក្រៀង
			4————				$(2) (\mathbf{R}) \leq 1.0$
12							$(2)(R) \le 1.011111$
12							( R ) ≤ 30.0mm
14							$(R) \ge 50.0 \text{mm}$
15							Total/បូករួម៖
16							
17							<u>Note/ന്ណന്ന്ന്</u> ന്
18							(1) Type of Rainfall Thunder, etc.
19							(១)  ប្រភេទនៃភ្លៀង ផ្គរ
20							រន្ទ:
Sub-total បូករួម							
21	{ <b></b> -		tł				
22							(2) Grade of rainfall
23							(២) បរិមាណទឹកភ្លៀង
24							
25							
20							
28							
29							
30							
31							
Sub-total បូករួម							
Total/Month បូករួមក្នុង១ខែ							

Seen and aproved ជានឃើញ និងឯកភាព

Meteorology Chief Office: ប្រធានការិយាល័យ ឧកុនិយម Date: Month: ថ្ងៃទី ខែ Year: ឆ្នាំ២០

Royal Kingdom o	of Cambodia
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ព្រះរាជាណាចក្រកម្ពុជា

# Nation Religion King

ជាតិ សាសនា ព្រះមហាក្សត្រ

Ministry of ក្រាត្	Water Reso រុងធនធានទី	urces and Me កៃ និងឧតុនិ៖	eteorology ਘਾਰ	FORM-11b Rainfall	Riv	Japan Internation ver Basin Watre Re (R	al Cooperation Agency sources Utilization Project BWRU)
			ហរី	ហេលទឹកកៅង	~~	···· ~ ) · ~ · ···· ···················	~~~~ <sup>′</sup> <sup>°</sup> <sup>°</sup>
Station: ស្ថានីយ			<u></u>	North: ខ្សែស្របខាងជើង៖		East: ខ្សែស្របខាងកើត៖	Elevation in meter: កំពស់៖
Capital City c រាជជានី-ខេត្ត	f Province:			Month: ខែ	Year: ឆ្នាំ	Type of S ប្រភេទនៃ	eason: វស្សាមាក្រ
Observer: អ្នកពិនិត្យ							
Date ៥ៃទី	Measu បរិមាណទីរ	rement កក្ដៀងវាស់	Total (24hr) បករម	Descriptions (1) ( សេចក្តីកត់ហេតុលេ	Started and S រដេៗនៃបាត	topped Rainfall) ភ្លេកដែលមាន(១)	
2	Time: 07-19	Time: 19-07	ូ ។ (២៤ម៉ោង)	, (ජෝසපාප්	ំ ផ្ទើម និងម៉េ	ាងបញ្ចប់)	
1			0.0		61	<i>3</i> ,	
2			0.0				
3			0.0				
4			0.0				
5			0.0				
6			0.0				
7			0.0				
8			0.0				
9			0.0				
10			0.0				
Sub-total បូករួម	0.0	0.0	0.0				Number of Rainfall Days ចំនួនថ្ងៃដែលភ្លៀង
11			0.0				(2) ( R ) ≤ 1.0mm
12			0.0				( R ) ≤ 10.0mm
13			0.0				( R ) ≤ 30.0mm
14			0.0				<u>(R)≥50.0mm</u>
15			0.0				Total/បូករួម៖
16			0.0				
17			0.0				
18			0.0				(1) Type of Rainfall Thunder,etc.
19			0.0				(ວ) [ບະເຜສາແລນ າ011
Sub-total			0.0				
បូករួម	0.0	0.0	0.0				
21			0.0				
22			0.0				(2) Grade of rainfall
23			0.0				
24			0.0				
25			0.0				
27			0.0				
28			0.0				
29			0.0				
30			0.0				
31			0.0				
Sub-total បូករួម	0.0	0.0	0.0				
Total/Month ບູກ <sub>ູ</sub> ນຍຽງ ເຂ	0.0	0.0	0.0				
Seen and a បានឃើញ និ	proved ងឯកភាព		2		Date: ਟ੍ਰਿਓ	Month: ເຮ	- Year: ឆ្នាំ២០

Meteorology Chief Office: ប្រធានការិយាល័យ ឧកុនិយម

Chief of Rainfall Collector: ប្រធានប៉ុស្តិ៍

Date	ID		Site	Signal	Value		
2015/8/14	7:1	15:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	7:3	30:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	7:4	45:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:0	00:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:1	15:01	AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:3	30:01	AM	09_Bak I rakoun	09_Bak I rakoun	RainFall	0
2015/8/14	8:4	15:01	AM	09_BakTrakoun	09_Bak I rakoun	RainFall	0
2015/8/14	9:0		AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	9:1	10:01		09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	9:0	15.01		09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/0/14	9:4	+0:01		09_DakTrakoun	09_DakTrakoun	RainFall	0
2015/8/14	10.0	15.01		09_DakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	10.1	20.01		09_DakTrakoun	09_DakTrakoun 09 BakTrakoun	RainFall	0
2015/8/14	10.0	15·01		09 BakTrakoun	09_DakTrakoun 09 BakTrakoun	RainFall	0
2015/8/14	10	0.01	AM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	11.1	15.01	AM	09 BakTrakoun	09 BakTrakoun	RainFall	Ő
2015/8/14	11:3	30:01	AM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	11:4	15:01	AM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	12:0	00:01	PM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	12:1	15:01	PM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	12:3	30:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	12:4	15:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	1:0	00:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	1:1	15:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	1:3	30:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	1:4	15:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	2:0	00:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	2:1	15:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	2:3	30:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	2:4	45:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	3:0	00:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	3:1	15:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	3:3	30:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	3:4	45:01	PM	09_Bak I rakoun	09_Bak I rakoun	RainFall	4.5/2
2015/8/14	4:0	00:01	РМ	09_Bak I rakoun	09_Bak I rakoun	RainFall	1.524
2015/8/14	4:	15:01	PM	09_Bak I rakoun	09_BakTrakoun	RainFall	0
2015/8/14	4:0	30:01		09_Bak I rakoun	09_BakTrakoun	RainFall Dain Fall	1 0 1 6
2015/8/14	4:4 5.0	+0:01		09_BakTrakoun	09_BakTrakoun	RainFall	10.414
2015/0/14	5.1	15.01		09_Dak Trakouri		RainFall	10.414
2015/8/14	5.0	20.01		09_DakTrakoun	09_DakTrakoun	RainFall DoinFoll	0 509
2015/8/14	5.4	15·01		09_DakTrakoun	09_DakTrakoun 09 BakTrakoun	RainFall	0.008
2015/8/14	 6.(	0.01	PM	09 BakTrakoun	09_DakTrakoun 09 BakTrakoun	RainFall	0 254
2015/8/14	6.1	15.01	PM	09 BakTrakoun	09 BakTrakoun	RainFall	0.201
2015/8/14	6:3	30:01	PM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	6:4	15:01	PM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	7:0	00:01	PM	09 BakTrakoun	09 BakTrakoun	RainFall	0
2015/8/14	7:1	15:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	7:3	30:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	7:4	45:01	РМ	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:0	00:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:1	15:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:3	30:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	8:4	45:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	9:0	00:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	<b>9</b> :1	15:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	9:3	30:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	9:4	45:01	PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/14	10:0	JU:01	РМ	U9_Bak I rakoun	U9_Bak I rakoun	RainFall	0
2015/8/14	10:1	15:01	РМ	U9_Bak I rakoun	U9_Bak I rakoun	RainFall	0
2015/8/14	10:3	30:01	PM	U9_Bak I rakoun	U9_Bak I rakoun	RainFall	U
2015/8/14	10:4		PM	U9_Bak I rakoun	U9_Bak I rakoun	RainFall	0
2015/8/14	11:0	JU:UI	ЧM	บษ_Bak I rakoun	оу_вак I rakoun	RainFall	U

2015/8/14	11:45:01 PM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	12:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	12:15:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	12:30:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	12:45:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	1:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	1:15:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	1:30:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	1:45:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	2:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	2:15:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	2:30:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	2:45:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	3:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	3:15:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	3:30:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	3:45:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	4:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	4:15:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	4:30:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	4:45:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	5:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	5:15:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	5:30:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	5:45:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	6:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	6:15:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	6:30:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	6:45:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
2015/8/15	7:00:01 AM	09_BakTrakoun	09_BakTrakoun	RainFall	0
			Total/One day i	rainfall (mm)	20.828
		M	aximum 15-minute r	ainfall (mm)	10.414

# Observation of Rainfall FORM-15 Daily Rainfall Record

River:				Station:						E:		
Year:				District:						N:		
Input by:			F	rovince:					AI	t.(amsl):		
											(L	Init: mm)
Day	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1												
2												
3												
4												
5												
6												
7												
8												
9				-						-		
10												
11												
12												
13								20.02				
14								20.03				
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.83	0.00	0.00	0.00	0.00
Max.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.83	0.00	0.00	0.00	0.00
Rainy days R>=0.5mm	0	0	0	0	0	0	0	1	0	0	0	0
Annual ra	infall:	20.8	mm	Annual m	nax. dailv	rainfall:	20.83	mm	Total rain	ny davs (R	l>=0.5mn	1

<b>Royal Kingdom ព្រះរាជាណាវ</b> Nation Reli ជាតិ សាសនា ត្រ	<b>of Cambodia ទក្រកម្ពុជា</b> gion King ពុះមហាក្សត្រ
Ministry of Water Resources and Meteorology ក្រសួងធនធានទីក និងឧតុនិយម	Japan International Cooperation Agency River Basin Watre Resources Utilization Project គម្រោងការប្រើប្រាស់ជនជានទីក នៅតាមអាងស្ទីង
HYDROLOGICAL OBSERVATIO	ON BOOK - GAUGE HEIGHT IN ERS

សៀវភៅសង្កេតពិនិត្យជលសាស្ត្រ ~ កំពស់ទឹកជាម៉ែត្រ

### **Royal Kingdom of Cambodia**

ព្រះរាជាណាចក្រកម្ពុជា

Ministry of Water Resources and

Meteorology

ក្រសួងធនធានទឹក និងឧតុនិយម

# **Nation Religion King**

ជាតិ សាសនា ព្រះមហាក្សត្រ

Japan International Cooperation Agency River Basin Watre Resources Utilization Project គម្រោងការប្រប្រាស់ធនធានទីកនៅតាមអាងស្ទីង

# HYDROLOGICAL OBSERVATION BOOK - GAUGE HEIGHT IN METERS (FORM-21)

សៀវភៅសង្កេតពិនិត្យជលសាស្ត្រ ~ កំពស់ទឹកជាម៉ែត្រ

	Month:		Year:						•
	ខែ		ភ្នាំ						
	River:		Station:				Zero G.H.:	- 1 1	M.S.L.
ទ	ន្ល~ស្ទុង		ស្ថានយ	. <u></u>			រយៈកំពស់នេសុ	ន្យក្តារម៉ែត្រ	ជៀបនឹងនីរ៉ូសមុទ្រ -
Date	Time	H. (m)	H. average (m)	Phenomena	Date	Time	H. (m)	H. average (m)	Phenomena
ថ្ងៃទី	ម៉ោង	កំពស់ទីក ជាម៉ែត្រ	មធ្យមប្រចាំ ថៃ	បាតុភូតផ្សេងៗ	ថ្ងៃទី	ម៉ោង	កំពស់ទីក ជាម៉ែត្រ	មធ្យមប្រចាំ ថៃ	បាតុភូតផ្សេងៗ
1	07:00	· · · · · · · · · · · · · · · · · · ·			17	07:00			
	19:00	[,				19:00	<b> </b> -7		[
2	07:00	· · · ·			18	07:00			
<b> </b>	19:00	/,				19:00			
3	07:00				19	07:00			†
!	19:00	[,				19:00	t		
4	07:00	i			20	07:00			<u> </u>
!	19:00	[,				19:00	tt		
5	07:00	ł +		ł	21	07:00			+
!	19:00	<b>!</b>		·		19:00	<u>+</u> +		
6	07:00			ł	22	07:00			+
	19:00	<b>/</b>				19:00	<u>+</u> +		
7	07:00	ł – – •		ł	23	07:00			łi
	19:00	<b>!</b>				19:00	<u> </u>		
8	07:00	ł +		ł	24	07:00			+
	19:00	<b>/</b>				19:00	<u> </u>		
9	07:00	<b>!</b>		<u> </u>	25	07:00			
	19:00	<b>/</b>	1			19:00	<u>+</u> +		
10	07:00	<b>!</b>		+	26	07:00			+
	19:00	/	1			19:00	<u> </u>		<b> </b>
11	07:00	<b>!</b>			27	07:00			+
	19:00	<i> </i>				19:00	<u> </u>		
12	07:00	<b>!</b>			28	07:00			+
	19:00	/	1			19:00	<u>+</u> +		<b> </b>
13	07:00	<b>!</b>		<b> </b>	29	07:00			<del> </del>
	19:00	<b>!</b>				19:00			
14	07:00	<u>├</u> ───┦		<u> </u>	30	07:00		<u> </u>	+
	19:00	<u>├</u> ───┦			<u> </u>	19:00			
15	07.00	<b>├</b> ────┦		i	31	07.00			+
10	10.00	<u> </u>	•	<sup>/</sup>		19.00	<u> </u>		
16	07.00	<b>├</b> ─────′		'	<b> </b> '	07.00			+
10	10.00	<u> </u>		<sup>!</sup>		10.00			
'	19:00	1 '				19:00			

#### Royal Kingdom of Cambodia

#### Nation Religion King ជាតិ សាសនា ព្រះមហាក្សក្រ

ព្រះរាជាណាចក្រកម្ពុជា Ministry of Water Resources and Meteorology ក្រសួងជនជានទឹក និងឧកុនិយម

Japan International Cooperation Agency River Basin Watre Resources Utilization Project

កម្រោងការប្រប្រាស់ជនជានទឹកនៅតាមអាងស្ទីង

HYDROLOGICAL OBSERVATION BOOK - GAUGE HEIGHT IN FORM-21b

សៀវភៅសង្កេកពិនិក្យដលសាស្ត្រ ~ កំពស់ទឹកដាម៉ែត្រ

	Month:		Year:											
	ខែ		្នុះ		_									
	River:		Station:				Zero G.H.:		M.S.L.					
ទ	ន្ល~ស្ទីង		ស្ថានីយ៍			_	រយៈកំពស់នៃសុ	ន្យក្តារម៉ែត្រ	ដៀបនឹងនីរ៉ូសមុទ្រ	Graph of	records	Calculat	ion daily m	ean WL
Date	Time	H. (m)	H. average (m)	Phenomena	Date	Time	H. (m)	H. average (m)	Phenomena			,	r	ı
ថ្ងៃទី	ម៉ោង	កំពស់ទឹក ជាម៉ែត្រ	មធ្យម ប្រភាំថៃ	បាតុភូតផ្សេ ងៗ	ថ្ងៃទី	ម៉ោង	កំពស់ទីក ជាម៉ែត្រ	មធ្យម ប្រភាំថៃ	បាតុភូតផ្សេងៗ	Date	WL	No.	Date	н
1	07:00	1.25	/		17	07:00	1.87			1	1.25	1	2015/8/1	1.255
	19:00	1.26				19:00	1.86		$\sim$		1.26	2	2015/8/2	1.290
2	07:00	1.29			18	07:00	1.85			2	1.29	3	2015/8/3	1.415
	19:00	1.29				19:00	1.84				1.29	4	2015/8/4	1.490
3	07:00	1.35	/		19	07:00	1.83	/		3	1.35	5	2015/8/5	1.525
	19:00	1.48				19:00	1.83				1.48	6	2015/8/6	1.635
4	07:00	1.46			20	07:00	1.82			4	1.46	7	2015/8/7	1.770
	19:00	1.52				19:00	1.8				1.52	8	2015/8/8	1.830
5	07:00	1.52			21	07:00	1.8			5	1.52	9	2015/8/9	1.965
	19:00	1.53				19:00	1.79				1.53	10	2015/8/10	2.015
6	07:00	1.56			22	07:00	0.78			6	1.56	11	2015/8/11	1.995
	19:00	1.71				19:00	1.76				1.71	12	2015/8/12	1.975
7	07:00	1.75			23	07:00	1.75			7	1.75	13	2015/8/13	1.955
	19:00	1.79		$\sim$		19:00	1.73				1.79	14	2015/8/14	1.925
8	07:00	1.81			24	07:00	1.72			8	1.81	15	2015/8/15	1.905
	19:00	1.85				19:00	1.71				1.85	16	2015/8/16	1.885
9	07:00	1.92			25	07:00	1			9	1.92	17	2015/8/17	1.865
	19:00	2.01				19:00	1.7				2.01	18	2015/8/18	1.845
10	07:00	2.02	/		26	07:00	1.69	/		10	2.02	19	2015/8/19	1.830
	19:00	2.01				19:00	1.68				2.01	20	2015/8/20	1.810
11	07:00	2	/		27	07:00	1.67			11	2.00	21	2015/8/21	1.795
	19:00	1.99				19:00	1.66				1.99	22	2015/8/22	1.270
12	07:00	1.98			28	07:00	1.65			12	1.98	23	2015/8/23	1.740
	19:00	1.97				19:00	1.64				1.97	24	2015/8/24	1.715
13	07:00	1.96			29	07:00	1.63			13	1.96	25	2015/8/25	1.350
	19:00	1.95				19:00	1.63				1.95	26	2015/8/26	1.685
14	07:00	1.93			30	07:00	1.62			14	1.93	27	2015/8/27	1.665
	19:00	1.92				19:00	1.62				1.92	28	2015/8/28	1.645
15	07:00	1.91	$\backslash$		31	07:00	1.61			15	1.91	29	2015/8/29	1.630
	19:00	1.9				19:00	1.61				1.90	30	2015/8/30	1.620
16	07:00	1.89				07:00		$\backslash$		16	1.89	31	2015/8/31	1.610
	19:00	1.88		$\sim$		19:00					1.88	Average		1.707
Obser	ver:				Check	ked by:				17	1.87	Max.		2.015
អ្នកពិន័	ອີສງ				បាន៧	រីញ					1.86	Min.		1.255





	1.86
18	1.85
	1.84
19	1.83
	1.83
20	1.82
	1.80
21	1.80
	1.79
22	0.78
	1.76
23	1.75
	1.73
24	1.72
	1.71
25	1.00
	1.70
26	1.69
	1.68
27	1.67
	1.66
28	1.65
	1.64
29	1.63
	1.63
30	1.62
	1.62
31	1.61
	1.61

Date	ID	Site	Signal	Value		
2015/8/10	7:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.004
2015/8/10	7:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.03291
2015/8/10	7:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.05603
2015/8/10	8:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.08493
2015/8/10	8:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.11961
2015/8/10	8:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.14852
2015/8/10	8:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.1832
2015/8/10	9:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.21788
2015/8/10	9:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.25256
2015/8/10	9:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.29303
2015/8/10	9:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.32771
2015/8/10	10:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.36239
2015/8/10	10:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.39708
2015/8/10	10:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.43176
2015/8/10	10:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.46644
2015/8/10	11:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.49534
2015/8/10	11:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.53003
2015/8/10	11:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.55893
2015/8/10	11:45:01	AM	09_Bak I rakoun	09_Bak I rakoun	WaterLevel	1.58/83
2015/8/10	12:00:01	РМ	09_Bak I rakoun	09_Bak I rakoun	WaterLevel	1.61095
2015/8/10	12:15:01	РМ	09_Bak I rakoun	09_Bak I rakoun	WaterLevel	1.63986
2015/8/10	12:30:01	РМ	09_Bak I rakoun	09_Bak I rakoun	WaterLevel	1.66298
2015/8/10	12:45:01	РМ	09_Bak I rakoun	09_Bak I rakoun	WaterLevel	1.6861
2015/8/10	1:00:01	PM	09_Bak I rakoun	09_Bak I rakoun	WaterLevel	1./15
2015/8/10	1:15:01	РМ	09_BakTrakoun	09_Bak I rakoun	WaterLevel	1./3812
2015/8/10	1:30:01	PM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.74968
2015/8/10	1:45:01	PM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.7/281
2015/8/10	2:00:01	PM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.79015
2015/8/10	2:15:01		09_BakTrakoun	09_BakTrakoun	WaterLevel	1.80749
2015/8/10	2:30:01		09_BakTrakoun	09_BakTrakoun	WaterLevel	1.01900
2015/0/10	2:40:01		09_DakTrakoun	09_DakTrakoun	WaterLevel	1.03039
2015/8/10	3.00.01		09_DakTrakoun	09_DakTrakoun	WaterLevel	1.04795
2015/0/10	2.20.01		09_DakTrakoun	09_DakTrakoun	WaterLevel	1.03931
2015/8/10	3.30.01		09_DakTrakoun	09_DakTrakoun	WaterLevel	1.07107
2015/8/10	3.43.01 1.00.01	DM	09_DakTrakoun	09_DakTrakoun	WaterLevel	1 80/2
2015/8/10	4.00.01	DM	09_DakTrakoun	09_DakTrakoun	WaterLevel	1 80008
2015/8/10	4.10.01	DM	09_DakTrakoun 09 BakTrakoun	09_DakTrakoun 09 BakTrakoun	WaterLevel	1 90576
2015/8/10	4:45:01	PM	09 BakTrakoun	09_BakTrakoun	Water Level	1 91732
2015/8/10	5.00.01	PM	09 BakTrakoun	09_BakTrakoun	WaterLevel	1 91732
2015/8/10	5.15.01	PM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 9231
2015/8/10	5:30:01	PM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 9231
2015/8/10	5:45:01	PM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.9231
2015/8/10	6:00:01	PM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.9231
2015/8/10	6:15:01	PM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.9231
2015/8/10	6:30:01	PM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.91732
2015/8/10	6:45:01	PM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.91732
2015/8/10	7:00:01	РМ	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.91732
2015/8/10	7:15:01	PM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.91154
2015/8/10	7:30:01	РМ	09 <sup>-</sup> BakTrakoun	09 BakTrakoun	WaterLevel	1.90576
2015/8/10	7:45:01	РМ	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.89998
2015/8/10	8:00:01	РМ	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.89998
2015/8/10	8:15:01	РМ	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.88842
2015/8/10	8:30:01	РМ	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.88264
2015/8/10	8:45:01	РМ	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.87685
2015/8/10	9:00:01	РМ	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.86529
2015/8/10	9:15:01	PM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.86529

						Maximum Minimmum	1.923
				-	<b>-</b>	Average	1.660
20	1 <u>5/8</u> /11	<u>7</u> :00:01	AM		09_BakTrakoun	WaterLevel	1.46644
20	15/8/11	6:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.478
20	15/8/11	6:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.48956
20	15/8/11	6:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.48956
20	15/8/11	6:00:01	AM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.50112
20	15/8/11	5:45:01	AM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.51268
20	15/8/11	5:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.52425
20	15/8/11	5:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.53003
20	15/8/11	5:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.54159
20	15/8/11	4:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.55315
20	15/8/11	4:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.55893
20	15/8/11	4:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.57049
20	15/8/11	4:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.57627
20	15/8/11	3:45:01	AM		09_BakTrakoun	WaterLevel	1.59361
20	15/8/11	3:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.60517
20	15/8/11	3:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.61095
20	15/8/11	3:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.62251
20	15/8/11	2:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.63408
20	15/8/11	2:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.64564
20	15/8/11	2:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.6572
20	15/8/11	2:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.66876
20	15/8/11	1:45:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.68032
20	15/8/11	1:30:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.6861
20	15/8/11	1:15:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.69766
20	15/8/11	1:00:01	AM	09_BakTrakoun	09_BakTrakoun	WaterLevel	1.70922
20	15/8/11	12:45:01	AM	09 BakTrakoun	09 <sup>–</sup> BakTrakoun	WaterLevel	1.72078
20	15/8/11	12:30:01	AM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1,73234
20	15/8/11	12:15:01	AM	09 BakTrakoun	09 BakTrakoun	WaterLevel	1.7439
20	15/8/11	12.00.01	AM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 76124
20	15/8/10	11.45.01	PM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 76702
20	15/8/10	11:30:01	PM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 77281
20	15/8/10	11.15.01	PM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 78437
20	15/8/10	11.00.01	PM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 79593
20	15/8/10	10:45:01	PM	09 BakTrakoun	09 BakTrakoun	Water Level	1 80749
20	15/8/10	10:30:01	PM	09 BakTrakoun	09 BakTrakoun	Water Level	1 81327
20	15/8/10	10:00:01	DM	09 BakTrakoun	09 BakTrakoun	Water Level	1 82/183
20	15/8/10	9.45.01 10:00:01		09_Dak Trakoun 09 BakTrakoun	09_BakTrakoun	WaterLevel	1.04217
20	15/8/10	9.30.01		09_DakTrakoun	09_DakTrakoun	WaterLevel	1.05575
20	15/8/10	9.30.01	РM	09 BakTrakoun	09 BakTrakoun	Waterl evel	1 85373

# Observation of Rainfall FORM-25 Daily Mean Water Levels

River:		_		Station:	_	_				E:		
Year:				District:						N:		
Input by:	ut by:			rovince:			Alt.(amsl):					
												(Unit: m)
Day	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1												
2												
3												
4												
5												
6												
7												
8												
9												
10								1.66				
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
Average	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.66	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Max.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66	0.00	0.00	0.00	0.00
Min.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Annual	mean:	1.7	Mar	Annual m	ax.:	1.66	m		Annual m	in.:	0.00	m